Consultant Course

Manufacturing

M200 Basic Manufacturing Scenarios 2022 R1

Revision: 3/28/2022

Acumatica
The Cloud ERP

Contents

Copyright....4

How to Use This Course.... 5

Company Story....7

Lesson 1: Production Processing....9

Production Processing: General Information....9

Production Processing: Item Availability and Allocation.... 12

Production Processing: Cost Calculation.... 13

Production Processing: To Process Production-Related Documents and Transactions....17

Lesson 2: Processing Production for Sales.... 25

Production Processing: Production for Sales.... 25

Production Processing: To Process Production for Sales....28

Lesson 3: Material Requirements Planning.... 35

Material Requirements Planning: General Information....35

Material Requirements Planning: Process Details.... 37

Material Requirements Planning: Process Activity.... 38

Lesson 4: Producing Lot- or Serial-Tracked Items.... 43

Production of Lot- or Serial-Tracked Items: General Information.... 43

Production of Lot- or Serial-Tracked Items: To Assign Parent Serial Numbers to Materials on Issue....49

Production of Lot- or Serial-Tracked Items: To Assign Parent Serial Numbers to Materials on Completion....54

Lesson 5: Producing Items with Outside Processing.... 60

Outside Processing: General Information.... 60

Outside Processing: Process Activity....63

Lesson 6: Producing Items with Backflushing.... 71

Production with Backflushing: General Information....71

Production with Backflushing: Process Activity.... 75

Additional Materials....82

Appendix A: Production Processing....82

Production Processing: Generated Transactions....82

Production Processing: Mass Processing.... 85

Production Processing: Related Report and Inquiry Forms....86

Appendix B: Material Requirements Planning.... 87

Material Requirements Planning: Forecasts and Master Production Schedule.... 87

Material Requirements Planning: Related Report and Inquiry Forms....88

Appendix C: Producing Lot- or Serial-Tracked Items.....88
Production of Lot- or Serial-Tracked Items: Related Report and Inquiry Forms.....88
Appendix D: Producing Items with Outside Processing.....89
Outside Processing: Generated Transactions.....89

Copyright

3933 Lake Washington Blvd NE, # 350, Kirkland, WA 98033

Restricted Rights

The product is provided with restricted rights. Use, duplication, or disclosure by the United States Government is subject to restrictions as set forth in the applicable License and Services Agreement and in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 or subparagraphs (c)(1) and (c)(2) of the Commercial Computer Software-Restricted Rights at 48 CFR 52.227-19, as applicable.

Disclaimer

Acumatica, Inc. makes no representations or warranties with respect to the contents or use of this document, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Acumatica, Inc. reserves the right to revise this document and make changes in its content at any time, without obligation to notify any person or entity of such revisions or changes.

Trademarks

Acumatica is a registered trademark of Acumatica, Inc. HubSpot is a registered trademark of HubSpot, Inc. Microsoft Exchange and Microsoft Exchange Server are registered trademarks of Microsoft Corporation. All other product names and services herein are trademarks or service marks of their respective companies.

Software Version: 2022 R1

Last Updated: 03/28/2022

How to Use This Course

This course introduces the Acumatica ERP Manufacturing Edition functionality based on a set of examples that illustrate the basic manufacturing processes, that is, production management and material requirements planning, in a midsize company. The course consists of lessons that guide you step by step through the examples and explanations of the process flow in Acumatica ERP Manufacturing Edition.

Which Training Environment Is Needed

All lessons of the course should be completed on an instance of Acumatica ERP 2022 R1 that you used to complete the M100 Basic Manufacturing Implementation training course, where you specified the settings and created the entities needed in the activities of the M200 training course.

What Is in This Guide

The guide includes the *Company Story* topic, process activities, and *Additional Reference* topics, as needed. *Company Story* explains the organizational structure of the company preconfigured in the *U100* dataset, as well as the company's business processes and requirements. The primary content of a guide is process lessons. Each of the process activities of the course is dedicated to a particular user scenario and consists of processing steps that you complete.

What Is in a Process Lesson

A *process lesson*—that is, a lesson dedicated to the performing of a particular business process—includes a brief user scenario, a description of the process workflow and can include process diagrams that illustrate the user scenario supported by this process. The lesson also provides a brief overview of the settings that need to be specified and the entities that need to be prepared in the system before you start to perform this business process.

Each process lesson includes at least one process activity that you have to complete in your Acumatica ERP instance to learn how to perform the described business process.

What Is in Additional Materials

In the **Additional Materials** chapter, you can find the following information related to the processes and scenarios covered in the corresponding parts of the guide:

- Additional information related to the processes
- Transactions generated as a result of the processes
- Details about the reports, inquires, and forms you can use to review and gather information related to the processes
- Explanations on how to perform mass-processing operations related to the processes

What Are the Documentation Resources

The complete Acumatica ERP documentation is available on *https://help.acumatica.com/* and is included in the Acumatica ERP instance. While viewing any form used in the course, you can click the **Open Help** button in the top pane of the Acumatica ERP screen to bring up a form-specific Help menu; you can use the links on this menu to quickly access form-related information and activities and to open a reference topic with detailed descriptions of the form elements.

