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Manufacturing

- Assembly Items
- Assembly Work Orders
- Advanced Bill of Materials
- Bill of Materials Member Control for Assembly Items
- Manufacturing Work In Process (WIP)
- Manufacturing Routing
- Manufacturing SuiteAnalytics Workbook
- Advanced Manufacturing
- Engineering Change Order
Manufacturing Overview

Manufacturing processes help organizations to create finished goods from raw or semi-finished materials using some combination of labour and machinery. Finished goods are then sold, at a profit, to other manufacturers, wholesalers, or retailers who then sell them to consumers.

NetSuite integrates your Manufacturing workflow beginning from the sales order and process planning to building goods, tracking work orders, and finally releasing finished goods for shipping.

For information about how to work with NetSuite Manufacturing, see the following help topics:

- **Assembly Item Records:**
  Define the members of an assembly and then track both the raw materials and the assembled items separately.

- **Assembly Work Orders:**
  Track the production of assembly items needed for stock or to fill orders.

- **Advanced Bill of Materials:**
  List the quantities of raw materials, assemblies, sub-components, and parts needed to manufacture a product at one or multiple facilities.
  The Advanced BOM record is available as of NetSuite 17.2. After your administrator enables the Advanced Bill of Materials feature, the Advanced BOM replaces the Assembly/Bill of Materials record.

- **Bill of Materials Member Control for Assembly Items:**
  Ensure that the right components are included in assembly builds at the right time. Use BOM controls to plan to use and purchase components which are effective or obsolete within specified times.

- **Manufacturing Work In Process (WIP):**
  Track work orders through the production process, from gathering materials, through shop floor assembly, to stocking finished goods.

- **Manufacturing Routing and Work Center:**
  Schedule and record manufacturing operational activities against a complex work order that requires multiple teams of employees, or work centers.

- **Manufacturing SuiteAnalytics Workbook**
  NetSuite has created a Manufacturing Transaction [Beta] data source that introduces the new analytics transactions concept for manufacturing specific transactions.

- **Advanced Manufacturing SuiteApp:**
  Extend your NetSuite manufacturing routing into the Advanced Manufacturing Work Bench.
  This connection enables manufacturers to define work instructions, associate material usage, compare resource supply with demand, and establish planned start and end times. To set up Advanced Manufacturing, you must have a NetSuite account with the Advanced Manufacturing SuiteApp installed.

- **Engineering Change Order:**
  Generate Engineering Change Order (ECO) records to document changes to your Bills of Materials (BOMs) and authorize the implementation of those changes.
Assembly Items

An assembly item is an inventory item made up of several components, but identified as a single item. Assemblies are manufactured by combining raw materials you stock.

**Note:** For details about distinctions between Groups, Kits, and Assemblies, see the help topic Groups, Assemblies, and Kit/Packages.

After you create assembly item records that define the members of an assembly, NetSuite enables you to track both the raw materials and the assembled items separately.

For example, Wolfe Manufacturing sells the LogLeaper mountain bike that they assemble in-house. The LogLeaper is assembled from the following inventory components:

- one aluminum bicycle frame
- one set of handlebars
- one saddle
- one gearing assembly
- two wheel assemblies
- two sets of brakes
- two pedals

NetSuite tracks the stock of the LogLeaper and each component item separately. This enables Wolfe to track the stock levels of LogLeaper mountain bikes in inventory and available to ship to customers, and the quantity of materials available to assemble more bicycles.

**To use assemblies:**

1. Turn on the Assembly Items feature.
   For more information, see Enabling Assembly Items.
2. To create assembly item records that define the assembly components, select the parts that make up the assembly.
   For more information, read Assembly Item Records.
   a. To create a new assembly item record, go to Lists > Accounting > Items > New
   b. On the New Item page, click Assembly/Bill of Materials.
   For more information, see the help topic Creating Item Records.
3. Record an assembly build:
   1. After creating an assembly item record, enter an assembly build to record assembly production.
      Physically manufacturing assemblies in a production run increases your stock of assembled items.
   2. To record inventory level changes, Transactions > Inventory > Build Assemblies to enter an assembly build for each production run.
      For more information, read Building Assembly Items.
   3. After creating your assembly item, build the assembly in NetSuite to replenish stock.
      To record an assembly build, go to Transactions > Inventory > Build Assemblies.
4. Because NetSuite tracks assembly item and member component records separately, the assembly
   and member item stock status are tracked individually.
   For each assembly build you record:
   - the assembly item stock level increases
   - the member items' individual stock levels decrease

After entering an assembly build, the assembly item is available on sales transactions and inventory
adjustment transactions.

**To make assembly items available on purchase transactions:**

1. Go to Setup > Accounting > Preferences > Accounting Preferences.
2. Click the **Order Management** subtab.
3. In the **Work Orders** section, check the **Allow the Purchase of Assembly Items** box.

For more information, see the **Items/Transactions Accounting Preferences** section of **Accounting Preferences**.

To **Unbuild Assemblies** to increase your stock of raw materials, go to Transactions > Inventory > Unbuild Assemblies.

For more information, read **Unbuilding Assembly Items**.

**Assemblies on Web Sites**

If you are offering this assembly in your web site using the **Store and Specials** subtabs, edit your
assembly item record to add the item to your web site.

For more information on selling items in your web site, read the help topic **Setting Up Items for the Web Site**.

**Assembly Work Orders**

The NetSuite Work Orders feature enables you to track the production of assembly items for stock or to
fill orders.

Work orders track the quantities of assemblies to be built and the required quantities of components, or
member items.

Use **Special Order Work Orders** for a particular sale. Use **Production Work Orders** to increase stock.

For more information, see **Assembly Work Orders**.

**Enabling Assembly Items**

Before you can create and use assembly items, an administrator must enable the Assembly Items and
Inventory features.

**To enable assembly items:**

1. Go to Setup > Company > Setup Tasks > Enable Features.
2. Click the **Items & Inventory** subtab.
3. Check the **Inventory** box.
4. Check the **Assembly Items** box.
5. Click **Save**.

**Assembly Item Records**

You can create an assembly item record to track each assembly and its component items. The assembly record details member items and the quantity of each member required for each assembly. To learn more, see Building Assembly Items.

**Available Member Items**

The following table displays the available member item types:

<table>
<thead>
<tr>
<th>Regular Inventory Assembly</th>
<th>Serial or Lot Numbered Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inventory</td>
<td>Inventory</td>
</tr>
<tr>
<td>Non-Inventory</td>
<td>Serialized Inventory</td>
</tr>
<tr>
<td>Other Charge</td>
<td>Lot Numbered Inventory</td>
</tr>
<tr>
<td>Service</td>
<td>Non-Inventory</td>
</tr>
<tr>
<td>Regular Assemblies</td>
<td>Other Charge</td>
</tr>
<tr>
<td></td>
<td>Service</td>
</tr>
<tr>
<td></td>
<td>Regular Assemblies</td>
</tr>
<tr>
<td></td>
<td>Serialized Assemblies</td>
</tr>
<tr>
<td></td>
<td>Lot Numbered Assemblies</td>
</tr>
</tbody>
</table>

**Assembly Items in Item Lists**

To make an inventory item available in your assembly build, but not sell the item on its own, do not choose an income account on the item record.

By not setting an income account on an inventory item's record, the item does not appear in the sales transactions items list. The item is sold as part of the finished goods assembly the item belongs to, which has its own income account.

If you do not set an expense account on a non-inventory item for resale, the item does not appear in the purchase transaction's item list.

**Assemblies and Serial/Lot Numbered Members**

Serialized and lot numbered items cannot be included as member items in a regular assembly item.

- A non-serialized assembly cannot include a serialized or lot numbered member item.
- A non-lot numbered assembly cannot include a serialized or lot numbered member item.

Serialized or lot numbered inventory items can be members of an assembly only if the assembly is serialized or lot numbered.

- A serialized assembly can include a serialized or lot numbered member item.
- A lot numbered assembly can include a serialized or lot numbered member item.
Matrix Assemblies

To use Matrix Assemblies, enable the following features:

- Enabling Assembly Items
- Matrix Items

After enabling both Assembly and Matrix Items, you can create assembly item records that contain matrix options to help improve assembly item planning and production tracking. Matrix options make it possible to use Bills of Materials (BOM) and Manufacturing Routings to build items with numerous product styles and variations.

During production, you can create matrix assemblies using work orders and assembly builds.

For example, Wolfe Manufacturing produces mountain bikes and sells them only on their web site, not through retailers.

1. A customer logs on to the Wolfe web store to order a bicycle.
2. While completing the sales order, the customer selects the size of the bike, its color, brakes, wheels, and other components.
   
   The matrix assembly record links the custom bike created and sold in the web store to the item in NetSuite.
3. NetSuite automatically converts the completed sale order into a work order.
   
   Each bike configuration must be associated with a BOM and routing which describes how to build the bike, the components needed, manufacturing costs, and subsequent selling price.
4. The bicycle matrix assembly record is linked with the item in NetSuite.
   
   This informs planners and production operators which components are required for the BOM and which manufacturing routing will be used to assemble it.
5. After the bike is assembled, the sales order can be fulfilled.
6. The bike is shipped to the customer.

Matrix assembly records enable you to manage a BOM at the parent matrix assembly level and then implement BOM changes to specific configurations when needed. BOM options can also be maintained on an individual item record basis.

- You can track demand for matrix assemblies and then make them available in the web store or build them using work orders or assembly builds.
For web store matrix assembly items, web store administrators can display only a parent matrix assembly item and make configuration options available in a list.

After matrix assembly sub-items are created, you may need to update the following matrix items:

- The BOM and its attributes such as the Cost Of Goods Sold (COGS) account or Unit of Measure.
- The parent assembly item and update some or all sub-items at one time.

To learn more, see the help topic Manufacturing Routing.

Creating Matrix Assembly Records

Use one of the following options to create a matrix assembly item record in the same way you create other matrix items:

**To create matrix assembly records:**

1. Select one of the following options:
   - **The Matrix Assistant:**
     1. Go to Lists > Accounting > Items > New.
     2. Click **Matrix Item Assistant**.
     To learn more, see the help topic **Matrix Item Assistant**.
   - **Automatically in NetSuite:**
     1. Manually create a parent matrix assembly item.
     2. Define options to create the new assembly item.
     3. Go to Lists > Accounting > Items > New.
     4. Click **Create Matrix Items**.
     To learn more, see the help topic **Creating a Matrix Item Manually**.

2. Click **Save**.

**Note:** After you create a matrix assembly, the Effective Date and Obsolete Date fields do not appear on the item record Component subtab.

To use BOM Control or set effective and obsolete dates, set them on the parent matrix assembly item record. Revision control must be set on the matrix assembly child item records. To learn more, see **Revision Control BOM Management**.

Updating Matrix Assembly Items

To learn how to update a matrix assembly item, see the help topic **Editing Matrix Items**.

While editing a matrix assembly item parent record, you can update child item BOMs.

**To update child item BOMs:**

1. Click **Update Matrix**.

   The **Update BOM of Matrix Sub-items** box is enabled:

   - Clear the box to not apply parent record changes to the child items. This box is clear by default.
   - Check the box to apply parent record changes to the child items. The child items will be updated with the parent item BOM.
Note: Previous BOMs are not updated with the changes entered.

2. Click Save.

Matrix Assemblies on Transactions

Work order and assembly build transactions permit you to select only child matrix assemblies. The parent matrix assemblies are not displayed in the list.

Phantom Assemblies

A phantom assembly is typically a non-stocked assembly that groups the components needed to produce a subassembly. For example, compare a phantom assembly to folders on a computer. The folder represents the phantom and individual files are the components. They are called phantoms because they are not counted as inventory items, but are created to fulfill the requirements of a higher-level assembly.

To learn more, see the Phantom Assemblies video.

Phantoms provide the following advantages:

- No need to create multiple work orders. The phantom assembly is added to the higher-level work order.
- They work as build-to-order instructions. Components do not have to be issued from stock beforehand.
- They simplify Bill of Materials (BOM) management. If a component is changed on the Phantom BOM, it is automatically reflected in all BOMs that use the phantom as a sub-assembly.
- You can use them as configuration options for manufactured products when it would not be cost effective to keep the assembly in stock.

For example, Wolfe Manufacturing can use a phantom wheel assembly to build the wheels as part of the build assembly and not keep certain wheel types in stock. In this example, the phantom could include the following:
Phantom Assemblies

After a wheel assembly is added to the work order and the components are issued, the system issues the components that make up that assembly and then adds them to the work order.

To learn more, see Marking Assemblies to Create Work Orders.

While phantom assemblies are typically used as components in a larger assembly build, they can also be used to create stock items. For example, as part of a warranty claim, a batch of replacement wheels could be manufactured using a phantom assembly.

Enabling Phantom Bill of Materials on Assembly and Work Orders

To enable the Phantom Bill of Materials feature, go to Setup > Company > Enable Features, and then check the following boxes:

- Assembly Items
- Work Orders

After they are enabled, phantom assembly options appear on the assembly and on work order records:

<table>
<thead>
<tr>
<th>Option</th>
<th>Visible on</th>
<th>Action Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phantom</td>
<td>Assembly/Bill of Materials record</td>
<td>Check this box to mark the Item Source for this item on any bill of materials as Phantom by default. This also applies to the item source value on any work order where the item is used.</td>
</tr>
<tr>
<td>Mark Sub-Assemblies</td>
<td>Assembly/Bill of Materials and Work Order records</td>
<td>Check this box to mark all sub-assemblies on the work order as Phantom. The sub-assemblies will be built as part of the higher-level work order rather than drawn from stock.</td>
</tr>
</tbody>
</table>
Phantom Assemblies

<table>
<thead>
<tr>
<th>Option</th>
<th>Visible on</th>
<th>Action Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing this box does not refresh the items in the Item subtab. It enables in-line editing of individual components.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearing the Mark Sub-Assemblies Phantom box does not refresh or remove sub-assembly components on the Items subtab since in-line editing of individual components is supported. To reload the BOM for a top level assembly, select a different assembly in the Assembly field. To reload a BOM for a phantom sub-assembly, change the item source for the sub-assembly back to Phantom.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Item Source</strong></td>
<td>Components subtab Assembly/Bill of Materials and Work Order records</td>
<td>Adds Phantom as an option on the Item Source list. Allows sub-assembly components to be treated as phantoms on one BOM, and regular stock items on another.</td>
</tr>
</tbody>
</table>

To create a phantom assembly:

1. Go to Lists > Accounting > Items > New
2. Select Assembly/Bill of Materials from the Item Type column.
3. Complete the fields.
   Required fields display a red asterisk (*).
   To learn more, see the help topic Creating Item Records.
4. On the Purchasing/Inventory tab Inventory Management section, check the Phantom box.
5. On the Components subtab, add the required components for the assembly and then update the Item Source field as required.
   To learn more, see The Item Source Field.
6. If the phantom assembly contains sub-assemblies, check the Mark Sub-Assemblies Phantom box to mark them as phantoms.
7. Click Save.

The Item Source Field

The Item Source column appears on Bill of Materials (BOM), BOM Revision Record, and Work Order transactions. It is used to specify the preferred method of supply for a particular item. Source options include: Stock, Phantom, Purchase Order, and Work Order. The Assembly and BOM Revision Record item source values are then used as work order and assembly build defaults. This is then reflected in the Assembly/Bill of Material and Work Order records.

On assembly builds, NetSuite uses the item source values (stock or phantom) from the assembly and BOM revision record, but the column field item source is not displayed. The system then expands the list of components on the assembly build when the list of components contains a sub-assembly with a phantom item source. These default values can be overridden on either the BOM record or the work order record.

The following example illustrates how default item source values are determined:
The **Frame** is an inventory item. When the Special Order Item box is unchecked, the Item Source is marked as Stock.

The **Wheel** assembly item is marked Phantom. Because the mark Sub-Assemblies Phantom box was not checked, the wheel assembly work order is marked Phantom, but its sub components are taken from stock. If the Special-Order Item box is checked, the item source is marked Work Order.

The **Handle bar** is normally an inventory item. When the Special Order Item box is checked, the Item Source is marked Purchase Order.

### Item Source set to Phantom

When the Item Source field is set to Phantom, the sub-assembly components appear indented under the Phantom on the Bill of Materials. This cannot be edited.

In the following example, Assembly Build for 0810 AssyB has two components: component 0810 AssyA is an assembly and the 0810 AssyB BOM has Item Source set to Phantom which is why we see the text indented.

### Inventory Detail Field

When the Item Source field is set to Phantom, the component sub-assembly is built as a part of the higher-level assembly.
For example, Wolfe Manufacturing sells road bikes in multiple configurations and have created a BOM for each configuration. The company does not stock carbon-fiber wheels, but has the wheel components in inventory and only assembles them when ordered. The carbon-fiber wheel is a sub-assembly of the road bike assembly and the Road Bike BOM. The item source for the carbon-fiber wheel is phantom.

Assembly and Inventory Items can be assigned a serial or lot numbered when you produce or receive them. After the item is consumed, in the Work Order Item subtab Inventory Detail field, select the serial or lot number being used.

Phantoms with Manufacturing Routing and Demand Planning

When using manufacturing routing, define the routing steps associated with the sub-assembly build on the manufacturing routing of the higher-level assembly. For more information, see the help topic Creating a Manufacturing Routing.

An assembly demand plan with a phantom sub-assembly in its bill of materials calculates dependent demand for the components of the phantom item, not the phantom itself. For more information, see the help topic Demand Planning.

Assemblies and Units of Measure

To identify units of measure on assembly item records you must enable the Multiple Units of Measure and the Assembly Items features.

After you select a basic unit type on an assembly record you can define a default unit for the item on a particular transaction. On item records, designate a unit to default as a purchase unit, stock unit, or sales unit.

**Note:** You can set purchase and sale units when you create the item record. After you save the record, these units cannot be changed. You can make a selection for the stock units when you create the item record, and change the stock units after the record is saved.

On Assembly Builds, Assembly Unbuilds, and Work Orders for Assembly Items with Units of Measure, the Units field defaults to base units and cannot be changed.

On transactions, units of measure are used as follows:

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Editable Units</th>
<th>Display Units Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receive Order</td>
<td>Yes (in units that match the purchase order)</td>
<td></td>
</tr>
<tr>
<td>Fulfill Orders</td>
<td>Yes (in units that match the sales order)</td>
<td></td>
</tr>
<tr>
<td>Adjust Inventory Worksheet</td>
<td>Yes (in stock units)</td>
<td></td>
</tr>
<tr>
<td>Replenish Location</td>
<td></td>
<td>Yes (in base units)</td>
</tr>
</tbody>
</table>

| Build Assemblies          |                                                     |                    |
| Unbuild Assemblies        |                                                     |                    |
Assemblies and Units of Measure

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Editable Units</th>
<th>Display Units Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter Work Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Opportunities</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Prepare Estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enter Sales Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create Invoices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enter Purchase Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bill Purchase Orders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enter Vendor Return Authorizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjust Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfer Inventory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Issue Credit Memos</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write Checks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use Credit Card</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Purchase orders show the item in purchase units by default.
- Invoices show the item in sales units by default.
- Inventory adjustments show the item in stock units by default.

Generated reports display units of measure based on the units used in transactions.

**Serialized Assemblies**

When working with serial-numbered assembly items:

- The base unit must be the lowest unit of measure when selecting a **Units Type**.
- Units cannot have a decimal unit of measure conversion with the base units when selecting **Stock Units**, **Purchase Units**, and **Sale Units**.
- The quantity of serial numbers entered must equal the quantity in base unit when a transaction is entered in a **non-base units**.

For example, you sell a serialized assembly that uses a base unit of Each and sale unit of Dozen. When you enter a sales order for 2 of the assembly, enter 24 serial numbers on the order because the sale represents 24 each of the item.

**Lot Numbered Assemblies**

After setting up a lot-numbered assembly item record, you can edit the purchase and sale units, but cannot change the units type or stock units.

**Assembly Builds and Unbuilds**

Assembly Builds and Unbuilds must be performed in the base units of measure.

For more information, see the help topic Using Item Records.
Assemblies and Work Orders

If the assembly selected on a work order uses Units of Measure, they are displayed in the Units field.

Work orders you view that were previously generated by NetSuite display the units for reference only and cannot be changed.

If the work order is created from another source (such as a sales order), you can only change the quantity by changing the source transaction.

For more information, see Assembly Work Orders.

Building Assembly Items

Each time you physically manufacture assemblies in a production run, you increase your stock of the assembled items. Record each production run and update stock levels by entering an assembly build in NetSuite.

To learn more, see the Building Assembly Items video.

For each assembly build you record:

- the assembly item stock levels increase
- the member items' individual stock levels decrease

Entering an assembly build for each production run updates your inventory levels.

**Note:** If you use work orders and have entered work orders for assemblies, see Building Work Orders to complete builds for those assemblies.

To enter an assembly build:

1. Go to Transactions > Manufacturing > Build Assemblies.

Primary Information

1. The Reference # field displays a system generated number. You can enter a different reference number to track this transaction.

2. In the Assembly list, select the assembly item you want to build.
   
   Required fields display a red asterisk (*).
   
   You can enter an assembly build only for assembly items on record.
   
   For more information, see the help topic Creating Item Records.

3. Select the Revision of the assembly build to use.
   
   The revision record effective date determines when this item is included as a member for an assembly.
   
   When you select an assembly item, the maximum number that you can build appears in the Buildable Quantity field.
   
   If you use locations, the quantity for the selected location is displayed in the Buildable Quantity field.

4. In the Quantity to Build field, enter the number of assembly items you want to build.
You cannot enter a quantity that exceeds the amount displayed in the Buildable Quantity field.

5. The projected value of your new assemblies appears in the read-only Projected Value field.
Projected value is the sum of the value of the member items times the quantity entered.

6. If you use serialized inventory, enter serial numbers for the assemblies you are building.

7. If you are building a lot numbered assembly, enter the expiration date of the lot in the Expiration Date field.

8. If you use bin management, the assembly item record preferred bin number is displayed in the Bin Numbers field. By default, all assemblies are added to the preferred bin. To add some assemblies to other bins, click the Bins icon or the Inventory Detail icon.

When you build this assembly, the bin quantity on hand for the assembly increases and the bin quantity on hand for each member item decreases.

9. In the Date field, enter a transaction date.

10. If you are building a lot numbered assembly item, enter the lot Expiration Date field.
    a. To receive a warning that a lot is about to expire, go to Setup > Accounting > Preferences > Accounting Preferences.
    b. On the Items/Transactions subtab, in the Days Before Lot Expiration Warning field, enter the number of days before a lot item's expiration to display a warning.
    c. Click Save.

11. If you use accounting periods, select a transaction Posting Period.

12. Enter a Memo. You can search for this text later to find this entry.

Classification

1. If you have a OneWorld account, select a Subsidiary.
   If you track departments, select a Department for this transaction.

2. If you track classes, select a Class for this transaction.

3. If you track locations, select a Location for this transaction.

Components

The Quantity field displays the number of components needed to complete the assembly. This number is taken from the Assembly Item record.

Component quantities can be adjusted on a build-by-build basis to allow for fluctuations in material usage.

For example, if a member item record shows a component quantity of 2, you can create a build that has 3 of the component to fill a particular order. As the quantity changes, your projected value is updated.

**Note:** If you change the quantity of members on a serialized or lot numbered assembly, use the assembly serial or lot numbers to track which assembly items were created with special member quantities. You cannot track non-serial or non-lot assemblies which could have special quantities of member items. For this reason, you may want to only build non-serial or non-lot assemblies with special quantities when your available quantity of that assembly is zero and you are building assemblies with special quantities for a customer order.

The Bin Numbers field displays the preferred bin for each component. By default, the items from the preferred bins are used to create the assembly.

1. To use other bins, click the Bins icon.
2. Edit the quantity for each bin associated with the item.
3. Click **Save**.

**Communication**

1. Enter events on the **Events** subtab. For example, maintenance, repair, or setup.
   a. Enter the event name or **Title**. For example, Assembly Work Center Setup.
   b. Enter the event **Location**. For example, West Coast Assembly.
   c. Accept today’s **Date** or use the calendar to enter a different date.
   d. If this is an all day event, check the **All Day** box.
   e. Enter event **Start** and **End Times**.
   f. Click **Add**.
      To add more events, repeat this procedure.
      For example, Setup could start at 7:00 am and end at 7:30am, Assembly 7:30 am to 3:30 pm, and Breakdown 3:30 pm to 4:30 pm.
2. On the **Tasks** subtab, view or enter CRM tasks records.
   For more information on tasks, see the help topic **Working with CRM Tasks**.
3. The **Phone Calls** subtab enables you to view or enter phone calls.
4. The **Files** subtab, enables you to attach files from the NetSuite File Cabinet, your computer, or the internet.
   - To add a file from the File Cabinet, select one from the **Attach File** list.
     After the file loads, the Folder, Size, Last Modified, and File Type fields are automatically populated.
   - To add a new file, in the **Attach File** list, select **New**.
     Complete the List window.
5. On the **User Notes** subtab, add and track notations.
6. Click **Save**.

After an assembly item has been built, it is treated like an inventory item for inventory costing purposes. The built assembly item asset/costing value is the total value of the assembly’s member items. These values act like the assembly item’s purchase price for inventory costing calculations.

Inventory costing is tracked for the assembly item based on the inventory costing method chosen at Setup > Accounting > Preferences > Accounting Preferences. For more information on inventory costing, see the help topic **Using Item Records**.

For more information about unbuilding assemblies to increase your stock of raw materials, see **Unbuilding Assembly Items**.

**Unbuilding Assembly Items**

After you have completed an inventory build, you may need to unbuild some assemblies.

For example, Wolfe Manufacturing receives an order for 100 mountain bikes. While building the bicycles, the customer cancels the order. Wolfe unbuilds the assembly items that are not sold and maintains the stock as raw materials.
Unbuilding Assembly Items

Unbuilding an assembly updates inventory levels on records for the finished assembly item and for each member component individually. For each assembly you unbuild:

- the assembly item stock level decreases
- the member item's individual stock levels increase

There are two ways to unbuild an assembly:

- To generate an unbuild transaction to automatically enter build information, on the Assembly Build transaction, click **Unbuild**.
- To generate a new unbuild transaction, go to Transactions > Manufacturing > Unbuild Assemblies.

**To unbuild an assembly from the Assembly Build transaction:**

1. Go to Transactions > Manufacturing > Build Assemblies > List.
2. Click **View** next to the assembly you want to unbuild.
3. On the Assembly Build page, click **Unbuild**.
   An unbuild transaction opens with the build information populated.

**To unbuild assembly items:**

1. Go to Transactions > Manufacturing > Unbuild Assemblies

**Primary Information**

1. NetSuite automatically generates a **Reference #** (number). If your administrator allows overrides, you can enter a reference number to track this transaction.
   For more information, see the help topic **Set Auto-Generated Numbers**.
2. In the **Assembly** list, select the assembly item you want to unbuild.
   Required fields display a red asterisk (*).
   When you select an assembly item, the maximum number that you can unbuild appears in the **Quantity Built** field.
   If you use locations, the quantity that appears in the **Quantity Built** field is for the selected location.

   **Note:** With Multi-Location Inventory enabled, when you select an assembly item and location, the maximum number that you can unbuild appears in the **Quantity Built** field. If you do not select a location, the maximum number that you can unbuild does not show in the **Quantity Built** field.

3. If you use serialized inventory, enter the **Serial Numbers** for the assemblies you plan to unbuild.
4. If you use bin management, select the **Assembly Item Record Bin Number** from **Bin Numbers** list. By default, all assemblies are removed from the preferred bin. To remove some items from other associated bins, click the Bins icon or Inventory Detail icon.
   When you unbuild this assembly, the bin quantity on hand for the assembly decreases and the bin quantity on hand for each member item increases.
5. If you enabled Advanced Bill of Materials, select a **Bill of Materials**.
6. If you enabled Advanced Bill of Materials, select a **Bill of Materials Revision**.
7. In the **Quantity to Unbuild** field, enter the number of assembly items you want to unbuild.
   You cannot enter a quantity that exceeds the number in the **Quantity Built** field.
8. The projected value of your disassembled items appears in the **Projected Value** field. Projected Value is the sum of the value of the member items times the quantity entered.

9. In the **Date** field, enter the transaction date.

10. If you use accounting periods, select a transaction **Posting Period**. You cannot post to a closed period.

11. Enter a **Memo**. You can search for this text later to find this record.

**Classification**

1. If you track departments, select a **Department** for this transaction.
2. If you track classes, select a **Class** for this transaction.
3. If you track locations, select a **Location** for this transaction.
4. If the assembly uses Units of Measure, the base units are displayed in the **Units** field.

**Components**

In the list of components, the **Bin Numbers** field displays the preferred bin for each component. By default, the items from the preferred bins are used to create the assembly.

1. To replace items to other bins, click the **Bins** icon.
2. Edit the quantity for each bin associated with the item.
3. Click **Done**.
4. Click the **History** subtab to enter information about tasks, phone calls, events, user notes, or attach files.

**Communication**

1. On the **Events** subtab, enter events. Events are scheduled activities that are added to your calendar when created.
2. On the **Tasks** subtab, view or enter CRM tasks records. For more information on tasks, see the help topic Working with CRM Tasks.
3. On the **Phone Calls** subtab, view or enter new phone calls.
4. On the **Files** subtab, you can select and add files from the File Cabinet that are associated with this record.
   - Select New to upload a new file to the File Cabinet.
5. On the **User Notes** subtab, add and track notations.
6. Click **Save**.

After you save the transaction, your inventory count of the assembly item decreases and the inventory count of the member items increases accordingly.

**Unbuilding Assemblies and Purchased Assembly Costing**

If you have enabled the **Allow Purchase of Assembly Items** feature, read the following to learn how NetSuite handles costing for assemblies you unbuild.

For more information, see the **Items/Transactions Accounting Preferences** section of Accounting Preferences.
When unbuilding an assembly item, NetSuite uses historical costing to determine member item values. For example, if a member item's historical transactions show a cost of $25, this amount is used to calculate cost for the member item after the assembly unbuild.

If the assembly being unbuilt was purchased from a vendor, then a member item has no previous transactions. The historical cost to be considered is $0 and member items in this case would have a value of $0.

If you need to unbuild purchased assemblies with member items that were not previously purchased, refer to the following:

- To enter an inventory adjustment prior to unbuild:
- Enter an inventory adjustment instead of an assembly unbuild.

**To enter an inventory adjustment prior to unbuild:**

Enter an inventory adjustment before the unbuild to establish item cost. Add a quantity of 1 and save the form, edit the form, and then enter a new line to remove a quantity of 1.

The following example describes the transaction sequence for assembly item ABC.

1. Go to Transactions > Inventory > Adjust Inventory.
2. In the Adjustments subtab, in the Item field, select an item. For example, Member item ABC.
   Required fields display a red asterisk (*).
3. Enter a value in the Adjust Qty. By field. For example, enter 1.
4. Enter a Current Value. For example, $25.00.
5. Click Save.
6. Click Edit on the adjustment.
7. In the Item field on a new line, select the item you edited. In this example, click Member item ABC.
8. Enter a quantity of -1.
9. Verify a value of $25.00.
10. Click Add and then click Save.

When the assembly is unbuilt, member item ABC will be valued at $25.

**Enter an inventory adjustment instead of an assembly unbuild**

Enter an inventory adjustment instead of an assembly unbuild, removing the assembly from stock and adding in the member items.

The following example displays the transaction sequence for assembly item XYZ. Item XYZ includes two items: Member 1 (quantity = 1) and Member 2 (quantity = 2.)

1. Go to Transactions > Inventory > Adjust Inventory.
2. In the Item field, select Assembly Item XYZ.
   Required fields display a red asterisk (*).
3. Enter a quantity of -1.
4. Enter a value of $100.00 and then click Add.
5. In the Item field, select Member item 1.
6. Enter a quantity of 1.
7. Enter a value of **$75.00** and then click **Add**.

8. In the **Item** field, select **Member item 2**.

9. Enter a quantity of **2**.

10. Enter a value of **$25.00**.

11. Click **Add** and then click **Save**.

The assembly is removed from inventory and the appropriate number of member items is added to inventory.

### Assembly Unbuild Variance Posting

After you unbuild an assembly item, a difference between the cost of the item at the time of assembly and the cost at the time of the unbuild could be displayed. In the assembly item record **Unbuild Variance** field, select an account for posting variance amounts.

For example, when you unbuild an assembly, each component is restocked and the item cost for each component is calculated. Any variance between the assembly cost and the unbuild cost is posted to the selected Unbuild Variance account on the item record for that assembly.

**To set the variance account for an item:**

1. To open the assembly item record, go to.

2. In the **Unbuild Variance Account** field, select the account where you want to post variance amounts.

3. Click **Save**.

If no variance account is selected for an assembly item in the Unbuild Variance Account field, variance amounts for that item post to the Cost of Goods Sold (COGS) account.

### Assembly Unbuilds and the Adjust Inventory Worksheet

Entering an Adjust Inventory Worksheet deletes the previous assembly unbuild cost history. To maintain costing history for an assembly, enter an inventory adjustment, not a worksheet.

### Marking Work Orders Built

NetSuite enables you to show work order items as assembled without completing all the steps. When you mark an order as built, the required items are marked built and added to inventory.

**Note:** Associated variances are not created when you mark an order built.

**To mark a work order built:**

1. Go to Transactions > Manufacturing > Mark Work Orders Built.

2. Select a **Location** to filter the list of orders.

3. Select an **Item** to filter the list of orders.

4. Select a **Customer** to filter the list of orders.
5. Check the **Mark Built** box next to each order.
6. Click **Save**.

**Marking Work Orders Closed**

For some work orders you may want to show the items as being assembled without completing all the steps. In such a case you can skip the steps and mark the order as closed.

When you mark an order as closed, the required items are marked closed and added to inventory.

**Note:** Associated variances are created when you mark an order built. For more information about variances, see the help topic Using Item Records.

**To mark a work order closed:**

1. Go to Transactions > Manufacturing > Close Work Orders.

**Primary Options and Criteria**

1. Select the **Posting Period** you want to post this transaction to. You cannot post to a closed period.
2. Enter a transaction **Date**.
3. Select a transaction **Location**.
4. Select an assembly **Item** to filter the list and show only work orders for the item.
5. Select a **Customer** to filter the list for transactions associated with the customer. Select All to show all transactions.
6. Check the **Include In-Process Work Orders** box to include work orders with In Process and Built status.
7. In the **Under-Produced Variance Tolerance (%)** field, enter a percentage to close only orders that produced less than planned. This helps you determine whether to keep some orders open because they have not produced enough finished product.
   
   Order variance calculation: \( \frac{\text{quantity ordered} - \text{quantity built}}{\text{quantity ordered}} \times 100 = \text{variance percentage} \)
   
   Entering a percentage in this field filters the list of orders to close to show only orders with a variance lower than the percentage entered.
8. In the **Production Variance Tolerance (%)** field, enter a percentage to filter orders with a specific value variance.
   
   Order variance calculation: \( \frac{\text{remaining WIP value}}{\text{WIP of assembly}} \times 100 = \text{variance percentage} \)
   
   Entering a percentage in this field filters the list of orders to close to show only orders with a variance lower than the percentage entered.

**Date Range Criteria**

- To filter by an order date range, enter a beginning date in the **Order Date From** field and end date in the **Order Date To** field.
- To filter by a production start date range, enter a beginning date in the **Production Start Date From** field and end date in the **Production Start Date To** field.
To filter by a production end date range, enter a beginning date in the Production End Date From field and end date in the Production End Date To field.

Orders

1. Check the Close box next to each order to be closed.
2. Verify the quantities and variances displayed for each order.
3. Click Submit.

Printing an Item Bill of Materials

A Bill of Materials (BOM) lists all the components of your assembly item, the assembly quantity, and the total quantity for each.

If one of the components of your assembly item is an assembly item, each item subcomponent is listed with the necessary quantity needed for each subcomponent to complete the assembly.

For example, your assembly item contains four components—Item A, Item B, Item C, Item D. Item B is an assembly item made up of Widget 1 and Widget 2. Two of each widget are necessary for assembly of Item B. And two of Item B are needed to complete the parent assembly. The quantity needed to complete assembly Item B must be doubled to complete the parent assembly.

The following table displays the assembly bill of materials:

<table>
<thead>
<tr>
<th>Parent Assembly</th>
<th>Name</th>
<th>Assembly Quantity</th>
<th>Total Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item A</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Item B</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Widget 1</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Widget 2</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Item C</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Item D</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

To print a bill of materials for an assembly item:

1. Go to Lists > Accounting > Items.
2. In the Type field, select Assembly to filter your item list to show assembly items.
3. Click View next to the item you want to print the bill of materials (BOM) for.
4. Click the Print icon.
5. When the window containing your BOM opens, click the Print icon.
   You can also click Export in this window to open or save your BOM as a CSV file.

To learn another way to view BOM details, see Bill of Materials (BOM) Inquiry.

To learn how to print a bill of materials for work orders that you enter, see Printing a Work Order Bill of Materials.
To learn how to examine the standard cost breakdown of an assembly, see **Costed Bill of Materials (BOM) Inquiry**.

**Bill of Materials (BOM) Inquiry**

If you use the Assembly Items feature, the Bill of Materials (BOM) Inquiry enables you to see the build requirements for an assembly item. This BOM displays the member components of the assembly and the number of each component needed for each assembly.

For example, you can run BOM Inquiry to identify the materials needed to assemble a Mountain Bike. The inquiry shows that you need two wheels, one frame, one seat, and one handle bar. The inquiry also shows the sub-assembly (phantom assembly) components for each wheel: one rim, one hub, one, tube, one tire, and spokes.

**Note:** Custom roles must specify access to view this inquiry. For more information, see the help topic **Customizing or Creating NetSuite Roles**.

**To run a Bill of Materials Inquiry:**

2. Select the assembly you want to show a BOM for.
3. If you use the multi-location inventory feature, select a Location to view data for that location. Required fields display a red asterisk (*).
   - If you are using Advanced BOM, see **BOM Inquiry**.
4. Choose a level of detail:
   - Check the **Top Level Only** box to show only the top level member items details (sub-assembly information is not shown).
   - Clear the **Top Level Only** box to show details about all levels of member items.
5. In the **BOM Display Control** list, select By Date or By Revision to decide what to include in an assembly.

**Note:** This field is available only when an assembly item uses Revision Control for its Effective BOM Control value.

If an assembly item uses Effective Date as its Effective BOM Control value, the Date field controls which date is used when querying the components of the assembly item.

Components are displayed based on the following criteria:
- Selected date is greater than or equal to the effective date.
- Selected date is less than or equal to the obsolete date.

If an assembly item uses Revision Control, you can query the components either By Date or By Revision.
- If you select By Date, then follow the process described in step 5 above.
- If you select By Revision, in the Revision field, select a revision.
  - The active components for the revision are displayed and the date field displays the revision effective date.

The inquiry displays all components used in a multi-level bill of materials structure, using an easy-to-read nested tree view.
The Bill of Materials Inquiry displays the following items:

<table>
<thead>
<tr>
<th>Column Label</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Name</td>
<td>The name of the Component as defined in the Item Name field</td>
</tr>
<tr>
<td>Level</td>
<td>Where the component appears on the BOM tree structure</td>
</tr>
<tr>
<td>Component Yield</td>
<td>Shows how much of this component is available for final assembly, after accounting for loss/scrap in the production process. A yield factor of 0.9 means that only 90% of the usage quantity of the component on a bill becomes part of the finished assembly</td>
</tr>
<tr>
<td>BOM Quantity per Assembly</td>
<td>The quantity required for this assembly according to the BOM</td>
</tr>
<tr>
<td>Quantity per Assembly</td>
<td>The quantity required when component yield is taken into consideration</td>
</tr>
<tr>
<td>Quantity per Top Level Assembly</td>
<td>The total quantity of this component required to make the top-level assembly. Top level items are typically finished products. For example, a Barbecue grill set</td>
</tr>
<tr>
<td>On Hand</td>
<td>Number of items physically held at the specified location</td>
</tr>
<tr>
<td>Available</td>
<td>Uncommitted stock of item</td>
</tr>
<tr>
<td>Back Ordered</td>
<td>The quantity of any unfulfilled order or existing commitment for this component</td>
</tr>
<tr>
<td>On Order</td>
<td>The total quantity ordered of this component across all current work orders</td>
</tr>
</tbody>
</table>

To display information stored in custom item fields for each component, click Customize.

**Export or Print a Bill of Materials Inquiry**

For more flexibility to work with data outside of NetSuite, you can print or export the results of a Bill of Materials Inquiry.

Click the printer icon at the top of the inquiry page to print or export (Excel or CSV) the inquiry results.

**Note:** The data in the inquiry header (such as location and date) is not exported. Only the table data resulting from the inquiry is exported. Only the columns shown on the query export page can be exported or printed.

For more information, see Printing an Item Bill of Materials for an alternate way to view BOM details.

**Costed Bill of Materials (BOM) Inquiry**

Use the Costed BOM Inquiry to examine the standard cost breakdown of an assembly. The Costed BOM Inquiry report displays individual and aggregated assembly costs enabling you to view how different cost components roll up to an assembly item based on the Bill of Materials (BOM). This includes material and conversion costs (labor and machine costs and their overheads).

For example, the Costed BOM Inquiry can help a cost accountant in a manufacturing environment to see the different cost components associated with building an assembly. It can also show how each component is calculated and rolled up to the finished goods.

This provides visibility into variances between inventory values at a certain time (displayed on the Inventory Valuation reports) and the desegregated component costs of the assembly.
To use the Costed BOM Inquiry, enable the Standard Costing and Assemblies features. This inquiry can be run only for a standard cost assembly item.

After you select the subsidiary, location, and assembly, the inquiry displays the cost breakdown of the assembly and its member components. This assembly cost is calculated based on the standard cost of components.

For assemblies that have a conversion cost, the assembly cost is calculated as follows:

- Component cost is based on the component cost displayed in the inventory revaluation transaction
- Conversion cost is based on the assembly inventory revaluation transaction

For assemblies that do not use routing, the assembly cost is based on the component cost displayed in the inventory revaluation transaction.

To run a Costed Bill of Materials Inquiry:

2. Select the Assembly you want to show a Costed BOM for.
3. If you use the multi-location inventory feature, select a Location to view data for that location.
   Required fields display a red asterisk (*).
   If you are using Advanced BOM, see Costed Bill of Materials Inquiry.
4. Choose the level of detail to show:
   - Check the Top Level Only box to show only the top level member items details (sub-assembly information is not shown).
   - Clear the Top Level Only box to show details about all levels of member items.
5. In the BOM Display Control list, select By Date or By Revision to decide what to include in an assembly.
   This field is available only when an assembly item uses Revision Control for its Effective BOM Control value.
   If an assembly item uses Effective Date as its Effective BOM Control value, the Date field controls which date is used when querying the components of the assembly item.
   Components are displayed based on the following criteria:
   - Selected date is greater than or equal to the effective date
   - Selected date is less than or equal to the obsolete date
   If an assembly item uses Revision Control, you can query the components either by Date or by Revision.
   - If you select By Date, then follow the process described in step 5 above.
   - If you select By Revision, then in the Revision field, select a revision.
     The active components for the revision are shown and the Date field displays the revision Effective Date.

6. The Top Level Material Cost field displays the material cost for the top level assembly selected. This cost is summed for all components.
7. The Top Level Conversion Cost field displays the routing cost for the top level assembly.
8. **Total Unit Cost** – This field displays the sum of [Top Level Material Cost] + [Top Level Conversion Cost].

Component costs are displayed only for standard cost components. Non-standard cost components are displayed with a cost of zero.

To display information stored in custom item fields for each component, click **Customize**.

**Export or Print a Costed Bill of Materials Inquiry**

For more flexibility to work with data outside of NetSuite, you can print or export the results of a Costed Bill of Materials Inquiry.

Click the printer icon at the top of the inquiry page to print or export (Excel or CSV) the inquiry results.

The data in the inquiry header (location and date) does not get exported. Only the tabular data resulting from the inquiry is exported. Only the columns shown on the query export page can be exported or printed.

For more information, see Printing an Item Bill of Materials for an alternate way to view BOM details.

**Printing Assembly Item Materials on Transactions**

You can print all the members of an assembly item, including display names, quantities, descriptions, and rates on an invoice or other transaction form. Alternatively, you can print only the description and amount of the assembly item on the form.

**To print raw materials on transactions:**

1. Go to Lists > Accounting > Items.
2. In the **Type** field, select **Assembly** to filter your item list to show assembly items.
3. Click **Edit** next to the assembly item you want to change.
4. Check the **Print Items** box.
5. Click **Save**.

**Note:** You must enter a display name on the member item records for an item name to appear.

Your administrator can customize the layout of your printed forms using Advanced PDF/HTML templates.

For information, see the help topic Advanced PDF/HTML Templates.

**Printing Assembly Labels**

**To print labels for each member item and the assembly item:**

1. Go to Transactions > Management > Print Checks and Forms.
2. Click **Item Labels**.
3. On the **Print Item Labels** page, click **Customize**.
4. On the **Customize Sublist** page, click the **Additional Filters** sublist.
5. Check the **Component Of** box.
6. Click **Save**.
7. On the **Print Item Labels** page, select the assembly from the **Component Of** list.
8. Click **Mark All**.
9. Click **Print**.

### Component Where Used Inquiry

The Component Where Used Inquiry enables you to view where components are used in assembly items, including parent assembly and sub-assembly items.

For example, item#24567 (a table leg) is a component in items that you assemble. Run the Component Where Used Inquiry to learn where that component is used:

- item#44555, small square table, requires 4 table legs per assembly
- item#55666, medium console table, requires 3 table legs per assembly
- item#66777, large rectangle table, requires 6 table legs per assembly

Data is also returned for sub-assembly component requirements:

- item#77888, 3-piece table set, includes one small square table, one medium console table, and one large rectangle table.
- To produce one of item #77888 requires 13 table legs per assembly.

**To run the Component Where Used inquiry:**

1. Go to Transactions > Manufacturing > Component Where Used Inquiry.
2. Enter criteria in the following fields to filter the results returned:
   1. Select a **Component** that is required for an assembly item or sub-assembly. Components represent level zero in the structure.
   2. If you use the Multi-Location Inventory feature, select a **Location**.
   3. Check the **Single Level Only** box to limit the display to only one level below the component. Clear this box to display all levels for the assembly.
   4. Enter an active **Date** for revision control and obsolete dating. This represents the date an assembly must be active to be included in the results list.
      - If specified on the item record, assembly active dates start on the Effective Date and end on the Obsolete Date.
      - For example, an assembly item Effective Date is January 1, 2017 and its Obsolete Date is December 31, 2019.
      - If you enter an active date of January 1, 2016, the assembly item does not appear in the results.
      - If you enter an active date of January 1, 2018, the assembly item appears in the results.
   5. The **Unit of Measure** field displays the component base units.
3. Based on the criteria selected, you could see the following fields:

- **Assembly** – The name of the assembly item that uses the component selected in the header.
- **Level** – The level in the Bill of Materials (BOM) structure where the component resides.
  
  For example, a level 1 item is a sub-member of the parent (selected) component item. A level 2 item is a sub-member of the level 1 item.
- **Quantity per Assembly** – The amount of the component required to build the assembly.
- **On Hand / Available / Back Ordered / On Order** – Quantities are displayed for the selected location.
- **Units** – The units for the component.
- **Effective Date** – The date the assembly becomes effective.
- **Obsolet Date** – The date the assembly is no longer effective.

The inquiry in the following example is run to determine where the Table Leg item is used as a component.

The following is selected in the inquiry header:

- **Component**: Table Leg
- **Single-Level only**: No

<table>
<thead>
<tr>
<th>Item</th>
<th>Level</th>
<th>Qty Required per Assembly</th>
<th>Qty Required per Top-Level Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table: European</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>European Table Set Box</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Table: American</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>American Table Set Box</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Patio Side Table</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Patio Table Pair Set</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Patio Table Box Set</td>
<td>3</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

The following is the same inquiry, with Single-Level only set to Yes.

<table>
<thead>
<tr>
<th>Item</th>
<th>Level</th>
<th>Qty Required per Assembly</th>
<th>Qty Required per Top-Level Assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table: European</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Table: American</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Patio Side Table</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
Assembly Work Orders

When you enable the Work Orders feature, you can use assembly work orders for your assembly items. Assembly work orders track the production of assembly items needed for stock or to fill orders. Work orders track the quantities of assemblies that need to be built and the quantities of components, or member items, needed to do so.

For example, if you stock and sell mountain bikes, you can enter a work order to do the following:
- Track the quantity of mountain bikes that need to be assembled.
- Commit member items available in stock to the work order.
- Track when the mountain bikes are assembled and the work order is completed, so the mountain bikes can be stocked or sold.

There are two types of work orders you may need to use:

- **Special Order Work Orders**
  Special order work orders track assemblies to be built for a particular sale. The work order can be linked to the originating sale.
  When assembly items are sold and finished goods are not in stock but member items are, a work order is automatically added to the work order creation queue. Based on the amount of finished product needed for the order, member items are committed to the work order to build the finished assemblies.

- **Production Work Orders**
  Production work orders track assemblies that need to be built to increase stock and are not intended for a particular sale. Production work orders are not linked to a sales order and have no customer assignment.
  Production work orders are generated when the back ordered quantity of an assembly reaches its assigned build point. After the build point is reached, a work order is added in the Mass Create Work Orders queue.
  For each work order, a bill of materials (BOM) is generated to facilitate picking member items for the build. When this work order is completed, the regular stock level of the assembly is increased and the finished goods are committed to open sales orders.

Both production and special order work orders use the same Work Order transaction form in NetSuite. A work order can be entered individually or be automatically added to the work order creation queue based on inventory settings, as described below:

- **Entering Individual Work Orders**
  You can enter work orders for assemblies one at a time. They can be special order or production work orders. For more information, read Entering an Individual Work Order.

- **Mass Creating Work Orders**
  After an assembly item reaches its assigned build point, a work order is added in the Mass Create Work Orders queue. The work order's suggested quantity will restore the item's preferred stock level. For more information, read Mass Creating Work Orders.

For both types of work order forms, if you check the Mark Sub-Assemblies Phantom box, member items that are assemblies themselves are also built to complete the work order.

If you use the Work Orders and Demand Planning features, see Work Orders and Sub-Assemblies.

You can also create a work order for an assembly item when you add it to a sales order. When you select an assembly on a sales order, check the Create WO box. Then, when the order is saved or approved, a work order is added to the Mass Create Work Order queue.
To learn more, see Marking Assemblies to Create Work Orders.

After work orders are entered, completing an assembly build for the work order closes the order.

**To enable the Work Orders feature:**

1. Go to Setup > Company > Enable Features.
2. Click the **Items and Inventory** subtab.
3. Under the Inventory heading, check the **Work Orders** box.
4. Click **Save**.

After the feature is enabled, you can set the Build Based On Commitment preference. Order Management Accounting Preferences of Accounting Preferences.

**Work Order Statuses**

Work orders can have these statuses:

- **Planned** – No components are committed regardless of commit option settings.
- **Released** – No transaction has posted and no activities have been recorded. Components can be committed based on commit option settings.
- **In Process** – A transaction has been posted.
- **Built** – The quantity built is equal to the quantity planned.
- **Closed**

**Sales Orders Linked to Work Orders**

If a work order is created from a sales order, then the two transactions are linked. Please note the following about making changes on sales orders or work orders that are linked:

- If a line on a sales order that includes a linked assembly is closed, the link to the work order remains. The work order remains open and the finished assembly from the build is added to general inventory.
- If the quantity on a work order line is changed to a quantity that exceeds the amount on the corresponding sales order line, the link to the sales order remains. When the build is completed, the excess assemblies are added to general inventory.
- Sales orders that are cancelled are no longer linked to work orders.

**Assemblies and Advanced Inventory Management Calculations**

When using the Advanced Inventory Management feature, if auto-calculation is enabled for inventory items that are components of assemblies, demand is based on work orders as well as sales using the following calculation:

\[
\text{Qty of assembly} \times \text{qty per assembly}
\]
Orders for finished assemblies are included in calculations of demand, reorder points, and preferred stock levels for member inventory items.

Also, you can choose to base demand on sales instead of sales orders using the Transactions to Consider preference. This preference determines if work orders and builds are included in demand calculations for assembly components. For more information, read the help topic Setting Up Advanced Inventory Management.