How to Create a Tenant with the U100 Dataset

Before you complete this course, you need to add a tenant with the *U100* dataset to an existing Acumatica ERP instance. You will then prepare the tenant for completing the activities. To complete this preparation, perform the following instructions:

1. Go to *Amazon Storage*.
2. Open the folder that corresponds to the version of your Acumatica ERP instance.
3. In this folder, open the `Snapshots` folder, and download the `u100.zip` file.
4. Launch the Acumatica ERP instance, and sign in.
5. Open the *Tenants* (SM203520) form, and click **Add New Record** on the form toolbar.
6. In the **Login Name** box, type the name to be used for the tenant.
7. On the form toolbar, click **Save**.
8. On the **Snapshots** tab, click **Import Snapshot**.
9. In the **Upload Snapshot Package** dialog box, select the `u100.zip` file, which you have downloaded, and click **Upload**.

   The system uploads the snapshot and lists it on the **Snapshots** tab of the *Tenants* form.
10. On the form toolbar, click **Restore Snapshot**.
11. If the **Warning** dialog box appears, click **Yes**.
12. In the **Restore Snapshot** dialog box, make sure that the correct snapshot package is being uploaded, and click **OK**. The system will restore the snapshot and sign you out.

    You are now on the Sign-In page, and you can sign in to the tenant you have just created.

Licensing Information

For the educational purposes of this course, you use Acumatica ERP under the trial license, which does not require activation and provides all available features. For the production use of this functionality, you have to activate the license your organization has purchased. Each particular feature may be subject to additional licensing; please consult the Acumatica ERP sales policy for details.

Company Story

This topic explains the organizational structure and operational activity of the company with which you will work during this training.

Company Structure

The SweetLife Fruits & Jams company is a midsize company located in New York City. The company consists of the following branches:

- SweetLife Head Office and Wholesale Center: This branch of the company consists of a jam factory and a large warehouse where the company stores fruit (purchased from wholesale vendors) and the jam it produces. Warehouse workers perform warehouse operations by using barcode scanners or mobile devices with barcode scanning support.
- SweetLife Store: This branch has a retail shop with a small warehouse to which the goods to be sold are distributed from the company's main warehouse.
- Service and Equipment Sales Center: This branch is a service center with a small warehouse where juicers are stored. This branch assembles juicers, sells juicers, installs juicers, trains customers' employees to operate juicers, and provides juicer servicing.

Operational Activity

The company has been operating starting in the *01-2021* financial period. In November 2021, the company started using Acumatica ERP as an ERP and CRM system and migrated all data of the main office and retail store to Acumatica ERP. Because the company has grown, the equipment center has begun its operations in *01-2022*.

The base currency of the company is the U.S. dollar (USD). All amounts in documents and reports are expressed in U.S. dollars unless otherwise indicated.

Company Purchases

The company purchases fruits and spices from large fruit vendors for sale and for jam production. For producing jams and packing jams and fruits, the company purchases jars, labels, and paper bags from various vendors. For the internal needs of the main office and store, the company purchases stationery (printing paper, pens, and pencils), computers, and computer accessories from various vendors. The company also purchases juicers and juicer parts for sale from a large juicer vendor and either purchases the installation service for the juicers or provides the installation service on its own, depending on the complexity of the installation.

Company Sales and Services

Each company's branch has its own business processes, as follows:

- SweetLife Head Office and Wholesale Center: In this branch, jams and fruit are sold to wholesale customers, such as restaurants and cafés. The company also conducts home canning training at the customer's location and webinars on the company's website.
- SweetLife Store: In the store, retail customers purchase fresh fruit, berries, and jams, or pick up the goods they have ordered on the website. Some of the goods listed in the website catalog are not stored in the retail warehouse, such as tropical fruits (which are purchased on demand) and tea (which is drop-shipped from a third-party vendor).
- Service and Equipment Sales Center: This branch assembles juicers, sells juicers, provides training on equipment use, and offers equipment installation, including site review and maintenance services. The branch performs one-time endeavors as well as complex projects with their own budgets.

The company has local and international customers. The ordered items are delivered by drivers using the company's own vehicle. Customers can pay for orders by using various payment methods (cash, checks, or credit cards).

Lesson 1: Production Processing

Production Processing: General Information

The production management functionality of Acumatica ERP Manufacturing Edition is used to control and track the transformation of raw materials and component parts into finished items and subassemblies. You create production orders of a regular type and the related transactions to record the production of items and their costs.

In this topic, you will find details about the standard workflow of processing production orders when backflushing and scrap reporting are not used.