**Note:** For transaction customization purposes, assembly work order forms are classified as sales forms. If you create a custom transaction field apply it to Sales transactions, it shows on work order forms.

### Assemblies and Units of Measure

If you use the Multiple Units of Measure feature, please read Assemblies and Units of Measure.

You can make changes on work orders after you have created them.

For details, please read Editing a Work Order.

### Assembly Work Orders Workflow Chart

**Entering an Individual Work Order**

Work orders are entered to track the production of assembly items needed either for stock or to fill open orders. A work order is a non-posting transaction.
Special Order work orders track assemblies for a particular sale, or Production work orders track assemblies to increase stock. Both use the same work order form, but production work orders do not link to a sale transaction.

Work orders you enter list the members, or components, of the assembly item to be built.

To learn more, see the Manufacturing Assembly Work Orders video.

For more information about work order statuses, see Assembly Work Orders

**To enter individual work orders:**

1. Go to Transactions > Manufacturing > Enter Work Orders.
2. Select a Custom Work Order or Standard Work Order Custom Form.

### Custom Work Order

1. Enter a new, or accept the default Date.
2. The default Status is Released.
3. Check the Firmed box to firm the order.
   - This box is checked by default for Released orders.
   - Selecting the Planned status enables the Firmed box.
4. The Order # increases the largest work order number by one.
   - To enter another order number, go to Setup > Company > Auto-Generated Numbers.
   - On the Transactions subtab, next to Work Order, check the Allow Override box.
   - Click Save.
     - The next order number will revert to the standard pattern.
5. Select the Assembly you need to build.
6. Check the Mark Sub-Assemblies Phantom box, to build member assembly items to complete the work order.
   - Clearing the Mark Sub-Assemblies Phantom box does not refresh or remove sub-assembly components on the Items subtab. To reload the BOM for a top level assembly, select a different assembly in the Assembly field. To reload a BOM for a phantom sub-assembly, change the item source for the sub-assembly back to Phantom.
   - After an assembly build is associated with this work order, this field cannot be changed.
7. Optionally, check the WIP box to designate the work order to use WIP instead of a standard assembly build.
   - This setting can be selected only when the order status is Released. This setting cannot be changed after a posting assembly transaction is logged against this work order.
   - For more information about using WIP, see Manufacturing Work In Process (WIP).
8. Select the related Manufacturing Routing.
   - This list is only available when the WIP box is checked.
9. Check the Auto-Calculate Lag box to calculate lag times for operation tasks.
   - For more information, see the help topic Operations Overlap
10. Enter the **Quantity** of assembly items you want to create. This can be a fractional number. If you enter a quantity higher than the available quantity, a warning message appears. The item’s available quantity is calculated based on availability across all locations. Changing the header location does not affect the item availability used on the line. Click the **Customize** button to display item availability for each item across all locations. For more information, see the help topic Creating Custom Entry and Transaction Forms.

**Important:** After an assembly build is associated with this work order, the quantity can only be changed by closing the work order and then making a copy or creating a new work order. Closing the work order sets the Back Order amount to zero for the component items but has no financial impact on the created Assembly Item.

To create a new work order to enter a new quantity:
1. View the work order and then click **Close**.
2. Click the **Make Copy** button.

11. The **Created From** field displays the number of the sales order associated with this work order, if any. The field is not available when entering Individual Work Orders. This Created From field appears only on existing work orders created from sales orders using one of the following methods:
   - Click the **Work Order** link on the sales order line item
   - By automatic work order creation from a sales order when the **Create WO** field is marked upon saving the sales order

12. Select a **Customer** to associate this work order with.
13. Select a **Department** or **Class** if you track them. The selected department or class carries over to the assembly build.
14. Select a **Location** if you track them. The selected location carries over to the assembly build. If you use Multi-Location Inventory, the selected location is the one that component inventory items are committed from.

**Note:** All items on one work order must be committed from the same location. Items can commit only from the location specified, even if there are no available items at the specified location, and there are items available at another location.

15. Optionally, enter a **Memo**. You can search for this text to find this record later.
16. NetSuite automatically populates the **Revision** based on the effective date. The selected assembly can disable this field.
17. Routing and Demand Planning generate supply work orders that enable you to select a **Scheduling Method**.
18. In the **Production Start Date** field, enter the date you expect to begin assembly production. When you use Demand Planning, the component demand is based on the production start date.
19. In the **Production End Date** field, enter the date you expect to complete assembly production. This field defaults to show the transaction date plus lead time.

**Standard Work Order**
1. The **Order #** increases the largest work order number by one.
Entering an Individual Work Order

To enter another order number, go to Setup > Company > Auto-Generated Numbers.

On the Transactions subtab, next to Work Order, check the Allow Override box.

Click Save.

The next order number will revert to the standard pattern.

2. Select a Customer to associate this work order with.

3. Select the Assembly you need to build.

After the item is selected, the assembly components appear on the Items subtab.

After an assembly build is associated with this work order, this field cannot be changed.

4. NetSuite automatically populates the Revision based on the effective date.

The selected assembly can disable this field.

5. Check the Mark Sub-Assemblies Phantom box, to build member assembly items to complete the work order.

Clearing the Mark Sub-Assemblies Phantom box does not refresh or remove sub-assembly components on the Items subtab. To reload the BOM for a top level assembly, select a different assembly in the Assembly field. To reload a BOM for a phantom sub-assembly, change the item source for the sub-assembly back to Phantom.

After an assembly build is associated with this work order, this field cannot be changed.

For more information about using the work order and demand planning, see Work Orders and Sub-Assemblies.


This list is only available when the WIP box is checked.

7. Check the Auto-Calculate Lag box to calculate lag times for operation tasks.

For more information, see the help topic Operations Overlap.

8. Enter the Quantity of assembly items you want to create. This can be a fractional number.

If you enter a quantity higher than the available quantity, a warning message appears.

The item's available quantity is calculated based on availability across all locations. Changing the header location does not affect the item availability used on the line.

Click the Customize button to customize this form to display item availability for each item across all locations. For more information, see the help topic Creating Custom Entry and Transaction Forms.

Important: After an assembly build is associated with this work order, the quantity can only be changed by closing the work order and then making a copy or creating a new work order. Closing the work order sets the Back Order amount to zero for the component items but has no financial impact on the created Assembly Item.

To create a new work order to enter a new quantity:

1. View the work order and then click Close.

2. Click the Make Copy button.

9. The Created From field displays the number of the sales order associated with this work order, if any.

The field is not available when entering Individual Work Orders.
This Created From field appears only on existing work orders created from sales orders using one of the following methods:
- Click the **Work Order** link on the sales order line item
- By automatic work order creation from a sales order when the **Create WO** field is marked upon saving the sales order

10. Enter a new, or accept the default **Date**.
11. The default **Status** is Released.
12. Check the **Firmed** box to firm the order.
   - This box is checked by default for Released orders.
   - Selecting the Planned status enables the Firmed box.
13. Optionally, enter a **Memo**.
   - You can search for this text to find this record later.
14. Routing and Demand Planning generate supply work orders that enable you to select a **Scheduling Method**.
15. In the **Production Start Date** field, enter the date you expect to begin assembly production.
   - When you use Demand Planning, the component demand is based on the production start date.
16. In the **Production End Date** field, enter the date you expect to complete assembly production.
   - This field defaults to show the transaction date plus lead time.

### Classification

1. Select a **Department** or **Class** if you track them. The selected department or class carries over to the assembly build.
2. Select a **Location** if you track them. The selected location carries over to the assembly build.
   - If you use Multi-Location Inventory, the selected location is the one that component inventory items are committed from.
   - **Note:** All items on one work order must be committed from the same location. Items can commit only from the location specified, even if there are no available items at the specified location, and there are items available at another location.
3. The **Built** field displays the total number of assemblies that have been completed on associated assembly builds.
   - This field is displayed only after the form is saved.
4. Select a job if the assemblies on this work order are for a particular job. Click the Open icon to open a list of jobs.

### Items

1. Select an **Item** from the list.
   - When an assembly is selected, the assembly components appear on the Items subtab.
   - If the assembly includes members that are assemblies and you checked the Mark Sub-Assemblies Phantom box, then sub-assemblies and sub-assembly components are indented based on their level in the assembly hierarchy.
   - The **Quantity** field shows the amount of the item required for this work order.
     - You can edit component quantities until a build is associated with the work order.
     - When using the Multiple Units of Measure feature, the quantity for members of an assembly item is always defined in base units on work orders.
Entering an Individual Work Order

1. **Units** field displays the base units of the component used in the parent assembly.
2. **Description** field displays the item description as recorded on the item record.
3. Select the serial or lot numbers of items to commit those items to be used to complete this work order.
   - **Commit** field displays whether the available quantity is committed on this order. Commitment occurs only when the full quantity is available. Otherwise, commitment is indefinitely deferred.
   - **Options** field displays any custom options associated with the item.
4. Select the **Purchase Order** option in the Item Source list to create a special order purchase order for a component or sub-assembly.
   
   **Note:** You must identify a preferred vendor and a purchase price on an item record in order for that item to be selected as a special order. For details, read the help topic *Identifying Special Orders*.
5. Select the **Work Order** option in the Item Source list to create a special order work order for a component or sub-assembly.
6. Click the arrows below to view steps for each subtab.

### Relationships

1. Check the **Update Customer** box to update the sales team on the customer's record with changes made.
2. Select a **Partner** and Partner role if necessary.
3. Check the box in the **Primary** column if this partner is the lead.
4. In the **Contribution %** column, enter the contribution percentage for each team member.
5. Click **Add**.

### Sales Team

1. If you use the Team Selling feature, click the **Sales Team** subtab.
2. Select the sales team responsible for this sale.
   - The members of the sales team appear below. You can edit each team member's sales role and contribution for this transaction or add team members if needed.
3. In the **Choose Team** field, select a sales team to associate with this transaction. To create a sales team, go to Lists > Relationships > New > Select Sales Team Members.
4. Check the **Update Customer** box if you want to update the sales team on the customer's record with changes you make here.
5. Select an **Employee** and **Sales Role** if necessary.
6. Check the box in the **Primary** column if this employee is the lead.
7. In the **Contribution %** column, enter the contribution percentage for each team member.
8. Click **Add**.

### Communication

1. On the **Events** subtab, enter events.
2. On the **Tasks** subtab, view or enter CRM tasks records.
   - For more information on tasks, read the help topic *Working with CRM Tasks*. 

3. On the **Phone Calls** subtab, view or enter new phone calls.
4. On the **Files** subtab, you can select and add files from the File Cabinet that are associated with this contact.
   Select **-New-** to upload a new file to the File Cabinet.
5. On the **User Notes** subtab, add and track notations.
6. Click **Save**.

After the work order is recorded, you can enter an assembly build against the order to close it.

### Adding Custom Fields to Work Orders

#### To add a custom field to the work order form:

1. Click **Customize** on the top right of the page:
   - For a custom body field, click **New Body Field**.
   - For a custom column field, click **New Column Field**.
2. On the Transaction Column Field page, enter a **Label** for the new field:
   - For body fields, this label is displayed next to the field on transactions.
   - For column fields, this name appears as a column heading on transactions.
3. On the **Applies To** subtab, check the box next to transactions you want the field to appear on:
   - For body fields, check the **Work Order / Assembly Build** box.
   - For column fields, check the **Work Order** box.
4. Click **Save**.

The custom field appears on your work order form.

### Mass Creating Work Orders

Work orders are entered to track the production of assembly items needed either for stock or to fill orders. The work order lists the members, or components, of the assembly item to be built. A work order is a non-posting transaction.

Some work orders in the queue are not intended for a particular sale. Production work orders are generated when the back ordered quantity of an assembly reaches its assigned build point. After the build point is reached, a work order is added in the Mass Create Work Orders queue.

For each work order, a bill of materials (BOM) is generated to facilitate picking member items for the build. When this work order is completed, the regular stock level of the assembly is increased and the finished goods are committed to open sales orders.

Special Order work orders track assemblies for a particular sale, and Production work orders track assemblies to increase stock. Both use the same work order form, but production work orders do not link to a sale transaction.

For more information about entering individual work orders, see [Entering an Individual Work Order](#).

#### To mass create work orders:

1. Go to Transactions > Manufacturing > Mass Create Work Orders.
2. Select a **Location** to show only work orders for that location. Select All to show work orders for all locations.
If you use Multi-Location Inventory, the location selected is the one that component inventory items are committed from.

**Note:** All items on one work order must be committed from the same location. Items can commit only from the location specified, even if there are no available items at the specified location, and there are items available at another location.

3. Select a Department or Class if you track them. The selected department or class carries over to the assembly build.

   Required fields display a red asterisk (*).

4. Select a Parent Item to show only child items for that parent.

5. Enter a Minimum Quantity to filter the list by the minimum set on the item record.

6. Check the box in the Order column next to each item you want to create a work order for.

After work orders are entered, completing an assembly build for the work order closes the order.

### Time Phased Items subtab

To use these enhancements for time-phased planned items on the Mass Create Work Orders page, the Demand Planning feature must be enabled.

The Time Phased Items subtab displays a list of items that need to be ordered based on time-phased replenishment.

1. Enter an Order Start Date.

2. Enter an Order End Date.

3. Check the box next to each item to order.

   Click the Mark All button to check all boxes or click the Unmark All button to clear all boxes.

4. Accept the suggested Quantity or enter a new amount.

   **Note:** When also using the Demand Planning feature, read the help topic Demand Planning on Item Records for information about suggested quantities.

When using Multiple Units of Measure, the quantity for members of an assembly item is always defined in base units on work orders.

5. If you enabled Make Departments Mandatory and Allow Per-Line Departments, select a Department. Departments are used for the corresponding line items on generated purchase orders. For more information, see the help topic Using Per-Line Classifications.

6. Check the Mark Sub-Assemblies Phantom box to treat the sub-assemblies within the selected assembly as phantoms. The sub-assembly components are included in the assembly work order that is generated.

   For more information about work orders and demand planning, see, Work Orders and Sub-Assemblies.

### Reorder Point Items subtab

**Note:** To use these enhancements for time-phased planned items on the Mass Create Work Orders page, the Advanced Inventory Management feature must be enabled.

The Reorder Point Items subtab displays a list of items that need to be ordered based on designated reorder point. These items have a quantity available that is less than the reorder point indicated on the item record.

Manufacturing
1. Check the box in the **Order** column next to items you want to order. Click the **Mark All** button to check all boxes or click the **Unmark All** button to clear all boxes.

2. Accept the suggested amount to order in the **Quantity** column, or enter a new quantity. The suggested NetSuite order calculation is: (preferred stock level + quantity needed) less (quantity available + quantity on order).

3. If you enabled Make Departments Mandatory and Allow Per-Line Departments, select a **Department**. Departments are used for the corresponding line items on generated purchase orders. For more information, see the help topic Using Per-Line Classifications.

4. Check the **Mark Sub-Assemblies Phantom** box to mark an individual sub-assembly as a phantom assembly. A phantom assembly is typically a non-stocked assembly that groups together material needed to produce a subassembly. The Phantom BOM option enables you to define the item source for the subassembly on a line-by-line basis.

   If you use the Work Orders and Demand Planning features, see **Work Orders and Sub-Assemblies**.

5. Click **Submit**.

Work Orders are generated for the items you have indicated.

Work orders generated for assembly items that use the Reorder Point replenishment method will use Forward Scheduling regardless of the default scheduling method set in the account preferences. For more information, read the help topic **Production Scheduling Methods Overview**.

### Marking Assemblies to Create Work Orders

After the work orders feature is enabled, you can create work orders for assembly items from sales orders. Items can be tagged to create work orders in two ways: by marking the item when you create the sales order or by tagging the item record.

#### On Item Records

You can set an assembly item to default to create a work order by tagging the item record. Then, when the item is selected on a sales order, the box in the Create WO column is automatically checked.

**To set an assembly item to default to create a work order:**

1. Go to Lists > Accounting > Items.
2. In the **Type** field, select **Assembly** to filter your item list to show assembly items.
3. Click **Edit** next to the item.
4. On the **Purchasing/Inventory** subtab of the assembly item record, check the **Special Work Order Item** box.
5. Click **Save**.

#### On Sales Orders

Items can be tagged to create work orders when you enter a sales transaction by checking the box in the Create WO column. Then, when you save or approve the order, NetSuite creates a work order that is linked to the sale.
To create a work order from the sales order:

1. Go to Transactions > Sales > Enter Sales Orders.
2. Enter information in the transaction header as needed.
   Required fields display a red asterisk (*).
3. In the Item field, select an assembly item.
4. Check the box in the Create WO column.
5. Enter additional information as needed for this line item.
6. Click Add.
7. Click Save.

Planned Work Orders

You can enter work orders that have a status of Planned. A planned work order functions as follows:

- Includes component information
- Includes resource information
- Does not commit items until the work order is released

Planned work orders can be either Open or Firmed.

- **Open** – Open planned work orders will be deleted before supply planning runs.
- **Firmed** – Firmed planned work orders will NOT be deleted before supply planning runs.

Planned work orders can be created manually or generated by the supply planning engine.

Manually Enter Planned Work Orders

To manually enter planned work orders:

1. Go to Transactions > Manufacturing > Enter Work Orders.
2. In the Status field, select Planned.
3. Complete additional fields on the form as necessary.
4. Click Save.

Automatically Generate Planned Work Orders

Set preferences for the NetSuite planning engine to generate planned work orders. When you let NetSuite generate planned work orders, you can see the resources and materials required immediately after a planning engine run.

To set up preferences:

1. Go to Setup > Accounting > Preferences > Accounting Preferences.
2. Click the Order Management subtab.
3. In the **Create Work Orders in Supply Planning** field, select one of the following to define the default for supply planning work orders:

- **Do Not Generate**
- **Generate in Firm Planned Status**
- **Generate in Open Planned Status**
- **Generate in Released Status**

Your selection defines the default status of new work orders generated by a planning engine run.

**Note:** If you make a selection to generate orders and also use the Manufacturing Routing and Demand Planning features, you will have the option to define production scheduling methods on work orders. For details, read the help topics *Production Scheduling Methods Overview* and *Supply Planning and Routing*.

4. In the **Default Work Order Status** field, choose one of the following:

- **Firm Planned**
- **Open Planned**
- **Released**

Your selection defines the default status of new work orders you manually create.

5. Click **Save**.

**Mark Work Orders Firmed**

You must change the status of Open order to be Firmed if you want the order to be saved and processed when the supply planning engine runs. You can open an individual order and set it to Firm, or use the steps below to update the status of many orders at one time.

**To mark work orders firmed:**

1. Go to Transactions > Manufacturing > Mark Work Orders Firmed.
2. In the **Item** field, select an item to filter the list and show only orders that include that item.
3. In the **Customer** field, select a customer to filter the list and show only orders for that customer.
4. Check the box in the **Mark Firmed** column next to each order you want to firm.
5. Click **Submit**.

**Mark Work Orders Released**

Any work order in a Firm Planned state must be set to the Released status in be able to commit items to it. You can open an individual order and set it to released, or use the steps below to update the status of many orders at one time.

**To mark work orders released:**

1. Go to Transactions > Manufacturing > Mark Work Orders Released.
2. In the **Item** field, select an item to filter the list and show only orders that include that item.
3. In the **Customer** field, select a customer to filter the list and show only orders for that customer.
4. Check the box in the **Mark Released** column next to each order you want to firm.
5. Click **Submit**.
Component Yield Preferences

Assembly Component preferences can help you with component requirement calculations.

**Note:** To use these component preferences, enable the Work Orders feature.

To use these component preferences, adjust your item records settings which are available on the following:

- **Use Component Yield** – Account for material component yield loss during the ordering and planning process
- **Round Up Quantity as Component** – Round the component quantity up to a whole number in base units

**Use Component Yield Preference**

The Use Component Yield preference enables you to automatically calculate quantity allowances for expected raw material loss during processing. This means you no longer need to manually adjust raw material purchase quantities to account for issues. For example, quality of material/defects or machine processing/scrap.

Accounting for material variances enables you to adjust your planned usable quantity by ordering more units than the target build quantity. Work orders can reflect item order quantities based on accurate expected component yield assumptions, not the quantities listed on the bill of materials.

For example, you sell a coffee cup assembly that is made up of 3 components: 1 cup, 1 lid and 1 sleeve. Since every 100 assemblies produces 5 defective cups, when ordering the cup assembly you need to order 105 units to produce 100 cups.

**To set component yield:**

1. Create or edit an assembly item record.
2. On the assembly record **Purchasing/Inventory** subtab, click the **Components** subtab.
3. Do one of the following:
   - To enable NetSuite to calculate the necessary quantity to build or order based on component yield settings, check the **Use Component Yield** box.
     After checked, this preference applies this setting to this assembly and any sub-assembly components required for the top level assembly. To learn more, see Component Yield Example Three: Sub-assemblies and Component Yield.
   - To not let NetSuite calculate the necessary quantity to build/order, clear the **Use Component Yield** box.

**Important:** Review your customization scripts prior to enabling this preference.

After checking the Use Component Yield box, you can set the following on the item record:

- The **Quantity** field on the Components subtab is disabled because this quantity is calculated by NetSuite.
  This field displays the amount required for the assembly when one unit of the assembly is being built. This value is automatically calculated from the entries in the Component Yield and BOM Quantity fields.
The **BOM Quantity** column displays the quantity of the component used to build an item assuming no loss.

The **Component Yield** column displays the anticipated yield due to loss during the manufacturing process.

For example, after enabling the Use Component Yield preference you can enter the yield and BOM quantity.

A Sleeve is a component of the Coffee Cup assembly. Each Coffee Cup assembly requires a sleeve. The sleeve has an anticipated loss amount of 50%. Enter the following on the Coffee Cup assembly item record:

- Check the **Use Component Yield** box
- Sleeve Component Yield is 50%
- Widget 1 BOM Quantity is 1

When a work order is created for the Coffee Cup item, NetSuite calculates a requirement of 2 sleeves, and displays 2 in the Quantity field Components subtab.

### Round Up Quantity as Component Preference

You can use the Round Up Quantity as Component Preference on a work order component quantity to automatically round up to a whole number in base units. Depending on your settings, the component yield calculation could result in a fractional quantity.

For example, a mountain bike assembly requires 2 units of the brake component. The component yield is 99%. To build 5 of these assemblies requires 10.1 units of the brake component. Since you can consume components only in whole numbers, you cannot consume 10.1 units. You need to round up to the next highest whole number, 11 base units.

On a work order for an assembly that uses component yield, NetSuite indicates the Component Quantity, BOM Quantity and Component yield for rounded-up components.

**To set round-up preference:**

1. Create or edit an item record for an Inventory item or an Assembly item that is used as a sub-assembly component.
2. In the **Purchasing/Inventory** subtab **Inventory Management** section, do one of the following:
   - To enable NetSuite to round up the quantity consumed for this item, check the **Round Up Quantity as Component** box.
   - To not let NetSuite round up the quantity consumed for this item, clear this box.

When this preference is enabled, the Quantity field on the Components subtab is disabled because this quantity is calculated by NetSuite.

**Important:** Review your customization scripts before enabling this preference.

### Examples

The following table displays the Table Assembly item and its components:
Component Yield Example One: Assembly without Component Yield

Each table assembly you manufacture requires 1 table top and 4 legs. For each leg, you require 1 rod and 1 filler. Because the Build Subassembly box is checked on the Table Top Assembly item record, when a work order for a table top assembly is created, 4 rods and 4 fillers are required.

Component Yield Example Two: Assembly with Component Yield

The item Table Assembly item record Use Component Yield box is checked. 10% of the leg subassemblies are processed incorrectly and are waste. When a work order is created for 100 table assemblies, NetSuite calculates that the order requires 110 rods and 110 fillers.

Component Yield Example Three: Sub-assemblies and Component Yield

When a work order is created for an assembly, the top level assembly component yield preference is applied to all sub-level components.

Example 3a:
- Table assembly does not use component yield
- Leg subassembly uses component yield

The item Table Assembly and the item record Use Component Yield box is not checked.

After a work order is created for 100 Table Assemblies, NetSuite follows the component yield preference for the top level assembly and for sub-level components.

Since component yield is not used for the top level, NetSuite does not use component yield for the subassembly. The work order displays a requirement of 100 rods and 100 fillers.

Example 3b:
- Table assembly uses component yield
- Leg sub-assembly does not use component yield

After the Build Subassembly box is checked, NetSuite performs a yield calculation for all subassembly components.

<table>
<thead>
<tr>
<th>Item A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uses component yield</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not use component yield</td>
</tr>
</tbody>
</table>
Component Yield Preferences

- Item C is a component of A
- Item D is a component of B
- Item C is a component of B
- Item D is a component of B

After a work order for Item A is created and the Build Subassembly box is checked, NetSuite uses component yield for all subassemblies (C and D) because it respects the setting of the top level assembly.

Editing a Work Order

You can add and edit components on any work order which is in Planned, In Process or Released state. You can also remove components from a Work Order, providing they have not already been used in the build. In such cases, amend the associated Work Order Issue or Work Order Completion, before attempting to remove the item from the work order. The quantity of components cannot be changed to a number less than the quantity used in a build.

To edit individual work orders:

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. Beside a work order that is in In Process or Released status, click Edit.
3. On the Item line, make the required changes.
4. Click **Save**.

**Note:** If you have enabled Advanced Manufacturing, you can track updates to your work order. For more information, see the help topic **Editing Work Orders for Scheduling**.

Printing a Work Order Bill of Materials

For work orders you have entered, you can print a Bill of Materials (BOM). The BOM shows the types and quantities of items you need to complete the work order.

If you print a BOM for a work order that has a Built status, only header information shows on the BOM. To print assembly details of a Built work order, you must open the assembly item record and click **Print**.

There are two ways to print a BOM:

**Print from the work order:**

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. Click **View** next to the work order.
3. On the work order, click **Print BOM**.
   
   When you click **Print BOM** on a work order with a Built status, only information from the header of the work order shows in the BOM. If you want to print assembly details of the work order, you must open the assembly item record and click **Print**.