Learning Objectives

In this chapter, you will learn how to do the following:

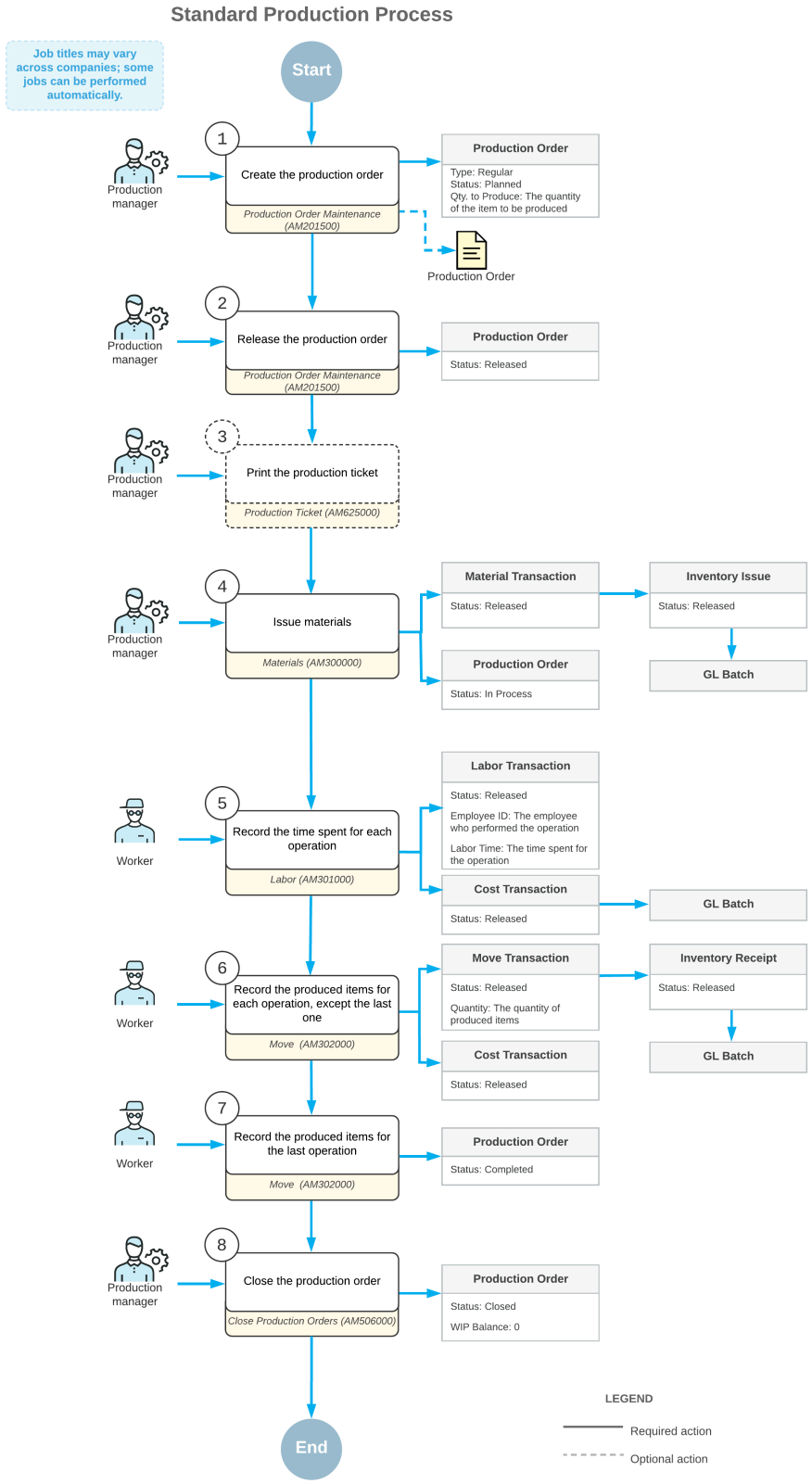
- Create and process a production order of a regular type
- View the list of components that are out of stock and create documents for purchasing the components
- Issue the components required to produce the item
- Track the produced quantity of items and the employee time spent on producing the items
- Record the movement of items from a work center to a warehouse

Applicable Scenarios

You process production orders of a regular type when you need to produce a certain number of items.

Standard Production Process

The standard process of the production of items involves the actions and generated documents shown in the following diagram.



The employees involved do the following to process the production order and the related transactions:

1. *Create a production order.*

the production manager creates a production order by using the *Production Order Maintenance* (AM201500) form, adding the item to be produced and the quantity of the item. When the production manager creates the production order and saves the changes, the system assigns the *Planned* status to the order.

2. *Release the production order.*

   When the production order is ready for processing, the production manager releases the order on the same form. The order status changes to *Released*.

3. Optional: *Print the production ticket .*

   If the production manager would like to give the printed production ticket to the workers who will produce the item, the production manager prints the ticket by using the *Production Ticket* (AM625000) report.

4. *Make sure that the required materials are available.*

   The production manager makes sure that the quantity of materials required to produce the item is available on hand by using the *Critical Materials* (AM401000) form. If the production manager finds a shortage of any materials, the production manager creates a purchase order to purchase the required materials from a vendor by using the same form.

5. *Issue the materials for each operation.*

   The production manager issues the materials required to produce the item by using the *Materials* (AM300000) form. The production manager either enters the materials manually or uses the Materials wizard.

   During the release of materials, the system creates and releases an inventory issue on the *Issues* (IN302000) form. The system also updates the production order's details and costs, and the balance of the WIP account. The production order's status changes to *In Process*.