**Print from the print queue:**

1. Go to Transactions > Management > Print Checks and Forms.
2. Click **Bill of Materials**.
3. In the **Filter By** field, choose one of the following to filter the work orders shown:
   
   - **Some Items Committed** – The list shows orders that have one or more items committed to be built.
   
   - **All Items Committed** – The list shows orders that have all items committed to be built.
   
   - **Ignore Item Availability** – The list shows all open orders regardless of the availability.
4. Select a location to filter the list for orders for that location.
5. Select a form to use for this print run.
   
   This field defaults to the preferred form, but you can choose a form you have previously customized.

   If you are printing packing slips and use the Advanced Shipping feature, you can also use a custom invoice form when printing packing slips. For example, you can customize an invoice form to show the item rate and amount, as well as the order total. Then, when you print the packing slip using the custom form, the packing slip shows the additional information.

   To customize a form, go to Customization > Forms > Transaction Forms. Click Customize next to the appropriate form.

6. The **Documents in Queue** field shows the number of forms you have selected to print. This field updates as you check bills of materials to print.

7. Check the **Allow Reprinting** box to be able to reprint previously printed transactions. When you check this box, all documents appear at the bottom of the page in segments. Clear this box to allow documents to be printed only one time.
Note: The work order tracks whether a bill of materials has been printed, and resets this flag whenever components are committed such that new top-level assemblies may be built, or the current committed quantity is only partially built.

8. Click the Select Order Number field to enter or scan in transaction bar codes.
9. Check the box in the Print column next to each order you want to print a bill of materials for.
10. Click Print.

The bill of materials prints in two sections:

- **Section One: Bill of Materials**
  This section is a complete list of all items needed to complete the build for the work order. It shows the specific items and the quantity needed for each, including components of assembly members.

- **Section Two: Assembly Hierarchy**
  This section shows how many of each component are needed for each unit.

---

**Bill Of Materials**

DB96 Doc All Access Test Account - 563214

<table>
<thead>
<tr>
<th>Item</th>
<th>Qty. Required</th>
<th>Units</th>
<th>Options</th>
<th>Inventory Detail</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100 shg Bandage-Strips: 25-lb box</td>
<td>100</td>
<td>100</td>
<td>Color: Blue</td>
<td>Size: Large</td>
<td>10 Person-First Aid Kit</td>
</tr>
<tr>
<td>Bag bandage-Strip: 25-lb box</td>
<td>100</td>
<td>100</td>
<td>Color: Blue</td>
<td>Size: Large</td>
<td></td>
</tr>
<tr>
<td>Bandage-Strips: 25-lb box</td>
<td>100</td>
<td>100</td>
<td>Color: Blue</td>
<td>Size: Large</td>
<td></td>
</tr>
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<td>Bandage-Strips: 25-lb box</td>
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<td>Color: Blue</td>
<td>Size: Large</td>
<td></td>
</tr>
<tr>
<td>10 Person-First Aid Kit</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Print Instructions with the Bill of Materials**

If you print your BOM in PDF format, you can append the PDF file to print additional materials with the BOM.

For example, you can print a diagram or instructions about the assembly process for the top level assembly item.
For more information, read Appending a PDF File to Print with the Bill of Materials.

An alternative way to view and print the BOM is by using the Bill of Materials (BOM) Inquiry.

Appending a PDF File to Print with the Bill of Materials

If you print your bills of materials (BOM) in PDF format, you can append the PDF file to print additional materials with the BOM for use when picking and assembling the item. For example, you can print a diagram or instructions about the assembly process for the top level assembly item.

To append a file to a bill of materials:

1. Go to Lists > Accounting > Items.
2. In the Type field, select Assembly to filter your item list to show assembly items.
3. Click Edit next to the assembly item.
4. On the Communication subtab of the item record, in the Attach File field, attach the PDF file that contains the diagram, instructions, or other information you want to print with the BOM.
5. Check the Print with BOM box.
   When this box is checked, the file is a PDF document, and PDF format is used for printing, then the contents of the PDF file are appended to printed BOMs for this assembly item.
6. Click Add.
7. Click Save.

Building Work Orders

To close a work order, you must complete a build that assembles the necessary items.

Complete the following steps to build work orders.

To build work orders:

1. Go to Transactions > Manufacturing > Build Work Orders.
2. Select an assembly Item to filter the list and show only work orders for the item.
3. Select a Customer to filter the list for work orders associated with that customer.
   Select All to display all work orders.
4. Select the Posting Period you want to post this transaction to. If a period is closed, you cannot post to that period.
5. By default, NetSuite inserts today's Date as the transaction date. You can enter another date, or click the calendar icon to select another date.
6. Select the Bulk Build From Location use to build the orders.
   Required fields display a red asterisk (*).
7. Check the Filter box to filter the list to show only orders associated with the location selected in the Bulk Fulfill From Location.
   Clear this box to build orders associated with any location or associated with no location.
8. In the Filter By field, choose one of the following work order filters:
Some Items Committed – Display orders with one or more items committed to be built
All Items Committed – Displays orders with all items committed to be built
Ignore Item Availability – Displays all open orders

9. Click the Select Order Number field to enter or scan in transaction bar codes.
10. Check Build box beside each order you want to build.
11. Click Submit.

An assembly build is recorded for each of the work orders.

Work Orders and Demand Planning

When you use both the Work Orders feature and the Demand Planning feature, work orders can be created to replenish stock based on demand for assembly items. These work orders use information from item records to calculate lead times for orders.

Lead Time for Supply Planning

When you use both the Work Orders feature and the Demand Planning feature, assembly item records show the Work Order Lead Time field.

In the Work Order Lead Time field, enter the lead time (in days) to build one assembly in the base unit. Then, NetSuite calculates the lead time for a work order using the following:

Lead time for a work order =

Work Order Lead Time on Item Record * Quantity in base unit of measure

Work Order Start and End Dates

Using Demand Planning, if either the start date or end date is left blank on a work order, it can be calculated in the following way:

- When an End Date is entered but the Start Date is blank, the start date is calculated as follows:
  Start Date = End Date - (Work Order Lead Time from the item record * Quantity in base unit of measure)
- When an Start Date is entered but the End Date is blank, the end date is calculated as follows:
  End Date = Start Date + (Work Order Lead Time from the Item Record * Quantity in base unit of measure)

Note: The natural rounding method is used to determine the start and end date of work orders.

Work Orders and Sub-Assemblies

When you generate a new supply plan for an assembly item, the supply plan calculates material requirements based on the lowest level of component items needed. This enables you to reduce planning for subassembly materials at intermediary levels of the production process.

This is true for assembly items that have the Mark Sub-Assemblies Phantom box checked on the item record.
For example, the following diagram depicts the Coffee Gift Set assembly item and has the following component structure:

- **Assembly Item A: Coffee Gift Set**
  - Component B: Coffee Bean Pair
    - Component E: Bag of Regular Beans, 1 lb.
    - Component F: Bag of Decaf Beans, 1 lb.
  - Component C: Coffee Grinder
  - Component D: Travel Mug

If you have checked the Mark Sub-assemblies Phantom box on the item record for Item A: Coffee Gift Set, when a planned work order is generated for a Coffee Gift Set, the component assembly requirements are for items E, F, C and D and the purchase order created shows these items. Notice that Item B: Coffee Bean Pair is not a requirement itself, only its member components are required.

Also, when the Mark Sub-assemblies Phantom box is checked on the item record, the Mass Create Work Order page displays the lines from the supply plan with the Mark Sub-assemblies Phantom box disabled.

By contrast, when the Mark Sub-assemblies Phantom box is left unchecked on the item record for Item A: Coffee Gift Set, then a work order is only created for items B, C, and D. If B is not available, no order is created to create E & F.
Advanced Bill of Materials

A Bill of Materials (BOM) lists the quantities of raw materials, assemblies, sub-components, and parts needed to manufacture a product. A BOM can be used to communicate between manufacturing partners, multiple facilities within the organization, or with a single manufacturing plant.

After your administrator enables the Advanced Bill of Materials feature, the Advanced BOM replaces the Assembly/Bill of Materials record.

When you enable the Advanced BOM feature, any existing BOM is automatically converted to a read-only legacy BOM record.

**Note:** When Advanced BOM is enabled, the Derived from Member Items Cost Estimate Type is not available for Assembly Items.

Advanced BOM enables you to do the following:

- Copy existing BOMs and create new BOMs
- Use a single BOM across multiple assemblies
  
  For example, multiple bicycle frame sizes could all use the same wheel assembly BOM.
- Assign multiple BOMs to a single assembly
- Apply unique BOMs to various stages of the product lifecycle
  
  For example, an engineering BOM, a production BOM, and a subcontracting BOM.
- Copy existing Manufacturing Routings and create new routings
- Designate a default BOM for an assembly, or select an assembly default BOM for a location
  
  For example, a bicycle assembly produced in Canada uses BOM CA. When the company starts producing the same bicycle in the U.S., the system uses BOM U.S.
- Define yield at the component level on the BOM revision record
  
  Component yield enables you to account for material component loss during ordering and planning.
- Create multiple revisions of a BOM with different effective start and end dates

Migrating to Advanced BOM

To enable the Advanced Bill of Materials (BOM) feature, your NetSuite administrator can complete the following procedure.

**Important:** Bill of Materials impacts many areas within NetSuite. Before making Advanced BOM available to your organization, test it in your sandbox or release preview account. Your company customization and third party integrations could be affected.

**To enable advanced BOM:**

1. Go to Setup > Company > Enable Features.
2. Click the **Inventory & Items** subtab.
3. In the **Inventory** section, check the **Advanced Bill of Materials** box.
4. In the warning box, click **OK** to enable Advanced BOM.
5. Click **Save**.
Multiple BOM revisions are created for assemblies that were using BOM revision control. For more information, see Revision Control BOM Management. These revisions appear on the BOM record revisions tab.

**Important:** If you disable Advanced BOM after it has been turned on, any BOM and BOM revision records you created when Advanced BOM was enabled are deleted. Only legacy BOMs are saved.

### Legacy BOMs

After you enable the Advanced BOM feature, existing BOMs are automatically converted to read-only legacy BOM records. A legacy BOM is a snapshot of an assembly and its components at the time of conversion. The legacy BOM contains a link to the assembly.

Enabling Advanced BOM also links existing routings to corresponding legacy BOMs. NetSuite saves a copy of the link between the routing and the assembly in case Advanced BOM is disabled. If Advanced BOM is disabled, the routing is linked to the assembly record.

After Advanced BOM is enabled, the "Assembly/Bill of Materials" label changes to "Assembly" on the New Item, Assembly Item, and Saved Search forms.

You cannot edit a legacy BOM.

**To view a legacy BOM:**

1. Go to Lists > Supply Chain > Bill of Materials.
2. Beside the item you want to display, click View.
   - To view Bill of Materials – click the link under the Legacy BOM for Assembly.
   - To view BOM Revision details – in the Revisions subtab, click the revision Name.

Legacy BOM records should be used as back up records only. To modify a legacy BOM record, create a copy of the legacy BOM. For more information, see Copying a BOM.

### Edit Legacy BOM

Since some Manufacturing customers want to use Advanced BOM, but do not want to copy Legacy BOMs. NetSuite 2019.1 enables you to now edit these legacy BOMs.

**To enable legacy BOM editing:**

1. Go to Setup > Accounting > Preferences.
2. Click the Order Management subtab.
3. Check the Allow Editing of Legacy BOMs box
4. Click Agree.

   After you click Agree, you cannot disable the Advanced BOM feature. It is important to test this feature in your sandbox account before turning it on in production.

### Creating a BOM

View the Create Bills of Materials and BOM Revisions video

You can create a BOM using one of the following methods:
Creating a BOM

- Create a new BOM record
- Create a BOM from an assembly
- Copy an existing BOM

**To create a new BOM record:**

2. Enter a unique and descriptive BOM Name.
3. In the Memo field, enter any information you want to include with this BOM. For example, include phase labeling.
4. To apply component yield to all BOM revisions, check the Use Component Yield box. For more information, see Component Yield Preferences.
5. To allow all assemblies to use this BOM, check the Available for All Assemblies box. Clear the box to limit BOM use to only the assemblies selected in the Restrict to Assemblies field.

   **Note:** Selecting an assembly from the Restrict to Assemblies field does not create a link between the BOM and the assembly.

6. To allow all locations to use this BOM, check the Available for All Locations box. Clear the box to limit BOM use to only the locations selected in the Restrict to Locations field.
7. Check the Inactive box if you do not want this BOM to appear in search lists on records and forms. Clear this box if you want this BOM to appear in lists.
8. If you are using a OneWorld account, select the Subsidiary this BOM is available for. Subsidiary is inherited by BOM revisions. Press CTRL to select multiple subsidiaries.
9. To make the BOM available for all subsidiaries of the selected parent, check the Include Children box. If checked, the read-only Used on Assembly box indicates that the BOM is associated to an assembly.
10. Click Save.

**To create a BOM from an assembly:**

1. To create a new assembly or use an existing assembly, go to Lists > Accounting > Items.
2. Beside the assembly you want to create a BOM for, click Edit.
3. Click the Manufacturing subtab.
4. In the Bill of Materials list, click New.
5. Complete the Bill of Materials window.
   For more information, see Creating a BOM.

6. Click Save.

Copying a BOM

Copying a BOM enables you to reuse existing (legacy) work to create a new BOM.

The following are reasons you might want to copy a BOM:

- Create a new BOM to use the same current and future revisions
- Create alternate BOMs with minor component changes for the same product
- Update a product version with component updates

To copy a BOM:

1. Go to Lists > Supply Chain > Bill of Materials.
2. Beside the BOM you want to copy, click View.
3. From the Actions list, select Make Copy.
4. Change the copied Bill of Materials Name.
   For example, change Engineering V1 BOM to Engineering V2 BOM.
5. Make other changes as necessary.
6. Click Save.

Creating BOM Revisions

A BOM revision enables you to update a BOM's details throughout the product lifecycle. A BOM revision also provides an accessible revisions history. Use revisions to compare and track cost savings when many BOM revisions are used in production.

For example, revision Engineering Revision V2 saves Wolfe Manufacturing $27,000 dollars a year because it uses a simplified spoke insertion method on its wheel assembly. This results in faster machine run times compared to the previous Engineering BOM.

To create a BOM revision:

1. Go to Lists > Supply Chain > Bill of Materials.
2. Click View beside the BOM you want to revise.
4. Enter a revision Name.
   For example, Revision 1 or Version 1.
5. In the Memo field, enter any information you want to include with this revision.
6. To set an Effective Start Date and Effective End Date, click the calendar icon and then select a date from the calendar.
   Not entering an effective end date may affect future BOM revisions.
Creating BOM Revisions

Note: Only one revision can be active at one time. BOM revision start and end dates cannot overlap. Gaps between revision dates are allowed. To learn more, see Updating BOM Revision Record Dates.

7. Check the Inactive box if you do not want this BOM to appear in search lists on records and forms. Clear this box if you want this BOM to appear in lists.
8. Click Save.
9. In the Revisions subtab, click Edit beside the revision you just created.
10. On the Components subtab, select an Item to include with this revision. All associated revision components appear in the components tab.
11. Accept or edit the BOM Quantity. You can enter partial quantities up to 5 decimals.
12. Select an Item Source.
The work order item source determines where item quantities are taken from. For example, from stock, work order, or purchase order.
For more information, see the Item Source field on the Phantom Assemblies window.
13. To add more items, click Add and then repeat steps 8 to 12. After you have selected your components, use the Move buttons to change component order.
14. Click Save.

Copying BOM Revisions

Copying a BOM revision is a convenient way to reuse existing work to help you create a new revision. It also reduces input tasks and helps maintain consistency across records.

To copy a BOM revision:

1. Go to Lists > Supply Chain > Bill of Materials.
2. Beside the BOM containing the revision you want to copy, click View.
3. Beside the revision you want to copy, click Edit.
4. In the Actions list, click Make a Copy.
5. Change the Name of the new BOM revision.
   For example, change Engineering Rev1 BOM to Engineering Rev2 BOM.
6. Optionally, update the Memo text.
7. Accept the default Bill of Materials, or select a new one.
   You can copy a revision from one BOM and associate it with another BOM.
   For example, you can move an assembly from an engineering BOM to a production BOM.
8. Accept the default Start and End Dates, or select new dates.
9. Check the Inactive box if you do not want this routing to appear in routing lists on records and forms.
   Clear this box if you do want this routing to show in lists.
10. Accept the default component Items, or select a new one.
To remove a component, select the item and then click **Remove**.

11. Click **Save**.

### Updating BOM Revision Record Dates

Advanced Bill of Materials does not allow BOM revision dates on the same BOM to overlap. A current BOM revision must end before a new BOM revision can start. If revision dates were to overlap, NetSuite could not identify which revision to select.

Previously, you could not save a new BOM revision when the current revision did not have a defined Effective End Date. To set the current revision end date when you had started to create a new revision, you had to cancel the new revision (losing all information), update the current revision Effective End Date, and then create a new revision.

NetSuite 2018.1 enables you to update the current revision Effective End Date without losing the work done on a new revision. After you try to save a new BOM revision when the current revision Effective End Date is not defined, NetSuite displays a message prompting you to set the current Effective Start Date minus one day. After you click OK, the system automatically sets the date and saves your revision.

For example, BOM Revision 1 was created without an Effective End Date. You create BOM Revision 2 and enter an Effective Start Date of February 25, 2018. Clicking **Save** prompts the Effective End Date message to appear: “Effective End Date of the previous revision is not set. Do you want it to be set to current revision Effective Start Date minus one day?” Click **Go Back** in the message box and then set the Effective End Date for BOM Revision 1 to February 24, 2018 (one day sooner than February 25, 2018) and save BOM Revision 2.

**To update a BOM revision date:**

1. Go to Lists > Supply Chain > Bill of Materials.
2. Click **View** beside the BOM you want to revise.
3. In the **Revisions** tab, click **Edit** beside the BOM Revision you want to update.
4. Click the Calendar icon beside the **Effective End Date** field and then select a date.
5. Enter a date at least one day before your new BOM Revision **Effective Start Date**.
6. Click **Save**.

### BOM Revision Component Sublist Customization

BOM revision component sublist customization enables you to define and display component level information specific to your business workflows. You can add custom columns, change column order, update column labels, and hide column fields.

To customize a sublist, go to Customization > List, Records, & Fields > Other Sublist Fields. After you create a custom field, it is displayed in the BOM Revision Components tab. To learn more, see the help topic **Other Sublist Fields**.

The BOM Revision component sublist is not automatically added to the work order.

**To add custom columns to a work order:**

2. On the **Applies To** tab, check the **Work Order** box.
3. On the **Sourcing & Filtering** tab, in the **Source List**, select **BOM Revision Component**.
4. In the **Source From** list, select the **Bill of Materials Revision** custom field.

5. **Click Save.**

After a BOM revision is selected on a work order, NetSuite automatically retrieves a list of components related to the BOM revision. This enhancement ensures that custom field information is included in the work order.

To learn more, see the help topic **Custom Transaction Line Fields.**

### Linking a BOM to an Assembly

After you create BOM records and revisions, you can link them to individual assemblies. You can also designate a BOM as either a location default or master default for that assembly.

**To link a BOM to an assembly:**

1. Go to Lists > Accounting > Items.
2. Beside the item you want to update, click **Edit.**
3. Click the **Manufacturing** subtab.
4. In the Current Revision list, select a BOM to associate with this assembly. The displayed **Current Revision** name is the same as the Bill of Materials revision name.
5. Check the **Master Default** box to designate this as the default BOM for the assembly. Checking this box disables the Default for Location option.
6. Alternatively, check the **Default for Location** box to designate a default location. Select a location from the list. For example, the West Coast location is the default location BOM. It is also the default assembly location.
7. For more information, see **Default BOM Workflow.**
8. **Click Save.**

### Linking Assemblies to BOM Records

After you create a Bill of Materials (BOM), you can link it to one or more assemblies. All assemblies associated to the BOM are displayed in the Assemblies tab.

**To link an assembly to a BOM record:**

1. In the BOM record, click the **Assemblies** tab.
2. In the **Assembly** list, select the assembly you want to link to the BOM.
3. **Click Add.**
4. **Click Save.**

From the BOM record you can assign the same default assembly record validation (master default or location-specific default) to the BOM. A BOM cannot be both master and location default. They must be assigned to separate BOMs within an assembly.
For example, you can set one BOM as the master default for the assembly, and then set a second BOM as the East Coast location default.

**Default BOM Workflow**

Advanced BOM enables you to assign a location-specific default BOM or a master default BOM to an assembly.

For example, you can set one BOM as the master default for the assembly, and then set a second BOM as the East Coast location default. A BOM cannot be both a master and location default. They must be assigned to separate BOMs within an assembly.

The following diagram displays the workflow an assembly follows to select the appropriate BOM:

For example, a mountain bike work order assembly is fulfilled at Wolfe Manufacturing’s Canadian facility. Canadian models of the mountain bike use a different wheel assembly than those manufactured in the United States. To complete the order, the system searches the BOM settings for a location default BOM. If a Canadian default location BOM exists, it is selected.

If a Canadian location default is not defined, the assembly then searches for a master default BOM. If a master BOM is assigned, it is selected. If a default BOM is not assigned, no BOM is selected.

When an assembly has no BOM defined, the Items sub-list on the Work Order is empty. You will have to manually add components.

This default BOM workflow logic also applies to the following NetSuite records and transactions:

- Work orders
- Assembly builds and unbuilds
- Supply plans
- Standard cost roll-ups
- Phantom items
Creating a Manufacturing Routing

In Advanced BOM, routings are associated with a Bill of Materials. This association enables you to define default routings for multiple BOMs.

For example, The Wolfe Company manufactures mountain bikes its U.S. location. To do this, the U.S. location uses BOM U.S. prompting NetSuite to automatically select the BOM U.S. Routing. Due to increased mountain bike sales, Wolfe starts to manufacture mountain bikes in Canada. To manufacture mountain bikes in Canada, BOM CA is selected and the system automatically uses BOM CA Routing.

Note: You cannot update Bills of Materials for routings that were used before Advanced BOM was enabled.

The Manufacturing Routing page at, Lists > Supply Chain > Manufacturing Routing, displays the following updates:

- Legacy routings are associated with legacy BOMs.
- Bill of Materials replaces the assembly (item) list.
- The Component per Operation subtab changes to read-only for legacy BOM routings. This subtab displays a line for each component and revision combination.
  For example, a bicycle frame component appears in multiple revisions of the Mountain Bike BOM. Each revision in this BOM displays a line each time the frame component appears in Mountain Bike BOM Revisions.

To create a manufacturing routing:

1. Go to Lists > Supply Chain > Manufacturing Routing > New.
2. If you are using a OneWorld account, select a Subsidiary.
3. Select a Bill of Materials from the list.
4. Select or enter one or more Locations where this assembly is performed.
5. Enter a routing template Name.
   This name is displayed in the manufacturing routing field routings list on records and forms.
   For example, Beta Alternate Supply Routing.
6. Optionally, enter a Memo for this routing.
   You can search for the text you enter in this field.
   For example, enter “Use Beta Alternate when primary widget supply is unavailable.”
7. To use this routing by default for item forms, check the Default box.
   This sets the default steps for creating new special work orders and mass created work orders.
   Clear this box if you do not want this routing to be the default.
8. Check the Inactive box if you do not want this routing to appear in routing lists on records and forms.
   Clear this box if you want this routing to appear in lists.
9. If you want NetSuite to calculate lag times for operation tasks, check the Auto-Calculate Lag box.
   For more information, see the help topic Operations Overlap.
10. Click the **Routing Steps** subtab.

For more information, see the help topic **Creating a Manufacturing Routing**.

11. Click **Save**.

### Copying a Manufacturing Routing Record

In NetSuite 2018.1, you can manually copy an existing manufacturing routing record and then reuse it with a new BOM. Reusing existing routings saves time, leverages existing processes, and avoids manual copy errors.

For example, Wolfe Manufacturing builds bicycles in their Denver location using the BOM U.S. Routing. The company then starts manufacturing bicycles at their Ontario location. By copying the BOM U.S. Routing and renaming it to BOM ON Routing, the Ontario location can follow the proven U.S. manufacturing process using the new ON BOM.

**To copy a manufacturing routing record:**

1. Go to Lists > Supply Chain > Manufacturing Routing.
2. Beside the routing you want to copy, click **View**.
3. From the **Actions** list, click **Make Copy**.
4. Change the manufacturing routing **Name**.
   
   For example, change BOM U.S. Routing to BOM ON Routing.
5. Make other changes to the routing as necessary.
6. Click **Save**.

### BOM Inquiry

A Bill of Materials Inquiry enables you to review the build requirements for an assembly item. The BOM displays the assembly components and the number of each component that is needed for each assembly.

**To run a Bill of Materials Inquiry:**

2. If you are using a OneWorld account, select a **Subsidiary** from the list.
3. Optionally, select an **Assembly** to filter the available bills of materials.
4. Optionally, select a **Location** to display data for that location.
5. To limit the details to the top level of member items, check the **Top Level Only** box.
   
   Sub-assembly information is not displayed.
   
   To show details about all levels of member items, clear the Top Level Only box.
6. Select a **BOM Display Control** option:
   
   - **By Date** – the Bill of Materials Revision field is disabled.
     
     If the date changes, the Bill of Materials revision field displays a new BOM revision.
   
   - **By Revision** – the Bill of Materials revision field is enabled.
7. Select the **Bill of Materials** to run this inquiry against.
   
   This selection can automatically populate the Bill of Materials Revision and Effective Date fields.
8. To change the default revision, select a Bill of Materials Revision.
9. To change the default date, click the Effective Date calendar icon and then select a date from the calendar.
   For more information, see Bill of Materials (BOM) Inquiry.

Costed Bill of Materials Inquiry

The Costed BOM Inquiry report details individual and aggregated assembly costs. It shows how cost components are rolled up to an assembly item based on the BOM. This report includes material and conversion costs (labor and machine costs and their overhead).

**Note:** Standard costing and assemblies must be enabled to use the Costed BOM Inquiry. This inquiry can be run for only a standard cost assembly item.