6. *Record the time spent and the quantity of completed items for each operation, except the last operation.*

   When each operation is completed, the worker creates a labor transaction by using the *Labor* (AM301000) form to record the time that they spent on the operation and the quantity of the completed items. The system also creates a cost transaction on the *Cost Transactions* (AM309000) form to record the cost of the worker's work.

7. *Record the quantity of completed items for the last operation.*

   When the produced items are ready to be moved to stock (usually when the last operation in the routing has completed), the worker creates a move transaction by using the *Move* (AM302000) form. The system also creates an inventory receipt on the *Receipts* (IN301000) form and a cost transaction on the *Cost Transactions* (AM309000) form. If the total quantity completed is greater than or equal to the quantity of the item to be produced, the system changes the status of the production order to *Complete*.

   > If the worker both records labor hours and the quantity of the completed items during the last operation in the routing, they can use only the *Labor* form.

8. *Close the production order.*

   The production manager closes the production order by using the *Close Production Orders* (AM506000) form.

   > Before the production manager closes the production order, we strongly recommend that the production manager reviews the balance of the WIP account. A nonzero balance may cause incorrect cost calculations of the finished goods and affect the sales cost. For details, see *WIP Balance Correction*.

   If the balance of the WIP account is not zero, the system creates the final adjustment to set the balance of the WIP account to zero by creating a cost transaction on the *Cost Transactions* form and a GL batch on the *Journal Transactions* (GL301000) form. The offset is added to the WIP Variance account.

Production Processing: Item Availability and Allocation

When you process production orders and related documents (such as sales orders and purchase orders), the system estimates the availability of items in the documents and allocates the items depending on the processing stage, as described in this topic.

Availability Calculation for Production Processing

The system uses the availability calculation rules specified on the *Availability Calculation Rules* (IN201500) form. We recommend that you create an availability calculation rule for items involved in production. For general information about availability calculation rules, see *Availability Calculation Rules: General Information*.

According to the rule settings, the system assigns plan types to the quantities of items in documents; you can view the plan types on the *Inventory Allocation Details* (IN402000) form. All documents that contain items related to production (finished goods or components) and that are not closed are assigned specific plan types depending on the document status; these plan types are described in the following sections.

The system resets allocations for production orders when the quantity of issued items is equal to the required quantity specified in the production order or when the production order is closed. When you complete the production order, the system does not reset the allocations because the materials have not been fully issued. If you need to close a production order with a smaller quantity of the item produced (such as when you were going to make 10 items, but because of a material shortage, you could make only 8), you need to first reduce the quantity to be produced in the production order and then close the production order.

Allocating Items in Purchase Orders to Production Orders

You can create purchase orders that contain components that are required for production. The type of the line for these items is *Goods for MFG*. You can specify this line type manually when you are creating a purchase order on the *Purchase Orders* (PO301000) form, and the system specifies this line type automatically when you create a purchase order by using the *Critical Materials* (AM401000) form.

Once the purchase order is created, the allocations on the production order materials line are updated. The plan type of the purchase order depends on its status as follows:

- If the purchase order has a status other than *Open*, the plan type is *Purchase for Prod. Prepared*
- If the status of the purchase order is *Open*, the plan type is *Purchase for Production*

For a production order for which the related purchase order is created but not completed yet, the plan type is *Production to Purchase*. When the items allocated for production are received in a warehouse, the plan type of the production order changes to *Production Allocated*.

The line type of the purchase order is not updated when the line is allocated to a production order.

Allocating Items to Production Orders Manually

You can manually allocate available items to a production order or remove the item allocation by using the **Line Details** dialog box on the *Production Order Details* (AM209000) form. In this case, the system uses the*Production Allocated* plan type for the production order.

You cannot allocate lot- or serial-tracked items manually for a production order.

Allocating Items in Production Orders to Sales Orders

When a production order is associated with a sales order line, on the **Item Plans** tab of the *Inventory Allocation Details* (IN402000) form, the system assigns plan types, which represent allocations for the item quantity, as follows:

- The sales order is assigned the *SO to Production* plan type, which is the demand allocation.
- If the production order has the *On Hold* or *Planned* status, it is assigned the *Production for SO Prepared* plan type, which is the supply allocation.
- If the production order has the *In Process* or *Released* status, it is assigned the *Production for SO* plan type, which is the supply allocation.

When the system creates an inventory receipt as a result of the move transaction, the plan type assigned to the sales order is changed to *SO Allocated*. If a stock item is a lot- or serial-tracked item, the system specifies the lot or serial number in the sales order line with this item.

Allocating Items in Production Orders to Other Production Orders

When you create production orders for subassemblies by using the *Critical Materials* (AM401000) form and these production orders are linked to the parent production order, the system assigns the *Production Allocated* plan type to the items in the parent production order. The plan type for the subassembly production order depends on the status of the production order as follows:

- For a production order that has the *Planned* status, the system assigns the *Production for Prod. Prepared* plan type.
- For a production order that has the *Released* or *In Process* status, the system assigns the *Production for Production* plan type.

Material Requirements Planning and Allocations

Availability calculation rules specified on the *Availability Calculation Rules* (IN201500) form do not affect allocation details when you regenerate material requirements planning by using the *Regenerate MRP* (AM505000) form.