To run a Costed Bill of Materials Inquiry

2. If you are using a OneWorld account, select a Subsidiary from the list.
3. Optionally, select an Assembly to filter the available Bills of Materials.
4. Select a Location to display data for that location.
5. To limit the details to the top level of member items, check the Top Level Only box.
   Sub-assembly information is not displayed.
   To show details about all levels of member items, clear the Top Level Only box.
6. Select a BOM Display Control option:
   ■ By Date – the Bill of Materials Revision field is disabled.
   If the date changes, the Bill of Materials Revision field displays a new BOM.
   ■ By Revision – enables the bill of materials revision field.
7. Select the Bill of Materials you want to run the from the list.
   This selection can automatically populate the Bill of Materials Revision and Effective Date fields.
8. To change the default revision, select a Bill of Materials Revision.
9. To change the default date, click the Effective Date calendar icon and then select a date from the calendar.
   For more information, see Costed Bill of Materials (BOM) Inquiry.

Matrix Items

Matrix items consist of multiple combinations of product styles and variations along with their respective bill of materials and routings. During production, matrix assemblies can be created using work orders and assembly builds.

If you use the Advanced BOM feature, the Bill of Materials subtab appears on the Manufacturing subtab:

- The Bill of Materials subtab moves from the matrix assistant to the new Manufacturing subtab.
- Both parent and child items display a bill of materials sublist.
- BOMs can be copied from parent to child item records.
The BOM sublist can be updated on child items.
You can assign a BOM or multiple BOMs to an assembly matrix.
The components subtab has been removed from the Matrix Assistant.

Note: You can add BOMs only from the assembly matrix parent or subitem.

To assign a BOM to an assembly matrix:

1. Go to Lists > Accounting > Items.
2. Beside the item you want to update, click View.
3. In the Assembly/Bill of Materials window, click Edit.
4. Click the Manufacturing subtab.
5. Select a Bill of Materials from the list.
6. To assign a BOM as a default for the assembly, check the Master Default box.
7. Alternatively, you can check the Default for Location box. Select the location from the list.
   For example, if the West Coast location is the default location BOM. It is used as the default for the assembly and the West Coast location.
   For more information, see BOM Workflow.

   Note: A BOM cannot be both a master and a location default. Only one default designation is allowed for a BOM.

8. To apply the BOM subtab settings to child matrix items, click Update Matrix.
9. In the Update Matrix Item window, check the child items to Include in this update.
10. To copy the parent BOM to all child BOMs (mass update), check the Update BOMs of Matrix Sub-items box.
11. Click Submit.

For more information, see Matrix Items.
Bill of Materials Member Control for Assembly Items

When you use the Assembly Items feature, the components needed for assemblies are identified in the Bill of Materials (BOM). Components required for an assembly can change due to engineering changes, vendor supply, availability, or seasonal requirements.

BOM member control helps you ensure that the right components are included in assembly builds at the right time. You can use BOM controls to plan for the utilization and purchase of components which are effective or obsolete within specific time frames.

To use BOM component member control, define effective and obsolete dates for member items on assembly records. NetSuite determines whether a component is valid for an assembly based on these dates.

- **Effective Date/Revision** – Defines the first date an item can be used for an assembly. Before the effective date, the item is not included in the BOM.
- **Obsolete Date/Revision** – Defines the last date an item can be used for an assembly. After the obsolete date, the item is not included in the BOM.

After a work order is created, NetSuite determines which components are required based on the transaction date. If you use the Demand Planning feature, NetSuite considers the production start date and determines which components are required on that date.

On assembly item records, after you choose a BOM control method and set up effective and obsolete dates, NetSuite uses them to determine which member items are needed to create an assembly based on the date the item is produced.

For example, Wolfe Manufacturing assembles bicycles for distribution throughout the year. The mountain bike component item includes the following:

- Disk brake 1: has an effective date of 4/1/2016
- Disk brake 2: has obsolete date of 3/31/2016

Wolfe creates a work order dated 3/31/2016 that includes a Mountain Bike assembly. NetSuite examines the effective and obsolete dates for the components on the assembly record and determines the following:

- The BOM will not include Brake 1 because it is not effective.
- The BOM will include Brake 2 because it is not obsolete.

Wolfe enters a work order dated 4/1/2016 that includes a Mountain Bike assembly, and NetSuite determines the following:

- The BOM will include Brake 1 because it is currently effective.
- The BOM will not include Brake 2 because it is obsolete.

The appropriate assembly BOM items are shown on work orders at the appropriate dates without having to manually change each work order.

For BOM management to track which components are needed at specific times, identify effective and obsolete dates for member items. To do this, select a BOM control method on assembly item records. Select to set dates individually for components or to create revision records to assign to items. When a new work order is created, NetSuite can determine the member items required based on the work order production date. Setting Up BOM Control on Assembly Item Records Revision Control BOM Management.
If you choose to manage assembly BOMs with revision records, set up revision records. Creating Revision Records for BOM Control.

Setting Up BOM Control on Assembly Item Records

To use Bill of Materials (BOM) component member control, define effective and obsolete dates for assembly record member items. You can enter the effective and obsolete dates individually on assembly records, or you create revision records that update many assembly records at one time. The following methods enable you to manage which items are used in assemblies based on production dates. Select one of the following methods:

- **Effective Date BOM Management** – Control the BOM based on dates entered on the assembly record's Components subtab.
- **Revision Control BOM Management** – Control the BOM by selecting a version with preset dates that determine components.

Effective Date BOM Management

Use Effective Date BOM management to set the effective and obsolete dates for items on individual assembly records.

**To set up Effective Date BOM Control on assembly records:**

1. Go to Lists > Accounting > Items.
2. Click **Edit** next to the existing assembly item record. You can also click **New** to enter a new assembly record.
3. On the **Purchasing/Inventory** subtab in the **Effective BOM Control** field, select **Effective Date**.
4. Click the **Components** subtab.
5. Click an existing member item or add a new one.
6. In the **Effective Date** field, enter the date when an item can be included as a member for an assembly.
   - After the Effective Date, the item is included in the BOM.
   - Before the Effective date, the member is not included in the BOM.

   | Note: A blank effective date indicates the item has always been included. |

7. In the **Obsolete Date** field, enter the date when an item can be included as a member for an assembly.
   - After the Obsolete Date, the item is not included in the BOM.
   - Before the Obsolete Date, the member is included in the BOM.

   | Note: A blank obsolete date indicates that the item will always be included. |

8. Click **Add** or **Done**.
9. Repeat steps 3 to 8 to set effective or obsolete dates for additional members of this assembly.
10. Click **Save**.

NetSuite can now source this item record to determine the correct BOM based on the assembly production date.
Revision Control BOM Management

To manage the Bill of Materials (BOM) for assembly items, use Revision Control as your Effective BOM Control method to simplify effective and obsolete date management. To use revision control, create revision records that define an effective date or an obsolete date. The revision records you assign to assembly members determine their effective and obsolete dates.

To learn more, see Creating Revision Records for BOM Control.

The Revision Control method enables you to set the effective or obsolete date for many items at one time by updating one revision record. When several items use a revision record, date changes can be made one time on the revision record instead of individually for many member items. Rather than changing the dates on every line item, you change only the effective or obsolete date in the revision record.

For assembly items that use Revision Control, create revision records to define effective and obsolete dates. The assembly effective and obsolete dates are determined by the assigned revision record.

Revision records can be created in two ways:

- As individual records. To learn more, see Creating Revision Records for BOM Control.
- From assembly record Members subtab. To learn more, see Setting an Assembly to Use Revision Control.

After a revision is assigned to an assembly member, you can enter a new work order and select the assembly. The correct revision defaults to based on the work order production date. The work order item list displays the correct set of member components based on the revision used.

- If you select a new revision, the item list updates to show the correct member items.
- If you change the date, NetSuite updates the revision to the one which is effective for that date.

To use only the assembly default revision, on the work order form, click Customize and then make the field not selectable.

- Edited revision record effective or obsolete dates are not retroactive. Previously entered transaction data using that revision remain unchanged.
- BOMs created for individual assembly builds compare the transaction date to the effective and obsolete dates.
- On an assembly unbuild, select a revision to determine the BOM. The default revision for an unbuild is based on the current date.
- BOM costs using Standard Costing are based on the effective date shown on the planned standard cost rollup record.

**Note:** If you use the Matrix Items feature, you cannot set the Effective BOM Control to Revision Control on a matrix parent item. However, it is possible to set the Effective BOM Control to Revision Control on a matrix subitem.

### On Work Orders

NetSuite automatically populates the work order effective revision based on the effective date. If you change the work order, NetSuite changes the components on the top level assembly based on the revision selected.

If you change the work order revision and the Build Subassembly box is checked, top-level components change based on the selected revision. The lower level components are determined based on the effective date.
Using Demand Planning

When demand increases for member items from a parent assembly, NetSuite reviews the work order start date to determine demand for those member items. For example, the Mountain Bike component items include the following:

- Brake Item 1: has an effective date of 4/1/2016
- Brake Item 2: has obsolete date of 3/31/2016

If demand for the item requires a work order to be created on 3/20 and one on 4/20, then the first work order uses the Member Item 2, and the second one will use Member Item 1. This is relevant if the member items are assemblies which need to have work orders created for them.

Setting an Assembly to Use Revision Control

To use revision records to manage effective and obsolete dates, set the assembly record to use revision control.

To set an assembly to use revision control:

1. Go to Lists > Accounting > Items.
2. Click Edit next to the assembly item record you want to set.
3. On the Purchasing/Inventory subtab, in the Effective BOM Control list, select Revision Control.

   **Note:** If you select Revision Control, you must use revision control for this item.

4. The Default Revision field displays the default revision for this item.
5. If you are creating a new item record, click Save and then click Edit to re-open the item.
   If you are editing an item already set to revision control, go to the next step.
6. Click the Components subtab.
7. Select an existing member Item or add a new one.
8. In the Effective Revision field, enter a revision or create a new one. The revision record effective date determines the start time when this item is included as a member for an assembly.

   For each member, the default selection is Default. The item will then be included in builds by default.
   a. To define a non-default date revision record, in the Effective Revision field, select New
   b. In the New Item Revision popup window, define the following for the assembly item:
      - Name (for example, Version 2)
      - Effective Date (for example, 4/1/2016)
      - Memo – Optionally enter a memo.
      - Inactive – Check this box to not display this revision in lists.

   Alternatively, enter new revision records at Lists > Accounting > Item Revisions. For more information on revision records, see Creating Revision Records for BOM Control.

   For more information about using effective fields, see Setting Up BOM Control on Assembly Item Records.
9. Select an Obsolete Revision. The obsolete revision record date determines the end time that an item is to be used for an assembly.
When you select an obsolete revision, the correct obsolete date displays in that field.

10. Click Done or Add.
11. Repeat the steps 1 to 4 for each member item you want to assign a revision to.
12. Click Save.

The BOM for this assembly is determined by referencing the production date of each work order against the revision record dates for member items.

Creating Revision Records for BOM Control

When using the Revision Control method for Bill of Materials (BOM) management, create revision records to assign to assembly items. These revision records define effective and obsolete dates and can be assigned to many items.

Update effective and obsolete dates on the revision record one time to change the dates for many items.

To create a revision record:

1. Go to Lists > Accounting > Item Revisions > New.
2. Select an Item to be associated with this revision. Required fields display a red asterisk (*).
3. Enter a revision Name. For example, Version One.
4. Enter the revision Effective Date.
5. Enter a Memo about this revision. You can later search for this version by memo text, if needed.
6. Check the Inactive box to not display this revision in lists.
7. Click Save.

Obsolete Dates

Obsolete dates on a revision record cannot be edited. You can set the effective date and when the revision is saved, the obsolete date is determined by NetSuite to avoid gaps or overlaps in dates covered by revisions.

The obsolete date field does display with a value if you try to insert a revision record between two others.

For example, you have a default revision and one with an obsolete date of 1/1/2017. The default revision has an obsolete date of 12/31/2017. Next, you create a revision with an effective date of 1/1/2017. In this case, the obsolete date is set to 12/31/2017. After you click Save, NetSuite changes the obsolete date of the Default revision to 12/31/2016. If you create another revision with an effective date of 1/1/2018, it will have no obsolete date, because it is the one with the latest effective date. When you save it, it still has no obsolete date and the 2017 revision has its obsolete date set to 12/31/2017.

Note: You can use the Import Assistant to add or update item revision records based on CSV file data. To learn more, see the help topic Item Revision Import.
Manufacturing Work In Process (WIP)

Manufacturers often use work orders to assemble the materials needed to produce an item. NetSuite Manufacturing Work In Process (WIP) enables manufacturers to track work orders through the production process, from gathering materials, through shop floor assembly, to stocking finished goods.

Assembly items built using WIP are divided into the following processes:

1. **Issue Work Order**: Move raw materials to an assembly area (work center)
2. **Complete Work Order**: Assemble raw materials and stock finished goods
3. **Close Work Order**: Reconcile variances

This separation enables you to enter work order transactions that define the completion of each step, from material consumption to assembly and completion.

To know where materials are in the manufacturing process, use WIP to track your materials and record the number of:

- Component materials in stock
- Component materials consumed against a work order
- Finished assemblies in stock
- Assemblies you can build

Use WIP to track assembly component to identify the materials not used in the process.

Tracking goods and materials enables you to control your inventory and raw materials. Controlling stock can help you avoid the following:

- Tying up funds in stock or on the production floor
- Unanticipated raw material stock-outs

NetSuite supports production processes with a long lead time and can track item assemblies as a work in process.

To use WIP, enable the feature and set up item records, see Enabling the WIP Feature.

**Note:** On transactions using WIP, you must identify a WIP location for line items. The WIP line location must match on all work order issue, work order completion, and work order close transactions.

Enabling the WIP Feature

Before you can work with Manufacturing Work in Process (WIP), you must also enable Assemblies and Work Orders. To learn more, see Enabling Assembly Items and Assembly Work Orders.
To enable the feature:

1. Go to Setup > Company > Enable Features.
2. Click the Items & Inventory subtab.
3. Check the Manufacturing Work In Process box.
4. Click Save.

After the feature is enabled you can set up items for WIP processing.

To learn more, see Setting Up Items as WIP Assemblies.

Setting Up Items as WIP Assemblies

After you have enabled the Manufacturing Work In Process (WIP) feature, you can set up assembly items to use WIP.

To set up an assembly item for WIP:

1. Go to Lists > Accounting > Items.
2. Click Edit next to the existing assembly item record.
   Alternatively, click New to enter a new assembly record.
   Only items that use standard or average costing can be used on a WIP work order.
3. On the Purchasing/Inventory subtab, check the WIP box.
   If you use the Multi-location Inventory feature, each location displays a WIP box.
   When WIP is checked, future work orders default to use the WIP multi-step production process.
4. Make a selection for the following accounts:
   1. WIP Cost Variance Account – The expense account for actual cost or average cost assemblies when the reconciliation amount cannot be returned to the asset account because the amount has been shipped. This account is required when WIP is checked for any locations.
   2. Scrap Account – The expense account for scrap that occurs during work order completion. This account is required if WIP is checked for any locations.
   3. WIP Account – The asset account used when a work order component issue is entered. This account is required if WIP is checked for any locations.

   Note: If you change the selected WIP account, the new WIP account affects only future transactions. Existing transactions continue to show the WIP account when the transaction was created.

5. To create a new assembly, complete assembly item form fields.
   To learn more, see the help topic Creating Item Records.
6. Click Save.

When the assembly is added to a work order you can use WIP to process the assembly.

Default Preferences

NetSuite WIP enables you to set default preferences for new item records.
To set preferences, go to Setup > Accounting > Accounting Preferences.

- **Default WIP Cost Variance Account** – The selected account is shown by default in the WIP Cost Variance Account field on item records. The WIP Cost Variance Account is an expense account for actual cost or average cost assemblies when the reconciliation amount cannot be returned to the asset account because the amount has been shipped. This account is required if WIP is checked for any locations.

- **Default Scrap Account** – The selected account is shown by default in the Scrap Account field on item records. The Scrap Account is an expense account for scrapping that occurs during the work order completion. This account is required if WIP is checked for any locations.

- **Default WIP Account** – The selected account is shown by default in the WIP Account field on item records. The WIP Account is an asset account used when a work order component issue is entered. This account is required if WIP is checked for any locations.

### Using WIP on Work Orders

**To use WIP on a work order:**

1. Go to Transactions > Manufacturing > Enter Work Orders.
2. To use WIP, instead of a standard assembly build on this work order, check the **WIP** box.
   
   **Note:** The WIP check box cannot be changed after a posting assembly transaction has been attributed to this work order.

3. Select a **Location**. This field is required for WIP work orders.
4. Complete the necessary Work Order form fields.
   
   To learn more, see **Entering an Individual Work Order**.

5. Click **Save**.

After a work order is designated as WIP, do not enter a standard assembly build to complete it.

Complete the build process using the following:

- **Work Order Issue** – Issue components to track material consumption or log service against a work order.
  
  To learn more, see **Entering Work Order Issues**.

- **Work Order Completion** – Identify the quantity completed and stocked.
  
  To learn more, see **Entering Work Order Completions**.

- **Work Order Close** – Generate reconciliation entries to post variances that may occur during the manufacturing process.
  
  To learn more, see **Entering Work Order Closes**.

The following table shows an example of the general ledger impact for WIP transactions:

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Location</th>
<th>CR-</th>
<th>DR+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component Asset</td>
<td>Location</td>
<td>CR-</td>
<td>DR+</td>
</tr>
<tr>
<td>Component Asset</td>
<td>WIP</td>
<td>DR+</td>
<td></td>
</tr>
</tbody>
</table>
Associating Components with Operations

Use the Manufacturing Work In Process (WIP) feature to assign and issue components at the operation level for items you assemble.

Associating components with specific operations can benefit operations that take a long time to complete. Some components may not be required when the work order starts, so it is not ideal to issue all assembly components during the first operation. If you associate components with specific operations for a routing, then components are issued on the day the corresponding operation begins.

For example, a work order is set up as follows:

- The routing includes 4 operations
- Each operation takes 1 week
- Operation 4 requires a special component

<table>
<thead>
<tr>
<th>Work Order - Start Date:</th>
<th>July 1, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Order - End Date:</td>
<td>July 28, 2014</td>
</tr>
<tr>
<td>Operation 1 - Start Date:</td>
<td>July 1, 2014</td>
</tr>
<tr>
<td>Operation 2 - Start Date:</td>
<td>July 7, 2014</td>
</tr>
<tr>
<td>Operation 3 - Start Date:</td>
<td>July 14, 2014</td>
</tr>
<tr>
<td>Operation 4 - Start Date:</td>
<td>July 21, 2014</td>
</tr>
</tbody>
</table>

- If the special component is linked to Operation 1, the component issue date is July 1, 2014.
- If the special component is linked to Operation 4, the component issue date is July 21, 2014.

To associate a component with an operation:

1. Go to Lists > Accounting > Items.
2. Beside the WIP assembly item you want to work with, click Edit.
3. Click the Manufacturing subtab.
4. Click the Components Per Operation subtab. The list displays all components and their corresponding quantities, as defined on the component list of the item record.
5. Click a Component Line.
6. In the Operations field, select an operation to associate the component with.
7. Click **Save**.
   
   After you save your work, the operation associations you set up are applied only to new work orders you create.

   Associations can also be defined for existing routings on assembly item records. Based on the specified routing, NetSuite updates the associations to components on work orders.

   - One operation can be associated with multiple components
   - Each component line can be associated with only one operation
   - One component can be associated with multiple operations if the component is defined on multiple lines.
   - Not all components are required to be associated with an operation. If no operation is defined for a component, that component is issued at the start date for the routing.

   **Warning:** Changing or deleting an operation number breaks all associations to the original operation number. For example, any component associated with the previous operation number will not be associated with the new operation number.

   Changing or deleting a component also breaks the association to an operation.

**Operation Associations and Sub-Assemblies**

If you check the Mark Sub-Assemblies Phantom box on a work order, the association between the sub-assembly and the operation is broken. The sub-assembly is replaced with its components on the list of available components and the same operation association is applied to the sub-assembly components. You can create new associations for these sub-assembly components, however you cannot edit the list of components.

**Entering Work Order Issues**

When using the Manufacturing Work In Process (WIP) feature, you need to issue components to start work order processing. When you issue components you are logging only the material consumption, not any work on the assembly process.

The work order issue indicates the material is consumed against the work. Issue assembly member components to track material consumption or log service against a work order.

After components are issued, the material value is recorded in the assigned WIP account. You can issue components for many work orders at one time.

If you use the Multiple Units of Measure feature, the issued component quantity is recorded in base units.

**To bulk enter work order issues:**

1. Go to Transactions > Manufacturing > Issue Components.
2. If you use a OneWorld account, select a **Subsidiary** from the list.
3. Optionally select the following to filter the list of work orders:
   - **Item**
   - **Customer**
4. Select the **Posting Period**.
5. Select the **Date** for this issue transaction.

6. Select a **Location** from the list.
   Location is displayed in the location field in the header of all work order issues.

7. Select a **Filter By** option:
   - **Some Items Committed** – Displays the committed quantity
   - **All Items Fully Committed** – Displays the committed quantity
   - **Ignore Commitment** – Displays the remaining quantity

8. Check the **Issue** box next to all work orders you want to create issues for.

9. Click **Submit**.
   After the page is submitted, the work order issues are generated for all marked orders.

After you issue components for an order, you can enter a work order completion against it to log the finished assemblies.

To learn more, see Entering Work Order Completions.

### Issue Components for an Individual Work Order

You can issue components for a single work.

**To issue components for a work order:**

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. Click **View** next to the work order you want to issue components for.
3. Click the **Issue Components** button.
4. In the **Reference #** field, you can enter a reference number to track this transaction.
5. In the **Assembly** field, select the assembly item you want to complete. A completion can be entered only for assembly items on record.
   To create new assembly item records, click Assembly at Lists > Accounting > Items > New.
6. Select the **Revision** to use for this completion.
   To learn more, see Revision Control BOM Management.
   The **Manufacturing Routing** field displays the associated routing.
   The **Created From** field identifies the work order that this issue is created from. The work order is linked to the issue record.
7. Select an issue **Date**.
8. Select the transaction **Posting Period**.
9. Optionally, enter a **Memo** for this transaction.
   You can search for text entered here to find the transaction later.
10. Select a **Department** or **Class**, if you use them.
11. Select a **Location**.
12. Select a **Starting Operation** and **Ending Operation** to define a range.
   The default component quantity shows for components to be issued within the operation range.
13. For each component, verify or enter the quantity being issued. The remaining committed component quantity shows by default.
14. Click **Save**.
Entering Work Order Completions

To use the Manufacturing WIP, enter a completion transaction to log the number of assemblies you completed and stocked for a work order. This transaction indicates the number of finished goods produced.

Entering a completion does not record the consumption of materials, it only records the work done on the assembly process and journals the value of the assembly out of the assigned WIP account.

You can enter a work order completion with backflush to issue components and complete the assembly at one time.

To bulk enter work order completions:

1. Go to Transactions > Manufacturing > Enter Completions.
2. Select a Location.
   This location appears in the location field in the header of all work order completions created.
3. Beside the Location field, check the Filter box to filter the list and display only items being completed from that location.
4. Optionally select the following to filter the list of work orders:
   - Item
   - Customer
5. Select the Posting Period.
6. Select the Date for this issue transaction.
7. To enter completions with backflush, check the Backflush box.
   Backflush records component consumption at the same time. Component consumption is based on the proportion designated on the original work order and the build quantity.
   Clear this box to enter the completion without backflush and not record consumption.
8. Check the box in the Complete column for each order to be completed.
9. Verify or enter the quantity completed for each order.
   The field shows the quantity remaining on the order by default.
10. Click Submit.
   After a completion is entered against a work order, that quantity of assemblies is recorded as being built and stocked in inventory.

Note: The work order completion Projected Value field displays the cost of the assembly, not individual components (unless you use backflush.) After you enter a Work Order Close for the work order, the close shows the difference between the cost of the assembly and the components.

Enter a Completion for an Individual Work Order

You can enter a completion for a single work order.

To enter individual work order completions:

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. Click View next to the work order you want to complete.
Enter a Completion for an Individual Work Order

3. Do one of the following:
   - To create a work order completion without backflush, click the Enter Completion button. The completion records the number of assemblies completed against a work order. It does not record component consumption.
   - To create a work order completion with backflush, click the Enter Completion with Backflush button. This records completion and component consumption.

4. On the Work Order Completion page, enter a Reference # (number).
5. To enter the completions with backflush, check the Backflush box. Using backflush means that component consumption is recorded at the same time. Component consumption is based on the proportion designated on the original work order and the build quantity.
6. Select the issue transaction Date.
7. Select the Posting Period.
8. Optionally, enter a Memo.
9. After you have entered a quantity to build, click the Inventory Detail button to specify a bin, serial or lot number for the items being processed.
   If you use Multiple Units of Measure, the Units field on the Inventory Detail record defaults to base units and cannot be changed.
10. Select a Department or Class if you track them.
11. Select a Location.
12. If you are entering a completion with backflush, verify or enter the Completed Quantity of each component consumed.
13. Click Save.

Manufacturing Routing and Completions

If you use Manufacturing Routing and Work Centers, when you enter a completion with backflush, under the Operation Completion section, complete the following additional steps.

To enter a Completion With Backflush:

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. In the Operation Completion section, select the completed operation tasks.
   - To mark a single operation task complete, select the task in both the Starting Operation and Ending Operation lists.
   - To mark a range of operation tasks complete, do the following:
     1. To identify the first operation task complete, enter the Starting Operation.
     2. To identify the last operation task complete, enter the Ending Operation.
     Operation tasks logged as completed include the starting operation, the ending operation, and all operation tasks in between the starting and ending operation tasks.
3. Enter the Completed Quantity.
   After you enter the quantity, the Components subtab and Operations subtab are automatically populated based on requirements.
   To learn more, see the help topic Routing Completion Labor and Machine Time Entry.
4. Optionally, modify the default quantity issued for components.
   When entering a routing completion with backflush, if the starting operation is the first operation, the quantity issued defaults based on the completed quantity. For example, if there are 5 components in each unit and the completed quantity is 60 units, the form displays 300 of the component item issued.

   **Note:** If the Allow Overage on Work Order Transactions preference is enabled, then you can complete/issue a quantity larger than planned.

5. If the ending operation is the last operation, you can enter a scrap quantity.
   The quantity of assemblies scrapped, posts a value to the scrap account indicated on the item record.