Production Processing: Cost Calculation

When produced items are moved to a warehouse, you record this movement by creating a labor or move transaction. The system creates a related inventory receipt on the *Receipts* (IN301000) form; it also creates a related GL transaction to debit the inventory account (and subaccount, if applicable) and to credit the work in process account (and subaccount, if applicable). If the stock item being received has a valuation method of *Standard* specified on the *Stock Items* (IN202500) form, then the system calculates the cost of the items in the receipt as the quantity received multiplied by the standard cost for the stock item. If the stock item has a valuation method of *FIFO*, *Average*, or *Specific*, the receipt cost is calculated depending on the costing method selected for the related production order, as described in this topic.

You can read more about item costs and valuation methods in *Item Costs and Valuation Methods*.

Costing Methods in Production

Acumatica ERP Manufacturing Edition supports the following methods of production cost calculation:

- The *Actual* method, which uses only the actual work in process (WIP) balance to calculate the cost
- The *Estimated* method, which combines actual and planned costs and is used when material and labor transactions may be reported after the produced items are received in stock

You specify the default costing method for new production orders in the settings of a production order type by using the *Production Order Types* (AM201100) form. You can change the default method when you are creating a production order. In the following sections, you will find detailed information about the costing methods.

You can view the cost details of a production order on the **Totals** tab of the *Production Order Maintenance* (AM201500) form.

Actual Costing Method

With the actual costing method, the system calculates the unit cost of produced items as the actual WIP balance divided by the quantity completed. The system sets the balance of the WIP account to zero when an inventory receipt is created to indicate that the items on a production order have been produced—that is, when the status of the production order is changed to *Completed*.

You can use this method in any of the following cases:

- When the quantity of materials used for production depends on particular conditions. For example, suppose that workers need to add a particular amount of salt to a product depending on the testing.
- When you might use an additional material or replace a material in item production based on the material availability or inspection, such as in repair orders when some parts of an item need to be replaced.
- When labor time spent on item production is unknown until the item is produced.

- Accurate costs with the *Actual* costing method are dependent on the recording of all required transactions before inventory receipts are created to track the movement of the produced items to stock. Because the receipt costs are calculated based on the actual WIP balance at the time of the receipt, using the *Actual* costing method may have an undesired impact on your costs when the units are issued or shipped.
- Transactions created and processed by using the *WIP Adjustment* (AM308000) form adjust the WIP balance and will be included in the cost of any receipt posted after the adjustment has been released.

The system calculates production order variances for each cost element in order to provide a means to measure performance.

Below you can find examples of calculating production costs by using the *Actual* costing method.

Example 1

Suppose that the production order to produce 10 units of an item has an actual **WIP Total** of $100 with zero completed units (that is, **MFG to Inventory** is zero). A user creates a move transaction to report the production of 5 units. The total cost for the transaction is $100 with a calculated unit cost of $100 / 5 = $20 each.

Further suppose that after the user added the move transaction, the other cost of $70 has been added to the production order, so the **WIP Total** is $170 and the **WIP Balance** is $70. A user creates a move transaction for the final 5 units. The system calculates the unit cost as $70 / 5 = $14. The system creates two inventory receipts, with a unit cost of $20 in the first receipt and a unit cost of $14 in the second receipt. When the second move transaction is released, the production order is assigned the *Completed* status, and the system updates the order balances to the following:

- **WIP Total**: $170
- **WIP Balance**: 0
- **MFG to Inventory**: $170

Example 2

Suppose that the production order to produce 10 units of an item currently has an actual **WIP Total** of $0 with zero completed units (that is, **MFG to Inventory** is zero). A user creates a move transaction to report the production of 5 units. The total cost for the transaction is $0 with a calculated unit cost of $0 / 5 = $0 each.

Further suppose that after the user added the move transaction, the cost of $170 has been added to the production order, so the **WIP Total** is $170 and the **WIP Balance** is $170. A user creates a move transaction for the final 5 units. The system calculates the unit cost as $170 / 5 = $34 each. The system creates two inventory receipts, with a unit cost of $0 in the first receipt and a unit cost of $34 in the second receipt. When the second move transaction is released, the production order is assigned the *Completed* status, and the system updates the order balances to the following:

- **WIP Total**: $170
- **WIP Balance**: 0
- **MFG to Inventory**: $170

Example 3

Suppose that the production order to produce 10 item units currently has an actual **WIP Total** of $170 with zero completed units (that is, **MFG to Inventory** is zero). A user creates a move transaction to report the production of 10 units. The total cost for the transaction is $170 with a calculated unit cost of $170 / 10 = $17 each. The system creates an inventory receipt with a unit cost of $17 and a total cost of $170. When the move transaction is released, the production order is assigned the *Completed* status, and the system updates the order balances to the following:

- **WIP Total**: $170
- **WIP Balance**: 0
- **MFG to Inventory**: $170

Estimated Costing Method

The estimated costing method uses a combination of actual and planned costs. In manufacturing, the actual product often flows through production processes faster than employees report the transactions to track it. In some organizations, employees might indicate the labor hours and materials used on the production tickets and a supervisor collects the data at the end of their shift, reviews the data, and then enters it into the system. The product may have already been packed, moved to stock, and shipped before the actual labor and materials have been posted. If the actual labor and materials are not reported, the balance of the WIP account is understated, and if an inventory receipt is created without these costs, the receipt cost will understated.