### Assembly Detail

1. Verify the **Quantity to Build**:
   When the ending operation is the last operation, the **Quantity to Build** field is populated with the completed quantity. The quantity is marked completed and moved to inventory.
   You cannot modify the quantity in this field. It updates dynamically based on the starting and ending operation.

2. If this is a lot numbered or serial numbered assembly, click **Inventory Detail** to enter lot or serial numbers.
   If you use Multiple Units of Measure, the Units field on the Inventory Detail record defaults to base units and cannot be changed.

3. Click **Save**.

### Entering Work Order Closes

Use Manufacturing WIP to enter a work order close to finalize the accounting for that order. The work order close reconciles the accounting by reviewing all issues and completions associated with that work order.

**To bulk enter work order closes:**

1. Go to Transactions > Manufacturing > Close Work Orders.

**Primary Options and Criteria**

1. Select the **Posting Period**.
2. Select the transaction **Date**.
3. Select a **Location**.
4. Optionally, select the following to filter the list of work orders:
   - **Item**
   - **Customer**
5. To include work orders with In Process or Built status, check the **Include In Process Work Orders** box.
6. In the **Under-Produced Variance Tolerance (%)** field, enter a percentage to close only orders that produced less than planned.
This helps determine whether some orders should not be closed because enough finished products have not been produced.

**Order Variance Calculation**: quantity ordered - quantity built/quantity ordered = variance percentage

When you enter a percentage in this field, the list of orders to close is filtered to show only orders that have a variance lower than the percentage entered.

For example, if order quantity is 10 and built quantity is 5, then the variance percentage is (10-5)/10 = 50%.

If you enter a tolerance of 60%, then this order shows in the list for closing.

If you enter a tolerance of 10%, then this order does not show in the list.

7. In the **Production Variance Tolerance (%)** field, enter a percentage to filter out orders that have a specific value variance.

The order variance calculation is: absolute value (remaining WIP value / WIP of assembly) = variance percentage

When you enter a percentage in this field, the list of orders to close is filtered to show only orders that have a variance lower than the percentage entered.

For example, if the WIP account value is $10, and the cost of building the assembly is $20, then the variance percentage is (10/20) = 50%.

If you enter 10% in this field, then this order does not show in the list for closing.

If you enter 60% in this field, then this order shows in the list.

**Date Range Criteria**

1. You can filter the list order by selecting a range of dates.

   If you use demand planning, optionally filter the list by selecting a production start date and end date.

   1. To filter by an order date range, enter a beginning date in the **Order Date From** field and end date in the **Order Date To** field.

   2. To filter by a production start date range, enter a beginning date in the **Production Start Date From** field and end date in the **Production Start Date To** field.

   3. To filter by a production end date range, enter a beginning date in the **Production End Date From** field and end date in the **Production End Date To** field.

2. Next to all order you want to close, check the **Close** box.

3. Click **Submit**.

**Enter a Close for an Individual Work Order**

You can also enter a close for a single work order.

**To enter an individual work order completion:**

1. Go to Transactions > Manufacturing > Enter Work Orders > List.

2. Beside the work order you want to close, click **View**.

3. Click the **Close** button.

4. Complete additional fields on the Work order Close page as necessary.

5. Click **Save**.
WIP and Inventory Costing

Only assemblies using standard cost and average cost are compatible with the Manufacturing Work In Process (WIP) feature. Assembly component members can use LIFO/FIFO, standard, average, or actual costing. Assemblies using LIFO/FIFO/specific costing are not compatible with this feature.

Standard cost assemblies have costs calculated based on the WIP account indicated for the order, not by date.

Standard Cost Assembly Revaluations

The standard cost of raw materials can change when a work order is still in process causing a change in the WIP valuation.

For example:

- A bicycle wheel is made of the following component parts: rims, tires, and spokes.
  - Rims cost $5.
  - Tires cost $6.
  - Spokes cost $7.
  - The total bicycle wheel cost is $18.

- When a work order is still in process, the standard cost of components changes to the following:
  - Rims cost $4.
  - Tires cost $5.
  - Spokes cost $6.
  - The total bicycle wheel cost is $15.

- The change in the bicycle wheel cost from $18 to $15 requires the following WIP cost adjustment:
  - (-1) for each component issued
  - (-3) for each assembly taken out of the WIP location

When the standard cost for an inventory or assembly item in a location changes, a separate standard cost revaluation transaction is created for each partially built work order. NetSuite creates standard cost revaluation transactions for each work order that does not have a status of Released or Built.

Posting GL Lines for a WIP Assembly Completion with Backflush

When you enter an assembly completion with backflush, you log the assembly completion and component consumption at the same time. This transaction posts to the general ledger as follows:

**Cost of the Assembly**

- For an average cost item, an estimate of the last purchase price is used for the assembly posting.
- For a standard cost item, the standard cost is posted.

**Cost of a Component**

- For an actual cost item or average cost item, the average or actual cost from the warehouse location is posted.
For a standard cost item, the standard cost for component is posted.

Note: If you use WIP, an average cost assembly item generates a variance based on the assembly cost and the component cost. If an adjustment needs to be made on the average cost based on the variance, you should use an inventory adjustment worksheet.
Manufacturing Routing

The Manufacturing Routing and Work Center feature enables you to schedule and record manufacturing operational activities against a complex work order that requires multiple teams of employees, or work centers. For example, you may have a set of operations for the following: a preparation team, an assembly run team, and a quality assurance team.

You can use Manufacturing Routing to record quantity assembly completions, team resource costs, and process overhead costs against individual work order operations.

View the Set up and Create a Manufacturing Routing video

The following roles represent members of your organization who can benefit from using Manufacturing Routing.

Operational Planner or Production Manager

Your Operational Planner or Production Manager can benefit from improved planning efficiency:

- Set up a routing record that defines multiple steps for building a complex assembly.
- Assign default scheduling parameters against each step.
- Use backward scheduling to establish a supply plan based on manufacturing scheduling requirements.

Production Manager

Your Production Manager can refine the shop floor tracking activities using the following:

- Facilitate scheduling by assigning work center groups to operation steps.
- Record progress of activities such as completion and component issue against multiple tasks or one task at a time.
- Record actual machine and labor times against anticipated times.

Cost Accountant

Your Cost Accountant can identify opportunity areas:

- Assign labor and machine overheads against completion activities.
- Develop a costing template for standard rates used in multiple routings.
- Track cost variances between actual and standard at a per service item and cost category level.

Please note the following:

- Manufacturing Routing can be used only with assembly items using standard costing or average costing.
- Manufacturing Routing can be used only with work orders that are marked as Work In Process (WIP).
- Manufacturing Routing creates variances based on per-service item and cost categories.

To set up Manufacturing Routing, you must enable the feature, define cost categories, define charge items, create cost templates, define resources, create routings, and if needed, set up standard costing.
- Complete the Setting Up Manufacturing Routing procedures.
  This enables you to use routings on WIP designated work orders.
Steps required to complete the assembly are detailed in operation task records. To learn more, see the help topic Manufacturing Routing and Work Orders.

These task records designate what needs to be done and when, as well as how much work has been completed and how much remains to be done. They define how much time you expect to spend on the task and the rates to be charged for it. Task records designate work centers to assign tasks to certain labor resources.

During the assembly process, time is logged against tasks to show progress towards completion. By entering data on the completion form you determine the following:
- Starting and Ending Operation – operation tasks that have been completed
- Quantity Completed – The time logged against each operation

Completion records show the actual time machines and labor were used. When time is entered against an operation task, the scheduling for all tasks related to the work order are updated to accurately portray progress against each operation.

For more information, see the help topic Manufacturing Routing Completions and Time Entry.

Values for assets and expenses associated with a routing work order are posted to the designated Work In Process (WIP) account during the assembly process.

Setting Up Manufacturing Routing

To set up manufacturing routing:
1. To enable the feature, see the help topic Enabling the Manufacturing Routing Feature.
2. To set preferences, see the help topic Setting Routing Preferences.
3. To define cost categories, see the help topic Defining Cost Categories for Routing.
4. To define manufacturing charge items, see the help topic Defining a Manufacturing Charge Item.
5. To group manufacturing charge items into a cost template, see the help topic Creating Manufacturing Cost Templates.
6. To define resources, see the help topics Creating Manufacturing Work Centers or Groups and Work Center Calendars.
   Click Help and read Creating Manufacturing Work Centers or Groups.
7. To create routings, see the help topic Creating a Manufacturing Routing.
8. To set up standard costing, (for accounts using the Standard Costing feature), see the help topic Standard Costing for Manufacturing Routing.

Enabling the Manufacturing Routing Feature

Before you can use the Manufacturing Routing and Work Center feature, you must it in your NetSuite account. To do so, complete the steps below.

To enable manufacturing routing:

1. Go to Setup > Company > Setup Tasks > Enable Features.
2. Click the Items & Inventory subtab.
3. Check the Manufacturing Routing and Work Center box.
4. Click Save.

Enable the following features to use the Manufacturing Routing and Work Center feature:

- Manufacturing Work In Process
- Multi-Location Inventory
- Work Orders
- Assembly Items
- Project Management

Setting Routing Preferences

When you use the Manufacturing Routing and Work Center feature, you have the option to enable the Show Planned Capacity on Work Orders preference to help manage work order planning. This preference lets production managers and planners monitor planned completion times for work order builds against work center capacity.

Setting this preference enables NetSuite to create planned time entries automatically when processing manufacturing work orders. When this preference is enabled, work orders display a new Planned Time subtab. NetSuite generates planned time entries showing the amount of time being allocated to each work center per day. The Planned Time subtab displays the duration of each operation and the associated work center. This aggregated planned time data can be accessed to determine if the resource capacity is enough to meet these needs, enabling more efficient manufacturing planning.

Note: These generated planned times cannot be edited.

When this preference is enabled, planned time is automatically recalculated after each completion. For example, your process requires Operation 10 which produces a completed quantity of 30. Next, you report the completion of Operation 10 with a quantity of 15 and the planned time is recalculated for the
remaining quantity. Because planned time is automatically updated, this preference simplifies production management.

To set routing preferences:

1. Go to Setup > Accounting > Preferences > Accounting Preferences.
2. Click the Order Management subtab.
3. Check the Show Planned Capacity on Work Orders box to show the Planned Time subtab on work orders and for NetSuite to create planned time entries automatically.
4. In the Default Scheduling Method field, choose either Forward or Backward scheduling. Your selection here will show by default in the Scheduling Method field on new work orders you enter. For more details, read the help topic Production Scheduling Methods Overview.
5. In the Create Work Orders in Supply Planning field, select one of the following to define the default for supply planning work orders:
   - Do Not Generate
   - Generate in Planned Firm Status
   - Generate in Planned Open Status
   - Generate in Released Status
   Your selection defines the default status of new work orders generated by a planning engine run.

   **Note:** If you make a selection to generate orders and also use the Manufacturing Routing and Demand Planning features, you will have the option to define production scheduling methods on work orders. For details, read the help topics Production Scheduling Methods Overview and Supply Planning and Routing.

6. Click Save.

You can also activate the Planned Time subtab on work orders that were entered prior to enabling the preference. To do so, after you have enabled the preference, open the work order in Edit mode and then click Save. The Planned Time subtab and planned time entries show on the work order.

Defining Cost Categories for Routing

You can create one of eight cost categories to use with Manufacturing Routing. These cost categories help define expenditures associated with a work order.

For example, you have a warehouse and employ workers to assemble widgets that you sell. You need to track costs associated with employee labor, warehouse machines, and overhead associated with each work order.

The cost categories below can be used to help track these costs:

**Direct Cost**

The costs are calculated when you record time for these items.

- **Labor Setup** – Cost of time for labor to set up a run
  For example, this is the cost of paying an employee to set up the machine that will be used to paint the widget.

- **Labor Run** – Cost of time for labor to run an assembly
  For example, this is the cost of paying an employee to use the machine that paints the widget during the assembly run.
■ **Machine Setup** – Cost of time spent to set up a machine to be used in a run
  For example, each time you set up the machine that paints the widget, wear and tear costs you .02 cents.

■ **Machine Run** – Cost of time spent to run a machine during assembly
  For example, each time you use the machine that paints the widget for an assembly run, wear and tear costs you .04 cents.

### Overheads

■ **Labor Setup Overhead** – Cost of overhead associated with labor to set up a run
  For example, this is the safety training expense incurred for an employee who sets up the machine used to paint the widget.

■ **Labor Run Overhead** – Cost of overhead associated with labor to run an assembly
  For example, this is the safety training expense incurred for an employee completes an assembly run.

■ **Machine Setup Overhead** – Cost of overhead associated with setting up a machine used in a run
  For example, this is the water expense incurred by running a machine during the machine set up.

■ **Machine Run Overhead** – cost of overhead associated with running a machine during assembly
  For example, this is the water expense incurred by running a machine during an assembly run.

### To set up a cost category for Manufacturing Routing:

1. To add choices to this list, go to Setup > Accounting > Setup Tasks > Accounting Lists..
2. Click **New**.
3. Click **Cost Category**.
4. Enter a name for the cost category. For example, US Labor Run Standard.
5. Select a cost type for this category. Choose from the following:
   - **Labor Run**
   - **Labor Run Overhead**
   - **Labor Setup**
   - **Labor Setup Overhead**
   - **Machine Run**
   - **Machine Run Overhead**
   - **Machine Setup**
   - **Machine Setup Overhead**
6. Check the **Inactive** box if you do NOT want this category to show in lists.

For details about creating a new cost category, read Creating Cost Categories.

### Defining a Manufacturing Charge Item

With manufacturing routing, when a specific routing operation is recorded you can use items to define charges for the activity. For example, you can define the hourly cost of activities being performed and the expense account charges are logged against.

To do so, you must set up the item record to define the item as a manufacturing charge item.
To define an item as a manufacturing charge item:

1. Go to Lists > Accounting > Items > New.
2. Click a link to create a charge item. You can track routing charges and expenses using the following item types:
   ■ Other Charge for Purchase
   ■ Service (for Purchase or for Resale)
3. Enter an Item Name.
   For example, Machine Run Time Cost.
4. If you use NetSuite OneWorld, select a Subsidiary.
   A manufacturing charge item can be associated with only one subsidiary.
5. On the item record, check the Manufacturing Charge Item box.
   The Manufacturing Charge Item box cannot be cleared if the item is included in a cost template.
   You cannot check the Include Children box on the item record when the Manufacturing Charge Item box is checked.
6. Select a Cost Category.
   The cost category cannot be changed if the manufacturing charge item is included in a cost template.
   Only manufacturing charge items can use the labor and machine cost categories.
7. Enter an hourly rate in the Purchase Price field up to 7 decimal places.
   Charges are based on hourly rate (amount per hour).
8. Click the Accounting subtab.
9. Select the expense account these hourly charges should be logged against.
10. Complete any additional necessary fields.
11. Click Save.

A manufacturing charge item cannot be associated with a unit type even if you use the Multiple Units of Measure feature.

To learn more, see the help topic Creating Item Records.

Creating Manufacturing Cost Templates

A manufacturing cost template is a list of rates that can be associated with completing a specific operation. The template defines the activities that occur and related costs to be recorded each time this step is completed.

For example, an employee works 10 hours on an assembly activity. A manufacturing operator needs to record the hours worked or a completion for this step. The cost template used defines costs associated with the step completed: the rate for each activity as well as what accounts these amounts should post to.

Using a manufacturing cost template streamlines tracking assembly process costs by making it easier to know which rates and accounts are commonly used for each step in an assembly process.

**Important:** Including too many cost types on a Manufacturing Cost Template may degrade NetSuite performance. This is compounded when multiple cost items are not related to production.

To create a manufacturing cost template:

1. Go to Lists > Supply Chain > Manufacturing Cost Template > New.
2. Enter a name for the template.

3. Optionally enter a memo. You can search for text you enter here to find this template later.

4. Check the Inactive box if you do not want this template to show in lists on forms and records. Clear this box if you do want this template to show in lists.

5. Select a cost category. For details about creating a cost category, read the help topic Defining Cost Categories for Routing.

6. Select an item. Only items that have been marked as Manufacturing Charge Items show on this list. For details, read the help topic Defining a Manufacturing Charge Item.

7. Enter rates for this line item up to 7 decimal places.
   - If this is a Setup category, enter a fixed rate. This is a one-time charge for a setup activity.
   - If this is a Run category, enter a run rate. This is an amount charged for each run completed.

   Note: Template creation performance is negatively affected when the number of lines on the cost templates is not kept to a minimum.

8. Click Add.

9. Repeat steps 5 through 8 for each category. Enter one category for each activity associated with this operational step.
   You can add only one of each of the following cost category types: Labor Run, Machine Setup, or Machine Run. However, you can add multiple categories for Overhead cost category types.

10. When all necessary categories have been added, click Save.

Cost Template Examples

A manufacturing cost template shows rates for many possible activities that are associated with an assembly step, such as the examples below:

<table>
<thead>
<tr>
<th>Activity Type</th>
<th>Example</th>
<th>Rate Type</th>
<th>Rate Amount</th>
<th>Cost Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Labor Setup Service</td>
<td>Warm up molding machine</td>
<td>Fixed</td>
<td>$10 per run</td>
<td>Labor Setup</td>
</tr>
<tr>
<td>Manufacturing Labor Setup Overhead</td>
<td>Facility rental</td>
<td>Fixed</td>
<td>$16 per run</td>
<td>Labor Setup</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overhead 1</td>
</tr>
<tr>
<td>Manufacturing Labor Run Service</td>
<td>Costs to complete one run</td>
<td>Run</td>
<td>$14 per hour</td>
<td>Labor Run</td>
</tr>
<tr>
<td>Manufacturing Labor Run Overhead Service</td>
<td>Electric utility cost per run</td>
<td>Run</td>
<td>$13 per hour</td>
<td>Labor Run Overhead</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Overhead 1</td>
</tr>
</tbody>
</table>

Creating Manufacturing Work Centers or Groups

A work center is a group of people that perform a specific step in the manufacturing process. After you have defined a work center group, that work center can be assigned to cover specific steps in the manufacturing process.

For example, your assembly process might require the following: a manufacturing group, a quality assurance group, and a packing machine group.
Work centers are set by creating a static group and identifying it as a manufacturing work center.

To create a manufacturing work center:

2. Select Static as the kind of group.
3. Select Employee as the kind of members.
4. Click Continue.
5. On Create Static Employee Group page, enter a name for this group. For example, enter Packing Machine Group. This name shows in work center lists on records and forms.
6. Select the owner of this group.

Note: You are selected by default. Only the owner of a group can add or remove members or delete the group.

7. Check the Manufacturing Work Center box. This enables this group to be used as a work center with routing records.
8. Click the Manufacturing Work Center Settings subtab.
9. Select one or more locations to associate with this work center.
   If you use NetSuite OneWorld, you can select multiple locations within a subsidiary.
10. Enter number of machine resources for this work center.
    If this machine is used in multiple work centers, enter a decimal amount. For example, if this machine is used by another work center for half the day, enter .05.
11. Enter number of labor resources for this work center.
    If labor is used by multiple work centers, enter a decimal amount. For example, if a welder only spends two hours in this work center in a day, enter .025.
12. Complete any additional fields necessary for this group record.
13. Click Save.

NetSuite uses the associated work calendar to schedule the operation tasks associated with each work center.

For more details about creating a static group record, read the help topic Creating a Static Group.

Work Center Calendars

For each work center, you can create a work calendar specific to the needs of that work center that represents the times the center is available to process work orders. Specified work center calendars enable you to manufacture products efficiently within time and resource constraints.

For example, your work centers operate as follows:

- Work Center 1: Operates five days a week for eight hours
- Work Center 2: Operates four days a week for ten hours

Your production manager can set up a work calendar for each work center that specifies the hours available for each. Based on this work center calendar information, you have real-time visibility into total scheduling capacity, as well as intelligent manufacturing routing that calculates the processing time.
After you have created the necessary calendar, define that work calendar on the work center record. Then, NetSuite can use the designated work calendar to determine the time when resources should be scheduled for associated manufacturing operation tasks.

Based on the requirement date, the supply planning engine determines the start date of a planned order using backward scheduling considering the work calendar assigned. The supply planning engine also considers work center calendars for forward scheduling when creating work orders.

To use work center calendars, complete the following steps:

- To set up a work center calendar:
  1. Go to Lists > Employees > Work Calendars > New.
  2. Enter a name for the calendar.
  3. On the Working Days subtab, define the working hours and days.
  4. On the Non-working days subtab, define exceptions to the working days rules.
  5. Click Save.

For additional details, read the help topic Setting Up a Work Calendar.

To assign a work calendar to a work center:

- 1. Click the Static button.
- 2. In the members list, select Employee.
- 3. Click Continue.
- 4. Check the Manufacturing Work Center box. This enables the Work Calendar field on the Manufacturing Work Center Settings subtab.
- 5. Click the Manufacturing Work Center Settings subtab.
- 6. In the Work Calendar field, select the appropriate work calendar from the list.
- 7. Enter additional information as needed. For details, read the help topic Creating a Static Group.
- 8. Click Save.

Creating a Manufacturing Routing

A manufacturing routing is a template that contains a list of steps required to build an assembly item. Each step is in a sequential order necessary to complete the operational sequence for completing the assembly.

After you have created a routing record, that routing can be selected on a work order to direct the completion of the assembly. The routing determines the work center, cost template, labor resources, and machine resources that will be used during the assembly.

Routings are unique for each assembly item, but routings may be shared across multiple locations.

To enter a manufacturing routing:

- 1. Go to Lists > Supply Chain > Manufacturing Routing > New.
- 2. Select the Item you are creating an assembly sequence for.
- 3. Enter one or more Location s where this assembly will be performed.
4. Enter a routing template Name. This name will be displayed in the list of routings in the Manufacturing Routing field on records and forms. For example, enter Beta Alternate Supply Routing.

5. Optionally, enter a Memo. You can search for the text you enter in this field. For example, enter Use Beta Alternate when primary widget supply is unavailable.

6. Check the Default box to use this routing by default for this item on forms. This denotes the default steps for creating a new special work orders and mass created work orders.

   Clear this box if you do not want this routing to be used by default.

7. Check the Inactive box if you do not want this routing to show in routing lists on records and forms. Clear this box if you do want this routing to show in lists.

8. Check the Auto-calculate Lag box if you want NetSuite to calculate lag times for operation tasks.

   For more information, read the help topic Operations Overlap.

9. Click the Routing Steps subtab.

Routing Steps

To enter routing steps:

1. Enter the Operation Sequence number for the step you are entering. For example, if you are entering the first step to be performed to build this assembly, enter 1.

   Sequence number determines dependencies between different operations. For example, operation 1 comes before operation 3 in the assembly process.

2. Enter the Operation Name. For example enter Assembly Setup.

3. Select a Manufacturing Work Center. This is the labor team that will complete this step.

   After you select a work center, the labor resources and machine resources are automatically entered from the work center record.

4. Select a Manufacturing Cost Template for this operation.

5. Enter the operation Setup Time in minutes. This is the amount of time required (fixed time per step) to prepare for this step in the sequence.

   For example, this could represent the time in minutes required to warm up a molding machine to bring the mold to the proper temperature.

   There is one setup time per order.

6. Enter the operation Run Rate in minutes. This is the amount of time required to complete a run and produce one unit.

   - The setup time and run rate recorded here are used in conjunction with the default calendar to schedule the completion of each step when a work order is created using this routing.
   - If you use the Demand Planning feature, backwards scheduling is used to determine the appropriate start date. There is one run time per base unit.
   - The setup time + run time = total manufacturing task time.

7. If you did not enable auto-calculate lag in the header, set Lag Type, Lag Amount, and Lag Unit as necessary.

   For more information about lag, see the help topic Operations Overlap.

8. Click Save.

You can create a new routing by clicking the New Manufacturing Routing button on the Manufacturing subtab of an assembly item record.
Standard Costing for Manufacturing Routing

When both the Standard Costing feature and the Manufacturing Routing and Work Centers feature are enabled, NetSuite calculates the assembly cost by incorporating the labor and machine costs based on the default routing.

Using Standard Costing with routings requires the following:

1. **Cost Version**
   - Verify that you have created a cost version.
   - For details, read Defining Cost Versions. Defining Cost Versions.

2. **Planned Standard Cost Rollup**
   - Run a cost rollup to calculate assembly cost. When you perform a cost rollup, NetSuite checks for a default routing to calculate costs for the assembly.
   - If the Manufacturing Routing and Work Centers feature is enabled, but no default routings are defined, NetSuite uses the first routing created as the default routing to calculate the assembly cost.
   - Planned Standard cost is a consolidation of cost based on the component and cost category.
   - For subassemblies, each of the cost categories are rolled up to the next level in the Bill of Materials (BOM) hierarchy. The differentiation between the cost categories of this level and lower levels in the roll up results are based on the items associated with the rollup.
   - When you review the cost of an assembly item based on the cost rollup, the lower level routing cost incurred by building the subassembly is denoted with the subassembly item as a component on the planned standard cost record. The routing cost incurred by building the final assembly at this level is denoted with Service and Other charge items as a component on the planned standard cost record.
   - For details, read Standard Cost Rollup. Standard Cost Rollup

3. **Inventory Revaluation**
   - Run update production cost to establish standard cost in production when Standard Costing features are used.
   - For details, read Revaluing Standard Cost Inventory. Revaluing Standard Cost Inventory

**Manufacturing Routing Cost Calculation**

The cost of each step in a routing is calculated as follows:

- **Part 1: Definition of Time / Quantity**
  - Total Setup Time = (number of resources x setup time)
  - Total Run Time = (number resources x run time)

- **Part 2: Rate**
  - Based on the manufacturing charge item, the quantity is the total hours required.
  - The total unit cost is derived at a component level per cost category and per operation sequence.

- Number of resources (from the work center) x Setup Time (from the routing record) x Manufacturing Charge Item Unit Cost (from the item record)
- Number of resources (from the work center) x Run Rate (from the routing record) x Manufacturing Charge Item Unit Cost (from the item record)

For more details about costing, read the help topic Manufacturing Routing Costing.
Manufacturing Routing and Work Orders

When the Manufacturing Routing and Work Center feature is enabled, you can use routings on work orders to manage your assembly process.