In order to minimize the impact of understated costs, the system calculates the cost of the inventory receipt as the cost of actual labor hours and cost of materials (reported by using the labor and material transactions) plus the difference between the planned and actual labor hours and quantities. Additionally, machine, tooling, and overhead costs are also calculated and applied. The balance of the WIP account is set to zero only when the production order is financially closed, even for stock items using the *FIFO*, *Average*, or *Specific Cost* valuation methods.

For items with the *Standard* valuation method, the receipt cost is always the current standard cost and any rate or usage variance is applied as a **WIP Variance** value when the production order is financially closed.

When you use the combination of planned and actual costs, be aware that the system calculates planned costs by using the predefined costs at the time the production order is created and updates the costs when the production order is released; during the processing of the production order, costs may change. The system calculates the actual costs at the time the material, labor, or move transaction is released. As an example, the cost layer for materials with the *FIFO* valuation method is determined when the inventory issue transaction is released, but not when the transaction is created.

Other examples of differences between planned and actual costs are the following:

- The average or last cost can be changed in a purchase receipt for stock item components, or the standard cost of components can be updated.
- The planned labor is calculated by using standard rates specified for a work center, but you report labor by using employee rates, which differ from the standard work center rates.
- Rates for production cost drivers—such as overhead, machines, or tools—may be changed after the planned costs of the production order were calculated.

Rate Variances and Usage Variances

The system considers differences between the planned costs and actual costs to be *rate variances* and differences between the planned quantities and actual quantities to be *usage variances*.

Rate variances will not create a production order variance;the full value of the WIP account is credited when the production order is completed—that is, when the actual completed quantity equals the quantity to be produced. If you create inventory receipts for partial quantities of items, a different cost may be calculated for each receipt, depending on when labor and material are posted to the production order.

Usage variances, however, can result in a production order variance and the non-zero balance of the WIP account at completion of a production order. The system creates usage variances in either of the following cases:

- There is a difference between the planned and actual labor hours.
- There is a difference between the planned and actual quantities of issued materials.

WIP Balance Correction

Before you close a production order for a finished item, we strongly recommend that you review the balance of the WIP account in the **WIP Balance** box on the **Totals** tab (the **Variance** section) of the *Production Order Maintenance* (AM201500) form.

A completed production order with a nonzero WIP account balance could be caused by any of the following:

- Materials required to produce the items have been issued in a quantity that does not equal the planned quantity calculated based on the bill of material assigned to the item.
- The number of labor hours reported for the production order differ from the planned number of labor hours.

If you correct the materials or labor recorded after you create the final inventory receipt for moving the finished goods to a warehouse, the system does not recalculate the receipt cost. An incorrect receipt cost affects inventory valuation and could affect the cost of sales if the item is a finished good.

For a production order with the *Actual* costing method, you can correct the variance as follows:

- You reduce the completed quantity of the item by creating and releasing a move transaction with the negative quantity on the *Move* (AM302000) form for the last operation in routing. The system will change the status of the production order to *In Process*.
- If you want to correct the material cost, you create and release a material transaction with the corrected material quantity by using the *Materials* (AM300000) form. To reduce the material quantity, you specify a negative value in the **Quantity** column.
- If you want to correct the labor cost, you create and release a labor transaction with the corrected time by using the *Labor* (AM301000) form. To reduce the reported time, you specify a negative value in the **Labor Time** column.
- You record the remaining quantity of the finished item for the last operation by creating and releasing a move transaction on the *Move* form. The system will change the status of the production order back to *Completed*.

For production orders with the *Estimated* costing method, if you have not issued the materials yet and the planned unit cost is not specified for the item, then you perform the steps above to correct the balance of the WIP account.

Planned Cost Update

If you are aware that significant labor, material, or other cost changes have occurred since the production order was created, you can use the **Update Planned Costs** command on the *Production Order Maintenance* (AM201500) form to specify these costs in the production order. You can use this command for only production orders that have a status of *On Hold*, *Planned*, *Released*, or *In-Process*.

Cost Calculation by Production Cost Driver

The system calculates costs for production cost drivers as follows:

- Labor: Costs are calculated for each operation by using the following formula if the actual labor hours are less than planned labor hours.

```
Actual labor cost + (Planned labor time - Actual labor time) * Work center standard
 rate
```

- Material: Costs are calculated for each material item by using the following formula if the actual issued quantity is less than the planned quantity to be issued.

```
Actual material cost + (Planned material quantity - Actual material quantity) *
 Planned unit cost
```

- Machine and tools: Costs are always calculated based on the actual completed quantity for each operation or, if necessary, by the adjusted completed quantity.
- Fixed overhead: Costs are calculated for each operation.
- Variable overhead: As with labor and material cost calculation, costs are calculated based on the actual completed quantity for each operation or if necessary, by the adjusted completed quantity.