A routing you select on a work order is a template describing a list of sequential steps required to build the assembly item. The routing directs the completion of the assembly by determining the work center, cost template, labor resources and machine resources to be utilized during the assembly.

To use routings with work orders, complete the routing setup process. To learn more, see the help topic Setting Up Manufacturing Routing.

To use Manufacturing Routing on a work order:

1. Create a new work order.
2. Select a location. If you use NetSuite OneWorld, select a subsidiary.
3. Designate the Work Order as Work In Process (WIP).
   A routing can be designated on an assembly work orders that is designated as Work In Process (WIP). NetSuite uses WIP accounting to issue materials in the designated WIP account.
   If the WIP box is not checked on a work order, you are not able to select a routing for that assembly.
   For details about WIP work orders, read Manufacturing Work In Process (WIP).
4. Select the appropriate Manufacturing Routing.
   After you select an assembly on the work order, NetSuite shows the default routing for the assembly based on the location setting. If you wish to select an alternate routing, the Manufacturing Routing field displays all routings associated with the assembly for the specified location.
   For details about associating a routing with an assembly, read the help topic Creating a Manufacturing Routing.
5. Save the work order. After it is saved, you can see the following:
   - The Items subtab shows components that are issued.
   - The Operations subtab shows all operation tasks required for a particular assembly run.
     Operation tasks are created based on the routing. These tasks define the list of steps that must be completed to finish the assembly process. Tasks can be viewed and edited from the Operations subtab of the work order.
     For details, read:
       - Manufacturing Operation Tasks
       - Editing a Manufacturing Operation Task

Changing Work Order Quantities

If you change the assembly item quantity on the work order and re-save it, the Operations subtab information is updated to reflect the new requirements. For example, entering a higher quantity on the work order results in more time being required to complete the run.

Routing and Time Zones

The associated work calendar applies for all routing work orders created.
If you do not use NetSuite OneWorld, the time zone of the schedule is based on the time zone selected for the company.

If you do use NetSuite OneWorld, the time zone of the schedule is based on the time zone of the subsidiary selected on the work order.

For details, read the help topic Configuring Company Information.

### Planned Time Subtab

When you use the Manufacturing Routing and Work Center feature and enable the Show Planned Capacity on Work Orders preference, work orders show a Planned Time subtab that details work allocated to each work center and NetSuite automatically generates planned time entries. For more details, read the help topic Setting Routing Preferences.

### Manufacturing Operation Tasks

After you save a WIP work order that has a designated routing, manufacturing operation tasks are created based on the routing.

Each of these tasks is a step that must be done in order for the assembly process to be finished. After work for the task has been done, manufacturing operators can log progress against each task on a work order completion form.

**To view a list of operation tasks:**

1. Go to Transactions > Manufacturing > Enter Work Orders > List.
2. Click View next to the work order.
3. Click the Operations subtab.
4. Optionally select a custom view for the operations list.

The list displays the following for each operation task:

- Operation Sequence
- Operation Name
- Predecessor
- Start Date
- End Date
- Input Quantity
- Completed Quantity
- Setup Time (Min)
- Run Rate (Min/Unit)

Click an operation name to open the task record.

**Note:** You can also modify tasks from the work order by going to Transactions > Manufacturing > Enter Work Orders > List and clicking Edit next to the work order to be edited. Then click the Operations subtab to view a list of operation tasks.

### Adding or Deleting Tasks

On the Operations subtab of a work order, you can add a new operation task and you can delete an existing task. However, note that you can add or delete only the LAST task in the sequence.
For example, you have operation tasks with these sequence numbers: 10, 20, 30, 40.

- You can add a new task with a sequence number 41.
- You cannot add a new task with a sequence number 21.
- You can delete task sequence number 40.
- You cannot delete task sequence number 20.

After task records have been created, they can also be opened and modified individually. For details, read the help topic Editing a Manufacturing Operation Task.

Operations Overlap

When you use the Manufacturing Routing feature, manufacturing planners can use the operations overlap function to schedule overlapping manufacturing operations. Overlapping of manufacturing operations can reduce work order lead times and allow more efficient utilization of manufacturing resources. When you set up operations to overlap, work order operations can be processed in a staggered method through the production cycle rather than one at a time.

For example, a manufacturing routing requires two steps to complete a work order. However, work on Step 2 requires that only half of Step 1 is completed. Therefore, it is more efficient to start Step 2 when Step 1 is half-complete rather than waiting until all of Step 1 is complete to begin step 2. This can be accomplished by defining overlap for operations on the routing record.

To use operations overlap, you must enable these features:

- Manufacturing Routing and Work Center
- Manufacturing Work In Process
- Work Order Completion

First, a planning operator defines how a subsequent operation can overlap an earlier operation by entering the lag amount based on time, quantity or percentage on the manufacturing routing. After the defined portion of the first operation is completed, the second operation automatically begins.

Defining Lag on a Routing

The Lag Amount defines what portion of an operation needs to be completed before the next operation can start. In other words, it defines lag between beginning of an operation (run time) and beginning of consequent operation (setup time).

For each sequence of the routing, you can define a lag type using the following types:

- Time (in minutes)
- Quantity (in assembly units)
- Time Percentage
- Quantity Percentage

Autocalculating Lag

If you choose to autocalculate the routing, NetSuite can automatically calculate the optimal Lag Amount, which is the shortest possible lead time for each work order.

To autocalculate lag, check the Auto-Calculate Lag box on the routing record. Then, define the following on the manufacturing routing record:
Manufacturing Operation Tasks

- Lag Type
- Lag Amount
- Lag Unit of Measure

After you define these values on the routing, they default on work orders. The auto-calculated lag amount is the Optimal (Minimal) Lag Amount. Optimizing lag means that operations on a work order are scheduled strategically to minimize the lead time of the order and maximize the utilization of work centers within the work order.

If lag settings are changed on the operation record, NetSuite reschedules the operation when the task is saved with the new settings and reschedules all affected subsequent tasks.

When a work order is scheduled, NetSuite calculates the Optimal (Minimal) Lag Amount and Maximal Lag Amount for each operation that has a preceding operation and has a defined lag type. Then, NetSuite does not allow the lag amount to be defined outside of this range.

The autocalculation setting can be changed only when the status of a work order is Planned or Released.

- When Auto-calculate Lag is enabled, lag amounts on operations cannot be edited.
- When Auto-calculate Lag is enabled, the only lag type available is Quantity.

After being created, you can click the Operations subtab on work orders to view the Start Date/Time and End Date/Time of each operation.

On the operation task record under the Predecessor section, the Lag Type and Lag Amount can be edited. Upon saving, NetSuite validates that each lag amount entered falls between the Optimal (Minimal) Lag Amount and Maximal Lag Amount. If the lag amount entered is outside this range, an error displays the valid range.

Operations Overlap and Supply Plans

As a supply plan generates supply plan lines for assemblies or work orders, calculations do account for lag related settings on the assembly routing. NetSuite verifies that the defined lag amounts fall in the valid range between the Optimal (Minimal) Lag Amount and Maximal Lag Amount. If not, the supply plan is automatically adjusted.

- If the lag amount defined on the routing is less than the Optimal (Minimal) Lag Amount, it is adjusted to the optimal lag amount.
- If the lag amount defined on the routing is greater than the Maximal Lag Amount, it is adjusted to equal the maximal lag amount.

Editing a Manufacturing Operation Task

For any work order with a status of Pending Build, you can make changes to operation tasks on the order. For example, due to specifications particular to one order, you may wish to change information defaulted on tasks from the routing template.

After work is logged against the order and the status is In Process, you can no longer edit the operation tasks.

On individual task records, you can view the following:

- **Manufacturing charge items** – Charge items are derived from the routing template, but can be modified as necessary for individual orders.
Manufacturing Operation Tasks

- **Estimated time required for completion**
  
  When you enter a setup time or run time on the task record, these times are planned estimates and are used for scheduling. It is only after completion time is entered against a task that the actual time updated in the Actual Hours field.

  Task dependencies are assigned based on the numeric order of the operation sequence and are not editable.

**To modify operation tasks:**

1. Go to Transactions > Manufacturing > Manufacturing Operations Tasks.
2. Click **Edit** next to the operation to be modified.
   
   The Manufacturing Operation Task record displays the details described below. To make changes, click the field and enter new appropriate values. Fields that cannot be edited are noted.

   **Note:** When you modify task settings from the original template entries, labor and machine scheduling is updated to reflect calculations based on the new entries after the task changes are saved.

3. When all changes are complete, click **Save**.

   You can also modify tasks from the work order by going to Transactions > Manufacturing > Enter Work Orders > List and clicking Edit next to the work order to be edited. Then click the Operations subtab to view a list of operation tasks.

**Primary Information**

- **Operation Name** – Name of the sequence task. This name can be edited.
- **Operation Sequence** – Number of the sequence task. This determines which tasks are predecessors for other tasks. This number cannot be edited here.
- **Work Order** – The associated work order number is entered automatically and cannot be edited here.
- **Insert Before** – If this task is a predecessor to another, the subsequent task shows here. This data is entered automatically based on the sequence number and cannot be edited here.
- **Status** – This field displays if the task is started and what stage it has progressed to. This data is entered automatically and cannot be edited here.
- **Comments** – You can optionally enter comments here. You can search for this text later to find this record.

**Operation Overview**

- **Estimated Hours** – NetSuite calculates the time expected to be required to complete this task based on the following:
  
  Total setup time + Quantity x Run rate

- **Actual Hours** – This data is entered automatically based on time logged against the task and cannot be edited here.
- **Remaining Hours** – This data is entered automatically based on the calculated estimated hours and cannot be edited here.
- **Input Quantity** – This data is entered automatically and is based on the Quantity field in the form header and cannot be edited here.
Manufacturing Operation Tasks

- **Completed Quantity** – This data is entered automatically based on completions entered against this task.
- **Setup Time (Min)** – This data is entered automatically from the routing template but can be edited as needed for individual orders.
- **Run Rate (Min/Unit)** – This data is entered automatically from the routing template but can be edited as needed for individual orders.

**Operation Schedule**

If you are using the Manufacturing Routing and Work Center feature or Demand Planning feature, the work order shows a Start Date field and End Date field.

- If a routing is selected the Start Date defaults to the current date, but can be edited as needed. The End Date field is disabled and NetSuite uses forward scheduling to calculate the end date based on this information from the operation tasks:
  - Associated work calendar schedule for each of the required resources
  - Scheduling parameters set up on the routing record, such as setup time and run time
- If no routing is selected, NetSuite calculates the Start and End dates for the order based on work order lead times defined on the assembly record.

**Cost Detail Subtab**

- **Manufacturing Cost Template** – Costs recorded for the task are based on the cost template selected. Then, when time is recorded against this task, the cost is updated based on the service charges or other charges listed on the template. This selection can be edited as needed.
- Click the Cost Category field to add new category lines and rates.

**Assignees Subtab**

These are entered automatically from the routing template, but can be modified as necessary for individual orders.

- **Work Center**
- **Machine Resources**
- **Labor Resources**

**Note:** These resources denote the machine and labor resources utilized to perform concurrently to complete a manufacturing operation task. The resources parameters are used for costing purposes.

**Predecessors Subtab**

This subtab details information about the sequence of tasks required to be completed before this operation task. For each preceding task, the following are displayed:

- **Task name**
- **Task type**
- **Start date**
- **End date**
Communication Subtab and System Information Subtab

For details, read the help topic Transaction System Information and Communication Subtabs.

Customization

When a manufacturing operation task is open in edit mode, you have customization options available to you for viewing the form.

- Click the Customize Form button to customize the subtabs, fields, lists, names and more.
- Add custom fields at Customization > Lists, Records, & Fields > CRM fields. Check the Manufacturing Operation Task box on the Applies To subtab.

Work Centers and Manufacturing Operations Tasks

You can view the Manufacturing Operations Tasks list to process work orders based on work centers. This enables you to see which centers have completed tasks that are predecessors for other tasks to be worked on.

You can view the operation tasks list and filter the list to show only tasks associated with Work Center 2. If you customize the view to show the Predecessor and Predecessor Completed Quantity, you can determine which tasks that Work Center 2 is due to work on next. (Create a custom view for the task list to display specific columns and information by clicking Edit View.)

For example, if the task list shows that two work orders have tasks for which the predecessors are completed, you know that Work Center 2 needs to work on those tasks. When Work Center 2 finishes their requirement for the tasks, click View next to those tasks in the task list to enter completions. The completions entered then update associated work orders with new predecessor data and the work center task lists display the updated task statuses.

Also, after completions are entered for tasks, scheduling is updated for labor and machines to reflect calculations based on the new entries. For example, if you complete work earlier than anticipated, subsequent tasks are moved up and start and end dates are scheduled to be earlier. Likewise, if a completion reflects that work is falling behind, subsequent tasks are moved out and start and end dates are scheduled to be later.

To view the operation tasks list:

1. Go to Transactions > Manufacturing > Manufacturing Operations Tasks.
2. Optionally filter the list by selecting a work center.

Manufacturing Task Scheduler

The NetSuite Manufacturing Task Scheduler provides a graphical view of operation tasks assigned and scheduled per work center. As a production planner or operations manager, you get a real-time view of each work center and their assigned operation task. You can quickly identify issues in how operation tasks are operated, and then resolve these issues within the Manufacturing Task Scheduler itself. Use the task scheduler to facilitate the monitoring and management of operation tasks, to help you ensure that they are being worked on efficiently.
The Manufacturing Task Scheduler enables you to:

- Identify work centers that are overloaded or underloaded.
- Reassign or reschedule tasks from overloaded work centers by dragging and dropping them to a different time slot or work center.
- Update the details of a work order on the Manufacturing Operation Task Detail form.

**Availability**

The Manufacturing Task Scheduler is available in the shared Supply Chain Management SuiteApp. For more information about this SuiteApp, see the Availability section of Supply Chain Management Reports. You may also contact your NetSuite account manager.

**Limitation**

Users of Internet Explorer may encounter issues when displaying the chart. Press F12 on an open browser and verify the settings on the menu bar:

- Browser Mode: IE10
- Document Mode: IE9 standards and above

**Setting Up the Manufacturing Task Scheduler**

**Prerequisites**

Before installing the Manufacturing Task Scheduler, be sure to enable the required features:

- Go to Setup > Company > Enable Features. On the **Items & Inventory** subtab, check the box for the two features below:
  - Manufacturing Work In Process
  - Manufacturing Routing and Work Center
- Go to Setup > Accounting > Accounting Preferences. On the **Order Management** tab, check the **Show Planned Capacity on Work Orders** box to correctly calculate and display the summary bars, especially those with overlapping schedules.

**Note:** This accounting preference applies only to newly created work orders. Records created prior to enabling this preference may still not correctly show the summary bars.

For more information on enabling features and preferences, see the help topic Enabling Features.

**Installing Supply Chain Management**

Install the Supply Chain Management SuiteApp with the following details:

- Bundle Name: Supply Chain Management
- Bundle Id: 47193

For instructions, see the help topic Installing Supply Chain Management. For more information on installing bundles, see the help topic Installing a Bundle.

Supply Chain Management is a managed SuiteApp and is automatically updated whenever there are changes. Issue fixes and enhancements are available after the SuiteApp is updated in your account.
Roles and Permissions

The following table shows the list of required permissions to use the Manufacturing Task Scheduler:

<table>
<thead>
<tr>
<th>Subtab</th>
<th>Permission</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transactions</td>
<td>Work Order</td>
<td>Full</td>
</tr>
<tr>
<td>Lists</td>
<td>CRM Group</td>
<td>View</td>
</tr>
<tr>
<td>Lists</td>
<td>Work Calendar</td>
<td>View</td>
</tr>
<tr>
<td>Lists</td>
<td>Locations</td>
<td>View</td>
</tr>
<tr>
<td>Lists</td>
<td>Subsidiaries (for OneWorld Accounts only)</td>
<td>View</td>
</tr>
<tr>
<td>Custom Record</td>
<td>SCM DPS Task View</td>
<td>Full</td>
</tr>
<tr>
<td>Custom Record</td>
<td>SCM DPS User Display</td>
<td>Full</td>
</tr>
</tbody>
</table>

By default, the following standard roles are granted Full access to the two custom records that are listed in the table:

- CEO
- CFO
- Sales Vice President
- Accountant
- Accountant (Reviewer)
- Bookkeeper
- Warehouse Manager

Aside from the two custom records, be sure to assign the other permissions to standard or custom roles. To edit or customize a role, go to Setup > Users/Roles > Manage Roles. On the Manage Roles page, click the Role name to open the record and verify that the permissions are set to the required level. For more information on editing or customizing roles, see the help topic Customizing or Creating NetSuite Roles.

Based on your role, you can access the Manufacturing Task Scheduler by following the appropriate path:

- Warehouse Manager
  - Inventory > Manufacturing > Manufacturing Task Scheduler
- Administrator
  - Transaction > Manufacturing > Manufacturing Task Scheduler
- Executive or Accounting
  - Financial > Manufacturing > Manufacturing Task Scheduler

Using the Manufacturing Task Scheduler

The Manufacturing Task Scheduler page contains the chart, work center list, the task view filter, and the time period bar. On the left pane, you can view the list of work centers along with the manufacturing operation tasks that correspond to their work order. On the chart, the task bar represents each task under a work order. You can determine the schedule, duration and status of a work order from its task bar. The summary bar across each work center provides you with a quick view of all its assigned work orders. To help you decode the color-coded status of summary and task bars, refer to the legend at the bottom right.
View the following topics for the correct usage of the Manufacturing Task Scheduler:

- Working with Task Views
- Viewing a Time Period
- Switching Work Views
- Searching for a Work Center
- Decoding the Status Colors

See the following figure and table to learn the sections and tools of the Manufacturing Task Scheduler:

<table>
<thead>
<tr>
<th>No.</th>
<th>Control Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Task View Filter</td>
<td>Enables selection of the default or custom view</td>
</tr>
<tr>
<td></td>
<td>Add View</td>
<td>Adds a new custom view</td>
</tr>
<tr>
<td></td>
<td>Copy View</td>
<td>Copies an existing custom view</td>
</tr>
<tr>
<td></td>
<td>Work View options</td>
<td>Switches the work view: Work Center or Work Order</td>
</tr>
<tr>
<td>2</td>
<td>Expand All/Collapse All</td>
<td>Displays all or hides all tasks within a work center or work order</td>
</tr>
<tr>
<td></td>
<td>Time Period</td>
<td>Changes the time period displayed on the chart: Daily, Weekly, Monthly</td>
</tr>
<tr>
<td></td>
<td>Date Range</td>
<td>Displays the start and end date of a time period</td>
</tr>
<tr>
<td></td>
<td>Date Range icons</td>
<td>Moves the start date from the previous or next date</td>
</tr>
<tr>
<td></td>
<td>Pagination</td>
<td>Enables selection of a page range</td>
</tr>
<tr>
<td></td>
<td>Page Range icons</td>
<td>Displays the previous or next page</td>
</tr>
<tr>
<td></td>
<td>Page Count</td>
<td>Displays the total number of pages</td>
</tr>
<tr>
<td>3</td>
<td>Search Work Center</td>
<td>Enables searching of a work center</td>
</tr>
<tr>
<td></td>
<td>Chart Header</td>
<td>Displays the specific day, week, or month within the current date range</td>
</tr>
</tbody>
</table>
### Manufacturing Operation Tasks

<table>
<thead>
<tr>
<th>No.</th>
<th>Control Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Manufacturing Operation</td>
<td>Displays the list of tasks within a work center or work order</td>
</tr>
<tr>
<td>5</td>
<td>Summary Bar</td>
<td>Represents all tasks on the chart assigned to a work center or work order</td>
</tr>
<tr>
<td>6</td>
<td>Task Bar</td>
<td>Represents a specific task on the chart</td>
</tr>
<tr>
<td>7</td>
<td>Legend</td>
<td>Provides a short description of each color on the summary and task bar</td>
</tr>
</tbody>
</table>

### Working with Task Views

The default Task View displays all your work orders, excluding work orders on Planned, Built, and Closed Status, and those from the subsidiary. Use the default view or create a custom view if you need to closely monitor a specific set of tasks. When creating a custom view, set your preferences for any of the following filters: Production Date From and To, Subsidiary, Location, Work Center, and Work Order Status.

**Note:** The Manufacturing Task Scheduler can only display a maximum of 2000 operation tasks per page. Creating a custom view can be helpful in limiting the number of tasks to be displayed on the chart.

On the Task View Filter bar, the **Add View** button is only displayed on the default view. The **Edit View** and **Copy View** buttons are only displayed on a custom view. Follow the instructions below to use any of these task view controls.

- **To add a view**
  
  To create a custom view, click **Add View**. Assign a name to the view and select your preference for any of the filters.

- **To edit a view**
  
  To make changes to a custom view, select the name of the view and then click **Edit View**. The current preferences for the selected view are displayed on the form, which you can change or update.

- **To copy a view**
  
  To make a slight variation of an existing view, use the **Copy View** option.

When you choose a custom view with a specified date range for the production start date, the start and end of the range are marked with vertical bars. All production start dates that fall within the range are included inside the bars.

On the sample screenshot, the vertical bars on the chart are placed on the week of July 27 and August 31. The production start date of all tasks fall within the vertical bars, as well as the date range.
Viewing a Time Period

On the time period bar, click any of the period options to change the current chart view. Changing the time period adjusts the entries on the date header above the chart:

- **Daily**: shows the day, month, and date on the date header. A total of 14 days are displayed at a time.
  
  On the Daily chart, task bars cover the entire day, regardless of the number of work hours.

- **Weekly**: shows the month and date of the first day of the week, on the date header. A total of 12 weeks are displayed at a time.

- **Monthly**: shows the month and year on the date header. A total of 6 months are displayed at a time.

Based on your selected time period, the date range is automatically adjusted. The date range displays the start and end date of the current period covered, for the daily and weekly time period. When you select the monthly option, it displays the start and end month along with the year.

Click the previous or next icon located beside the date range to move the start and end date or month before or after the current selection, respectively. This automatically adjusts the date header and chart view.

Switching Work Views

Beside the task view controls, click either the Work Center or Work Order link to change the operation task grouping on the left pane. By default, the left pane displays the Work Center view where operation tasks are listed under their assigned work centers. You have the option of switching to the Work Order view if you need to see all tasks that belong to each work order.

In Work Order view, aside from the operation task, you can also see the assembly item of each work order and the work center where the task is assigned. Also, the pagination at the right side of the time period bar represents the number of work orders on the current page. On the chart, the summary bar across each work order represents all tasks under it.

**Note:** Reassignment and rescheduling of tasks cannot be done through drag and drop of the task bars. You have to switch back to Work Center view to update the tasks directly on the chart.

Searching for a Work Center

On the Work Center view, use the search tool located below the time period bar to search for a work center that is not displayed on the current page. Enter the complete or partial Work Center name as search criteria. Press Enter on your keyboard or click the search icon to start the search. Only the retrieved work center and its assigned work orders are displayed on the chart.

**Note:** At least 3 characters are required as search criteria.

To return to the initial list of work centers, remove any criteria on the search tool and then click the search icon.

Click the Expand All or Collapse All links to display or hide the work orders of all work centers at the same time. This expands or collapses work centers across all pages and is carried out even when you move from one page to another.

When work centers or work orders are collapsed, the chart displays only the summary bars. This is useful in the following ways:

- You can compare the summary bars across all work centers or work orders.
In the Work Center view, displaying only the summary bars highlights any overloaded or underloaded resource.

You can also use the pagination controls at the right side of the time period bar to help in searching for a work center. It displays the current number of work centers displayed on the page. Click the down arrow to view and select another page. Use the previous and next arrows to move from one page to the next.

The Manufacturing Task Scheduler can display a maximum of 20 work centers or work orders per page.

Decoding the Status Colors

The color of the task bar indicates the current status of a task as seen in its operation task record. Any status change that is made on the record is also reflected on the bar. The initial task status is **Not Started**, in yellow. As soon as it is **In Progress**, the percentage of task completion is indicated in blue, and the rest of the task bar remains yellow.

All work orders are represented on the summary bar across each work center, in green. You can check for conflicting tasks with overlapping schedules, which are indicated in red.

Check the color codes on the legend bar located below the chart. Use the table below as a guide to the definition or description of colors used in the task bar, summary bar, and chart.

<table>
<thead>
<tr>
<th>Color</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green (Task Assigned)</td>
<td>Summary bar color that indicates an assigned task</td>
</tr>
<tr>
<td>Red (Task Conflict)</td>
<td>Summary bar color that indicates one or more tasks with overlapping schedules</td>
</tr>
<tr>
<td>Yellow (Not Started)</td>
<td>Task bar color that indicates a task that has not started</td>
</tr>
<tr>
<td>Blue (Completed)</td>
<td>Task bar color that indicates a task's percentage of completion</td>
</tr>
<tr>
<td>Gray (Non-Working Day)</td>
<td>Column color that indicates a non-working day</td>
</tr>
</tbody>
</table>

Understanding Task Conflicts

On Work Center view, the summary bar displays all operation tasks assigned to a work center. The summary bar may display a task conflict, in red, if two or more overlapping tasks exceed the total working hours per day.

The sample screenshot shows overlapping tasks in conflict for April 8 and 9, but not for April 10. This is derived by comparing the duration of all tasks for a certain day against the total working hours allotted for the work center.
The following table shows the duration or working hours for each task and the total duration per day. You can see how the overlapping tasks are shown as such in the summary bar. For April 8 and 9, the total task duration exceeds the allotted 8 working hours for Work Center 3.

**Work Center 3:** Total working hours per day = 8.

<table>
<thead>
<tr>
<th>Work Order #33: 40 Packaging</th>
<th>April 8</th>
<th>April 9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Order #36: 30 Packing</td>
<td>7.33</td>
<td>8</td>
</tr>
<tr>
<td>Work Order #38: 30 Packing</td>
<td></td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Total task duration per day</strong></td>
<td><strong>15.33</strong></td>
<td><strong>10.1</strong></td>
</tr>
</tbody>
</table>

The duration is indicated in the planned time details of a work order. To view the duration of tasks in a work order, go to Transactions > Manufacturing > Enter Work Orders > List. On a specific Work Order page, you can see the duration on the **Planned Time** tab. For more information, see the help topic **Manufacturing Routing and Work Orders.**

On the chart, you can adjust the schedule of a task or reassign a task to another work center to resolve a task conflict. For more information, see the help topic **Updating Tasks Using the Manufacturing Task Scheduler.**

### Updating Tasks Using the Manufacturing Task Scheduler

By looking at the summary bar of a work center, you can check for overlapping tasks indicating that a work center is overutilized. In this case, you have the option of scheduling a work order to a later date or assigning it to another resource. You can perform the following updates or changes to a task using the Manufacturing Task Scheduler:

- Reassigning a Task
- Forward Scheduling on the Manufacturing Task Scheduler
- Backward Scheduling on the Manufacturing Task Scheduler
- Updating a Task Record

**Note:** You can update tasks directly on the chart only when you are on the Work Center view. Use the task view filters to help limit the view to specific work centers where the reassignment or rescheduling are going to be performed.

For more information on task conflicts, see the help topic **Understanding Task Conflicts.**
When updating the chart, appropriate icons are displayed to inform you which tasks can be reassigned and updated. Refer to the list of icons used on the chart:

- **🔒**: This lock icon on the cursor indicates that the task is not open for reassignment or rescheduling.
- **学会了**: No lock on the cursor means that the task can be transferred to another chart location.
- **✅**: This icon indicates that the task can be transferred to the new chart location.
- **🚫**: This icon indicates that the task cannot be transferred to the new chart location.

You can also check the work order status of the task to determine if the details can be updated or changed. Only tasks with **Planned** or **Released** work order status can be updated.

To check the work order status, place the cursor on the task bar to display specific details from its manufacturing operation task record.

### Reassigning a Task

To reassign a task, drag the task bar upward or downward within the same column, toward the new work center.

**Note:** You cannot reassign a task to an inactive work center or one that belongs to a different subsidiary.
As you drag the task bar, the check icon is displayed beside the start and end dates. This indicates that you can drop the task onto the specific chart location on the new work center. The reassigned task retains all its details, except for the new work center number.

Forward Scheduling on the Manufacturing Task Scheduler

To perform forward scheduling on the chart, you can change the start date of the first task in the work order. This applies to work orders set to Forward scheduling method. For more information on scheduling methods, see the help topic Production Scheduling Methods Overview.

Set your chart to the Work Center view to start forward scheduling. To locate the first task in the work order, verify that the sequence number located beside the work order number is the first in the operation process. To move the schedule to an earlier or later date, drag the task bar to the left or right of the original start date, within the same row. You can drop the task to the new location when you see the new start date displayed with a check icon.

**Note:** Select the appropriate time period option to have an easier time locating a new date on a different week or month. Use the previous and next date range arrows to adjust the dates on the view accordingly.

After moving the date of the first operation task, the schedules of the succeeding tasks are automatically adjusted. You can switch to the Work Order view to review the new schedule of tasks within the work order. The changes made on the chart are also applied to the work order and operation task records.

Backward Scheduling on the Manufacturing Task Scheduler

Backward scheduling on the chart applies to work orders set to the Backward scheduling method. To perform this, you can move the end date of the last operation task in the work order. Changes to the schedule are also reflected on the corresponding work order and operation task records. For more information on scheduling methods, see the help topic Production Scheduling Methods Overview.

To start backward scheduling, be sure to set your chart to the Work Center view by clicking its link located above the chart header. On the left pane, look for the last operation task of the work order to be rescheduled. On the chart, drag and drop the task bar of the last operation task to the new date.

- Drag to the right of the current date to move the schedule to a later date.
- Drag to the left of the current date to move the schedule to an earlier date.

After moving the last operation task bar to the new date, the preceding tasks within the work order are automatically adjusted to accommodate the new schedule. You can review the new task schedules by switching to the Work Order view.
Updating a Task Record

You may update a task record, but after a task is changed to In Progress status, its details can no longer be edited. To display the manufacturing record, double-click its corresponding task bar on the chart. You can edit the following details:

- Setup Time
- Run Time
- Work Center
- Machine Resources
- Labor Resources

After a record is changed, any adjustments to the time or date are automatically reflected on any dependent fields. For more information about editing the task details, see the help topic Editing a Manufacturing Operation Task.

Supply Planning and Routing

If you use the Demand Planning feature in addition to the Manufacturing Routing and Work Center feature, routings on work orders can affect your supply planning. This is because supply planning uses backwards scheduling to meet manufacturing due dates.

**Note:** Procurement lead times do not affect these time requirement calculations.

The supply planning method used depends on whether or not a default routing is identified.

**Without a Default Routing**

When you generate a supply plan on the Generate Supply Plan page, NetSuite calculates the order date (or release date) based on the due date using the following formula for assembly items that are required to be built:

\[
\text{Order Date} = \text{Due Date} - (\text{Quantity} \times \text{Work Order Lead Time})
\]

- **Quantity** = Quantity of items required
- **Work Order Lead Time** = Number of days required to build, per unit
- **Due Date** = Date when the additional supply is required

Note that without a default routing, calculations are made without reference to any calendar or resource requirements.

**With a Default Routing**

When the Manufacturing Routing and Work Center feature is enabled, the supply planning engine on the Generate Supply Plan page considers the default routing and associated work calendar for scheduling purposes.

When an assembly build is required and a default routing is defined, NetSuite calculates the cumulative lead time across all operation sequences using the following formula:
Total time = 
\[\text{Sum of Setup Time for all operation tasks} + (\text{Sum of Run Rate} \times \text{Quantity})\] \times \text{Total Hours per day}

**Note:**
- Setup Time = Total cumulative setup time across all operation sequences in the default routing
- Run Rate = Total cumulative run time across all operation sequences in the default routing
- Total Hours per day = Total number of hours available on the associated work calendar

The order is calculated by backward scheduling from the due date. NetSuite does consider the associated work calendar for days available as well as holidays.

If changes are made to the associated work calendar or to the routing record, the supply plan should be regenerated. These changes can include:
- modifying the work calendar (such as to increase/decrease the working days or add/remove holidays)
- editing the routing to increase/decrease a setup time or run rate

After regeneration, the order dates are modified to reflect the new requirements and still meet the due date deadline.

### Routings and the Generate Work Order in Supply Plan Preference

NetSuite supply plan processing for an assembly that has a routing defined depends on your setting for the Generate Work Order in Supply Plan preference, as described below:

<table>
<thead>
<tr>
<th>Generate Work Order in Supply Plan Setting</th>
<th>Default Scheduling Method</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do Not Generate</td>
<td>—</td>
<td>The supply plan uses backward scheduling to determine order date. In this case, only the supply plan line is created, not the actual Work Order.</td>
</tr>
<tr>
<td>Not Do Not Generate Forward</td>
<td>Forward</td>
<td>The supply plan uses backward scheduling to determine the order date. Within the supply plan run, NetSuite automatically creates a work order and sets the production start date the same as the order date. When the work order is created, NetSuite uses forward scheduling to calculate the work order production end date and sets the production start date. In this case, the supply plan creates an actual order.</td>
</tr>
<tr>
<td>Not Do Not Generate Backward</td>
<td>Backward</td>
<td>NetSuite creates a work order right away using the receipt date from the demand plan. The production end date is set at one day prior to the receipt date to allow time to complete production and be available on the required date. The work order then uses backward scheduling to calculate the work order production start date. In this case, the supply plan creates an actual order.</td>
</tr>
</tbody>
</table>

For details about setting the Generate Work Order in Supply Plan preference, read the help topic [Setting Routing Preferences](#).
Production Scheduling Methods Overview

When you use the Routing and Demand Planning features to generate supply work orders, you can choose the method NetSuite uses to calculate production requirements. These calculations assess the time, materials, and resources required to complete an order and set a start or end date for the production run accordingly.

Forward Scheduling

When you use forward scheduling, you set a production start date and NetSuite calculates the time, materials, and resources required to complete all necessary operations to finish the task. The production end date is determined based on these calculations.

When using the Forward Scheduling method, on work orders, the Production Start Date field is required and defaults to the current date. The Production End Date field is dimmed because it will be calculated.

Backward Scheduling

When you use backward scheduling, you set the production end date, which is the date you need to have the completed items. Then, based on data from the associated routing, as well as the related work center calendar, NetSuite calculates the time, materials, and resources required to complete all necessary operations. The production start date is determined based on these calculations.

When using the Backward Scheduling method, on work orders, the Production End Date field is required. The Production Start Date field is dimmed because it will be calculated.

Note: This calculated start date may be a date in the past, prior to the current date.

When Backward Scheduling is set as the default scheduling method, different factors determine the production end date on generated work orders. To learn more, see the help topic Backward Scheduling.

These scheduling methods can be used both when generating individual work orders and by generating work orders using supply planning.

When a work order is saved, or generated, the supply planning engine calculates requirements and then generates necessary work orders. On the work order Operations subtab you can click an operation name to view or edit details about the operation.

To choose a production scheduling method, you must first set these preferences:

Generate Work Orders in Supply Planning

To set production scheduling methods on work orders, you must first enable the preference to Generate Work Orders in Supply Planning. For more details about this preference, read Automatically Generate Planned Work Orders. After you have set this preference to generate orders, you can select a scheduling method on orders and set a default scheduling method. When the Generate Work Orders during Supply Plan preference is enabled, the supply plan schedules work orders based on the default scheduling method.

Default Scheduling Method

Choose a default production scheduling method to determine the method that shows by default in the Scheduling Method field on work orders created manually and by automated supply planning.
To set default scheduling method preferences:

1. Go to Setup > Accounting > Preferences > Accounting Preferences.
2. Click the Order Management subtab.
3. In the Default Scheduling Method field, choose either Forward or Backward.
   This field defaults to the Forward scheduling.
4. Click Save.

This method you select automatically completes work orders, but you can change the method on individual orders with a status of Planned or Released.

**Backward Scheduling**

When you use the backward scheduling method for production planning, you set the production end date, which is the date you need to have the completed items. Then, based on data from the associated routing, as well as the related work center calendar, NetSuite calculates the time, materials, and resources required to complete all necessary operations. The production start date and time is determined based on these calculations.

For example, you need to schedule an order of widgets that requires two operations to complete a production run. Each operation requires 1 day of setup time and 10 days of production time. Operation 1 must be complete before Operation 2 can start. These production requirements are depicted below:

![Operation Schedule]

Using backward scheduling, when you enter the date you need the items completed, NetSuite can use the information above to calculate the day work must begin to complete production on time. When a work order is created by a supply plan, NetSuite schedules work so that the last operation is completed before the due date. Because the due date time is 00:01 AM, the last operation on the work order is scheduled to be completed by 11:59 PM on the day before the due date.

The time displayed for each operation is based on work hours set for each work center. Read the help topic Creating Manufacturing Work Centers or Groups.

Planners who use the Backward Scheduling method can appreciate accuracy that can help reduce waste of manufacturing resources. Because NetSuite calculates start dates automatically, time is not wasted.
trying to figure out when a work order production needs to start to finish by certain date. Work order production is scheduled to start as late as possible, giving planners flexibility to cancel or change an order, if needed.

**Note:** The NetSuite planning engine calculations may set a production start date in the past, depending on the end date entered.

Production work is not automatically re-allocated based on resource capacity. After work orders are created, you may need to assess resource assignments.

When Backward Scheduling is enabled as the default scheduling method, the production end date on generated work orders is determined using the following factors:

- **Sales Order** — When you check the box in the **Create WO** column on the **Items** subtab for an item that uses the WIP multi-step production process, a work order is generated for your assembly item. The production end date on the work order will be set to one day before the expected ship date indicated on the work order. If no expected ship date is entered, the production end date will be set to the same day as the sales order date.

- **Work Order** — When you check the box in the **Create WO** column on the **Items** subtab, a work order is generated for a sub-assembly. The sub-assembly’s production end date will be set to the same date as the parent item’s production start date.

- **Supply Plan** — When a work order is generated during a supply plan, the production end date for a sub-assembly will be set to the same date as the parent item’s production start date.

  The **Generate Work Orders** preference must be set to any option except **Do not Generate**.

- **Mass Creating Work Orders** — If you select **Reorder point** as the Replenishment Method, the system will use Forward Scheduling for the work orders regardless of the default scheduling method set in the account preferences.

## Manufacturing Routing Completions and Time Entry

For work orders that use manufacturing routings, enter time and completions against the operation tasks to track the assembly process and monitor associated scheduling and costs.

Click one of the following links for details about completions and time entry:

- **Routing Work Order Completions**
- **Routing Completion Labor and Machine Time Entry**
- **Time and Status Updates on Tasks**

## Routing Work Order Completions

After an assembly task has been completed, record a completion against the operation. The completion logs time and activities against the operation. Updating records to keep information current in the work order records enables you to track costs and expenditures up to the current point in time.

You can enter a completion in three ways:

- **Enter a Completion from a Work Order**
- **Enter a Completion on a Task Record**
Bulk enter completions (Read Entering Work Order Completions).

After you have entered an operation task completion, you can go to More Actions > GL Impact to see effects of the completion on the general ledger. The GL Impact page shows the overheads and labor expenses recorded against the WIP account.

When you enter the final required task work for an assembly as completed, saving the completion records the items as put into inventory. If you view the GL Impact page, note that the value is removed from the WIP account and added to the inventory account.

Completion Validation Preference

You can set a preference to validate that routing operation sequences are always followed in accordance with the work order. NetSuite uses this validation to ensure that the correct quantity is completed for each operational step before permitting the work order to continue being processed.

When this preference is enabled and you are entering a work order completion, this validation can function to restrict the completed quantity amount you can enter on a work order completion for a particular operation. If completing Operation B requires a set amount of items that are generated during Operation A, you can verify that the requirements of the predecessor have been met before saving the completion for Operation B.

For this example, the below is true:

- Creating 5 units during Operation A is a predecessor for creating 5 units during Operation B.
- You choose the preference setting Do Not Allow Saving. This means the total completed quantity of Operation B cannot be greater than the total completed quantity of Operation A.
- If Operation B of your routing requires 5 units that are created during Operation A, NetSuite can verify that 5 units are completed during Operation A before Operation B can begin. If you try to enter a completion with more units than are allowed, an error dialog is presented.

Such verification helps prevent problems due to out-of-sequence processing.

For orders completed across multiple days or shifts, partial quantities can be logged over time.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Qty Day 1</th>
<th>Qty Day 2</th>
<th>Qty Day 3</th>
<th>Qty Day 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation A</td>
<td>50</td>
<td>30</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Operation B</td>
<td>40</td>
<td>40</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Operation C</td>
<td>35</td>
<td>45</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

For the Check Completed Quantity in Prior Operations During Operation Completion preference, choose from the following settings:

- **No Verification** – Choose this setting if you do not want to receive verification warnings.
- **Require Confirmation before Saving** – Choose this setting to receive verification warnings. NetSuite will permit the completed quantity to be greater than the predecessor completed quantity after the warning is acknowledged.
- **Do Not Allow Saving** – Choose this setting to require that the completed quantity is not greater than the predecessor completed quantity.

**Note:** This field defaults to the No Verification selection. If you do not change this default setting, unverified completions can be entered.

For details about setting this preference, read the help topic Order Management Accounting Preferences.
Enter a Completion from a Work Order

When using the completion buttons on a routing work order, you can choose from the following options:

- **Enter Completion** (completion only)
  
  Records one of the following:
  
  - completion of a single operation or a range of operations
  - completion of entire assembly

- **Enter Completion with Backflush** (completion + issue components)
  
  Records one of the following:
  
  - completion of a single operation or a range of operations **AND** issue components
  - completion of entire assembly **AND** issue components

**Note:** When a completion and issue occurs and the status is not closed or built, the operation status automatically changes to in-progress.

For detailed steps on entering a completion from a work order, read Enter a Completion for an Individual Work Order.

Enter a Completion on a Task Record

You can open the complete list of task records to enter a completion for an operation task.

**To view an operation task record:**

1.  Go to Transactions > Manufacturing > Manufacturing Operations Tasks.
2.  Click **View** next to the completed task.
3.  On the operation task record, enter the completed quantity.
   
   After you enter the quantity, NetSuite automatically enters data on the **Components** subtab and **Operations** subtab based on the necessary requirements.
   
   For additional details, read the help topic Routing Completion Labor and Machine Time Entry.
4.  Click **Save**.

Routing Completion Labor and Machine Time Entry

When you enter a completion for a routing work order, the Operations subtab is available to record labor and machine time completed against an operation task.

For more details on entering a completion, read the help topic Routing Work Order Completions.

By entering data on the completion form you determine the answers to these questions:

- Starting and Ending Operation – Which operation tasks have been completed?
- Quantity Completed – How much time should be logged against each operation?

The Operations subtab shows which operations are being completed and the amount of labor and machine time to record against each of those operations.

First, identify which operations have been completed:
1. Enter the starting operation. This identifies the first operation task you want to identify as being completed.

2. Enter the ending operation. This identifies the last operation task you want to identify as being completed.

Operation tasks that will be logged as completed include the indicated starting operation, the ending operation, and all operation tasks in between the starting and ending operation tasks.

Next, enter the quantity completed. Then, this quantity is used to calculate the appropriate amount of labor and machine time for sequences completed.

**Note:** The completed quantity must be entered in the Operation Completion section of the form. The Completed Quantity field on the Operations sub is display only and cannot be changed.

For example, you enter the following:

- A completed quantity of 1 is entered, along with the starting operation of 10 and ending operation of 30.
- For operations 10, 20 and 30, NetSuite multiplies the completed quantity against the labor and machine time requirements set on the operation task record. The results of this calculation populate the labor and machine time fields on the Operations subtab.

### Labor Time and Machine Time for Completed Operations

After the operations being marked complete are identified, details about labor and machine time can be entered for each operation.

The Operations subtab can be used as follows for each operation completed:

- The completed quantity defaults to the same amount entered in the Completed Quantity field.
- You may or may not record setup time:
  - If you have not previously recorded any setup time against an operation, the setup columns default to show the full setup time for the operation. This total setup time is based on the setup time indicated on the operation task record.
    - In this case, the Record Setup Time box defaults to be checked.
    - For each operation, you have these options:
      - Modify the default setup time quantity.
      - Clear the Record Setup Time box.
  - If you have previously recorded some setup time against an operation, the Record Setup Time box defaults to be cleared. On any subsequent completion entry, if you want to log setup time, you must check this box manually and enter the setup time to be recorded.
- Machine and labor run times for each operation are automatically entered based on the quantity completed using the following formula:

  \[
  \text{Default run time} = \text{Qty completed} \times \text{Run rate on the operation record}
  \]

After the labor and machine times have been entered for all completed operation tasks, these times are used to calculate both the progress of the assembly and also the costs of the assembly.

- For details about assembly progress and time updates, read the help topic Time and Status Updates on Tasks.
- For details about costing implications of routing assembly completions, read the help topic Manufacturing Routing Costing.
Time and Status Updates on Tasks

When time is entered against an operation task, the scheduling for all tasks related to the work order are updated to accurately portray progress against each operation.

Often machine and labor resources working concurrently are fully utilized against a certain operation task. In such cases, both resource types are weighted equally to determine the actual time recorded on the operation task record.

Sometimes, one resource may have a higher value than the other resource for a certain task. For example, on a task, the machine run time is less than labor run time. In such a case, the critical path is the labor time since it is the greater of the two. The production schedule is updated based on the larger requirement of the two.

In such a case, of the two time values recorded, the greater is used as the actual hours on the operation task record. This applies to setup time as well as run time.

In another example, the recorded machine time is larger than the labor time because the machine can run without constantly being overseen by labor. In this case, the machine time is the critical path and is used to update scheduling. It is worth noting that the labor time is used for costing purposes.

For an operation, if the labor run time is larger than the machine run time then the labor run time is used as the actual hours.

**Note:** The default values that show for machine run and labor run times can be modified to accommodate individual run times.

After the appropriate time values have been determined, the amount shows in the Actual Hours field on the operation task record.

Based on the actual hours recorded, NetSuite adjusts the schedule of subsequent tasks to provide a realistic view for completions.

**Operation Task Status Updates**

The status of an operation task is updated automatically based on data entered for the work order or tasks. Possible status options include the following:

- **Not Started**
  - No time is recorded against the task.
  - No quantity completed is recorded on the task.

- **In Progress**
  - Some time is recorded against the task.
  - Some quantity completed is recorded on the task AND the completed quantity is less than the input quantity required.

- **Completed**
  - The completed quantity is equal to/greater than the input quantity required OR
  - The work order is closed.

**Marking a Routing Work Order as Built or Closed**

For some orders, you may want to show the items as being assembled without finishing all the individual steps for each operation task. In such a case you can do one of the following:
Manufacturing Routing Completions and Time Entry

- **Mark an Order Built**
  
  When you mark an order as built, the required items are marked built and added to inventory. Note that associated variances are not created when you do so.

  To mark a work order built go to Transactions > Manufacturing > Mark Work Orders Built.

  For details, read Marking Work Orders Built.

- **Mark an Order Closed**

  When you mark an order as closed, the required items are marked built and added to inventory. Note that associated variances are created when you do so.

  To mark a work order closed go to Transactions > Manufacturing > Mark Work Orders Built.

  For details, read Marking Work Orders Closed.

After you mark an order as Built or Closed, if you view an operational task record associated with that order, the task status displays as Completed.

**Manufacturing Routing Costing**

Values for assets and expenses associated with a routing work order are posted to the designated Work In Process (WIP) account during the assembly process.

Values are added to the WIP account based on time logged against operation tasks or quantity produced in a run. After the assembly process is complete, the values are removed from the WIP account and added to the Asset for Assembly account.

**Time Updates and Costing**

When time is logged against an operation task for an assembly, this time is used to calculate costs associated with the assembly. For example, when completion time is logged against an operation task, the following accounting entries are generated:
Manufacturing Routing Costing

<table>
<thead>
<tr>
<th>Account</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Labor</td>
</tr>
<tr>
<td>DR</td>
<td>WIP account for assembly</td>
</tr>
</tbody>
</table>

- Hours – time logged on a completion record
- Resources – sourced from the completion record
- Rate – sourced from the operation task record

Then, the result of these calculations posts to the WIP account for the assembly.

Costs can be one of two types: setup costs or run costs.

**Setup Costs**

Costs need to be logged for expenses related to setting up for an assembly run. These costs are defined on the operation task record and are based on time logged against the task.

**Note:** Setup costs are only time dependent, not based on quantity produced.

For example, the operation task *Staging* defines costs on the Cost Detail subtab. One cost category defined is Labor Setup. Using this category on a task defines the following:

- The Labor Setup cost category record indicates the item *Other Charge for Purchase - Labor Setup*.
- The task record defines the fixed rate for using the item *Other Charge for Purchase - Labor Setup* at $30.
- The item record for *Other Charge for Purchase - Labor Setup* indicates the Assembly Staging Expense expense account.

Therefore, when you log time against the *Staging* task, the appropriate amount posts to the *Assembly Staging Expense* account. This appropriate amount is calculated as follows:

\[
\text{Expense amount} = \text{Setup time logged} \times \text{Labor setup fixed rate}
\]

If 2 hours of time are logged against the *Staging* task, then $60 is logged to the *Assembly Staging Expense* account.

<table>
<thead>
<tr>
<th>Labor Setup</th>
<th>Account</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Labor Setup</td>
<td>Rate x Resources x Hours</td>
</tr>
<tr>
<td>DR</td>
<td>WIP account for assembly</td>
<td>Rate x Resources x Hours</td>
</tr>
</tbody>
</table>

Similar calculations are also made for other categories that may be defined on a task record, such as overheads (Overhead expense amount = Setup time logged x overhead rate.)

<table>
<thead>
<tr>
<th>Labor Setup Overhead</th>
<th>Account</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Labor Overhead Setup Account</td>
<td>Rate x Resources x Hours</td>
</tr>
<tr>
<td>DR</td>
<td>WIP account for assembly</td>
<td>Rate x Resources x Hours</td>
</tr>
</tbody>
</table>

**Run Costs**

Costs need to be logged for expenses related to processing an assembly run. These costs are defined on the operation task record and are based on quantity completed during the assembly run.
For example, the operation task *Staging* defines costs on the Cost Detail subtab. One cost category defined is Labor Run. Using this category on a task defines the following:

**Note:** Run costs are only based on quantity produced and are not time dependent.

- The Labor Setup cost category record indicates the item *Other Charge for Purchase - Labor Run*.
- The task record defines the run rate for using the item *Other Charge for Purchase - Labor Run* at $65.
- The item record for *Other Charge for Purchase - Labor Setup* indicates the Assembly Staging Expense account.

Therefore, when you log time against the *Staging* task, the appropriate amount posts to the Assembly Staging Expense account. This appropriate amount is calculated as follows:

Expense amount = Setup time logged x Labor setup fixed rate

So, if 10 units are completed for the Staging task, then $650 is logged to the Assembly Staging Expense expense account.

<table>
<thead>
<tr>
<th>Labor Run</th>
<th>Account</th>
<th>Rate x Resources x Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Labor Run</td>
<td></td>
</tr>
<tr>
<td>DR</td>
<td>WIP account for assembly</td>
<td></td>
</tr>
</tbody>
</table>

Similar calculations are also made for other categories that may be defined on a task record, such as overheads (Overhead expense amount = Run quantity logged x overhead rate.)

<table>
<thead>
<tr>
<th>Labor Run Overhead</th>
<th>Account</th>
<th>Rate x Resources x Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>Labor Overhead Run Account</td>
<td></td>
</tr>
<tr>
<td>DR</td>
<td>WIP account for assembly</td>
<td></td>
</tr>
</tbody>
</table>

**Costing Lot Size**

If you have enabled the Standard Costing feature and the Manufacturing Routing and Work Center feature, the Costing Lot Size field shows on the Locations subtab of assembly item records. The default value for this field is 1 and the minimum value for this field is 0.01.

If you also use the Multiple Units of measure feature, the value is in base units of measure.

During the cost rollup process, NetSuite calculates the routing cost of assemblies as follows:

<table>
<thead>
<tr>
<th>Setup Cost</th>
<th>Run Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Resources (work center) x Setup Time (routing record) x Manufacturing Charge Item Unit Cost (item record) / Standard Cost Lot Size (assembly item - item location map)</td>
<td># of Resources (work center) x Run Rate (routing record) x Manufacturing Charge Item Unit Cost (item record)</td>
</tr>
</tbody>
</table>