Production Processing: To Process Production-Related Documents and Transactions

The following activity will walk you through the process of creating and processing a production order and the related documents and transactions.

Story

Suppose that based on the analyzed demand from previous periods of sales, the sales department of SweetLife has asked the production department to produce 12 juicers for citrus, according to the bill of material dedicated to the juicer production. Acting as a production manager, you will create a production order for producing 12 citrus juicers, order the juicer parts that are out of stock from the vendor, and process all related transactions. Further suppose that the production of juicers should start on today's date and the scheduling priority is standard (you do not need to produce the juicers faster or slower than the other items in the queue).

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse and the *MGI* and *MTL* locations have been defined.
- On the *Stock Items* (IN202500) form, the *CFJCITRUS*, *JCREAMER*, *JUICECUP1L*, *MRBASEHIGH*, *STRBASKET*, and *SPLGUARD* stock items have been defined.
- On the *Vendors* (AP303000) form, the *JALOOZA* vendor has been created.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJCITRUS* stock item.
- On the *Production Order Types* (AM201100) form, you have created the *RO* production order type for regular production orders.

- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.
- On the *Employees* (EP203000) form, you have selected the **Production Employee** check box for the *EP00000027* (Carlos Cruz) employee.

Process Overview

In this activity, to process the documents and transactions related to the production of the citrus juicers, you will do the following:

1. On the *Production Order Maintenance* (AM201500) form, you will create and release the production order.
2. On the *Critical Materials* (AM401000) form, you will view the list of components that are out of stock and create a purchase order for the components.
3. On the *Purchase Receipts* (PO302000) form, you will create a purchase receipt to record the receipt of the components from the vendor.
4. On the *Materials* (AM300000) form, you will issue the components required for the production order.
5. On the *Labor* (AM301000) form, you will record the labor spent for the juicer assembly and the produced quantity.
6. On the *Storage Summary* (IN409010) form, you will view the quantity of juicers available in the warehouse.
7. On the *Production Order Maintenance* form, you will view the changes in the production order.
8. On the *Move* (AM302000) form, you will record the receipt of one more juicer to the warehouse.
9. On the *Production Order Maintenance* form, you will view the labor and costs recorded for the production order.
10. On the *Close Production Orders* (AM506000) form, you will close the production order.

System Preparation

Do the following:

1. Launch the Acumatica ERP website, and sign in to the company in which the M100 Basic Manufacturing Implementation training course has been completed. You should sign in as the production manager by using the *peters* username and the *123* password.
2. In the info area, in the upper-right corner of the top pane of the Acumatica ERP screen, make sure that the business date in your system is set to today's date. For simplicity, in this activity, you will create and process all documents in the system on this business date.

Step 1: Creating the Production Order

To create the production order for 12 citrus juicers, do the following:

1. On the *Production Order Maintenance* (AM201500) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *RO*
   - **Inventory ID**: *CFJCITRUS*
   - **Warehouse**: *WORKHOUSE* (automatically selected)
   - **Location**: *MGI* (automatically selected)
   - **Order Date**: Today's date (automatically selected)
   - **Hold**: Cleared
   - **Description**: `Production of 12 citrus juicers in the standard configuration`

Notice that the status of the production order is *Planned*.

3. In the **Qty. to Produce** box of the **General** tab, specify `12`. Notice that this quantity is copied to the **Qty. Remaining** box.
4. On the form toolbar, click **Save**.
5. On the More menu (under **Processing**), click **Release Order**. The order status is changed to *Released*

> You open the More menu by clicking the More button (…) on the form toolbar.

6. In the **Planned** section of the **Totals** tab, review the planned labor time and the planned costs for production of the juicers (see the following screenshot). The system calculates the planned time based on the values you have specified in the bill of material on the *Bill of Material* (AM208000) form. The planned costs are calculated based on the planned time and on the settings of the production cost driver. (See *Production Cost Drivers: Implementation Activity* for details.)

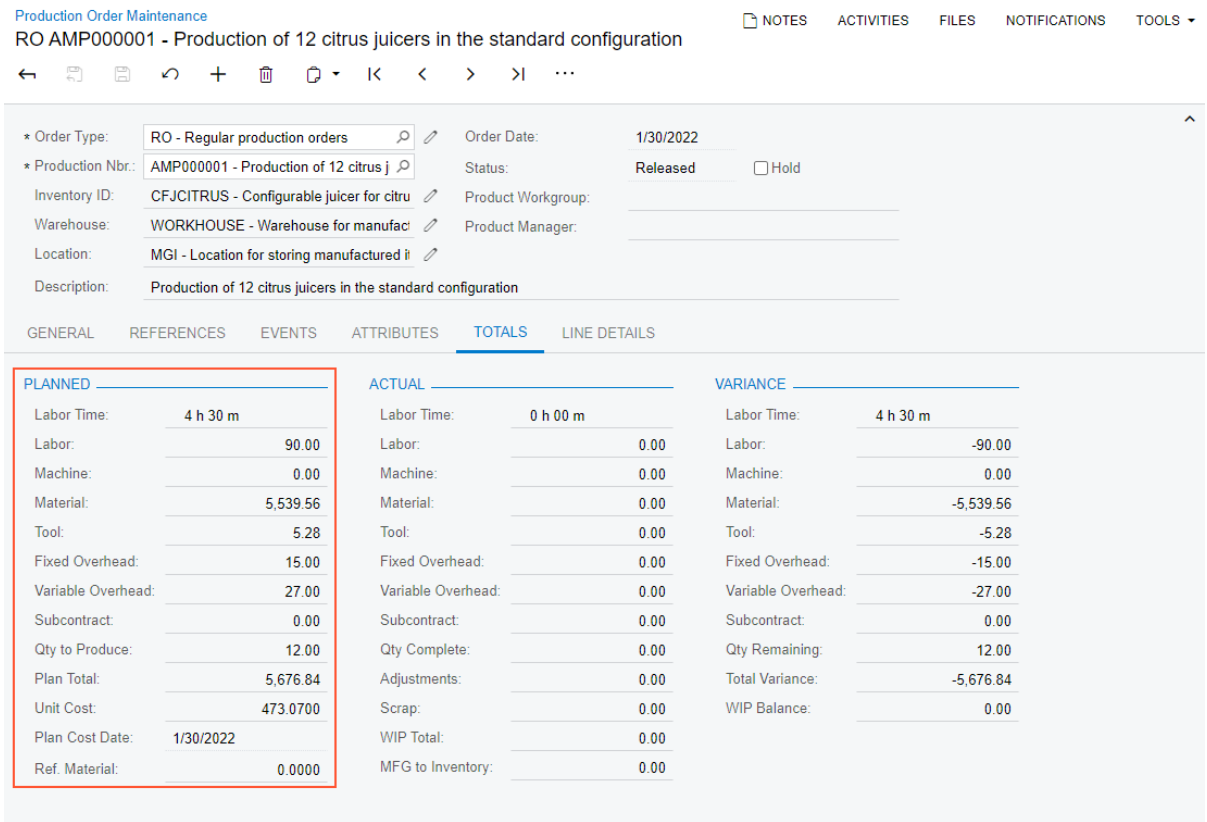


Figure: The Totals tab of the Production Order Maintenance form

The production order is ready to be processed further.

Step 2: Creating a Purchase Order for Out-of-Stock Components

In this step, you will view the list of components that are required for the production of the juicers and are out of stock, and you will create a purchase order to purchase the components from the *JALOOZA* vendor. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, click **Critical Material** (under **Other**) of the More menu. The *Critical Materials* (AM401000) form opens with the production order number selected in the **Production Nbr.** box.

2. In the **Qty. On Hand** column, make sure that zeros are specified in all rows. This means that all the components required to assemble the juicers are out of stock and must be purchased.
3. In the column header with the unlabeled check box, select this check box to select all rows.
4. On the form toolbar, click **Purchase**.
5. In the **Create Purchase Order** dialog box, which opens, view the default settings, and click **Create**. The system creates a purchase order and opens it on the *Purchase Orders* (PO301000) form.
6. On the form toolbar, click **Remove Hold**. The status of the purchase order is changed to *Open*.

Step 3: Receiving the Components in a Warehouse

Suppose that you have received the ordered components from the *JALOOZA* vendor and need to create a purchase receipt. The items have been received to the *MTL* location in the *WORKHOUSE* warehouse (this location is dedicated to the storing of components). Do the following:

1. While you are still viewing the purchase order on the *Purchase Orders* (PO301000) form, on the form toolbar, click **Enter PO Receipt**. The system creates the purchase receipt and opens it on the *Purchase Receipts* (PO302000) form.
2. On the **Details** tab, view the list of the received components.
3. In the **Location** column, make sure that *MTL* is specified for each row.
4. On the form toolbar, click **Release**. The system releases the purchase receipt and changes its status to *Released*.
5. On the **Orders** tab, make sure that *Completed* is specified in the **Status** column of the only row.

You have received the required components into stock and now you can continue processing the production order.

Step 4: Issuing the Components for the Production Order

In this step, you will issue the components for the production order. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
2. On the More menu (under **Processing**), click **Release Materials**. The system opens the *Materials Wizard* (AM300020) form with the list of components from the production order.
3. On the form toolbar, click **Select All**. The system creates the material transaction and opens it on the *Materials* (AM300000) form.
4. In the Summary area, do the following:
   a. In the **Description** box, specify `Materials for 12 citrus juicers`.
   b. Clear the **Hold** check box. The system changes the transaction status to *Balanced*.
5. On the form toolbar, click **Release**. The system releases the material transaction and changes the status of the transaction to *Released*.
6. On the *Issues* (IN302000) form, make sure that the inventory issue with the components from the production order has been created and released.

Step 5: Recording the Labor and Produced Items

Suppose that Carlos Cruz, a worker in the work center, spent 30 minutes setting up the working environment for juicer assembly and assembled 5 juicers for 1 hour and 40 minutes. Another work center worker, Casey Burrows, assembled 6 juicers for the same amount of time. The assembled juicers have been moved to the *MGI* location of

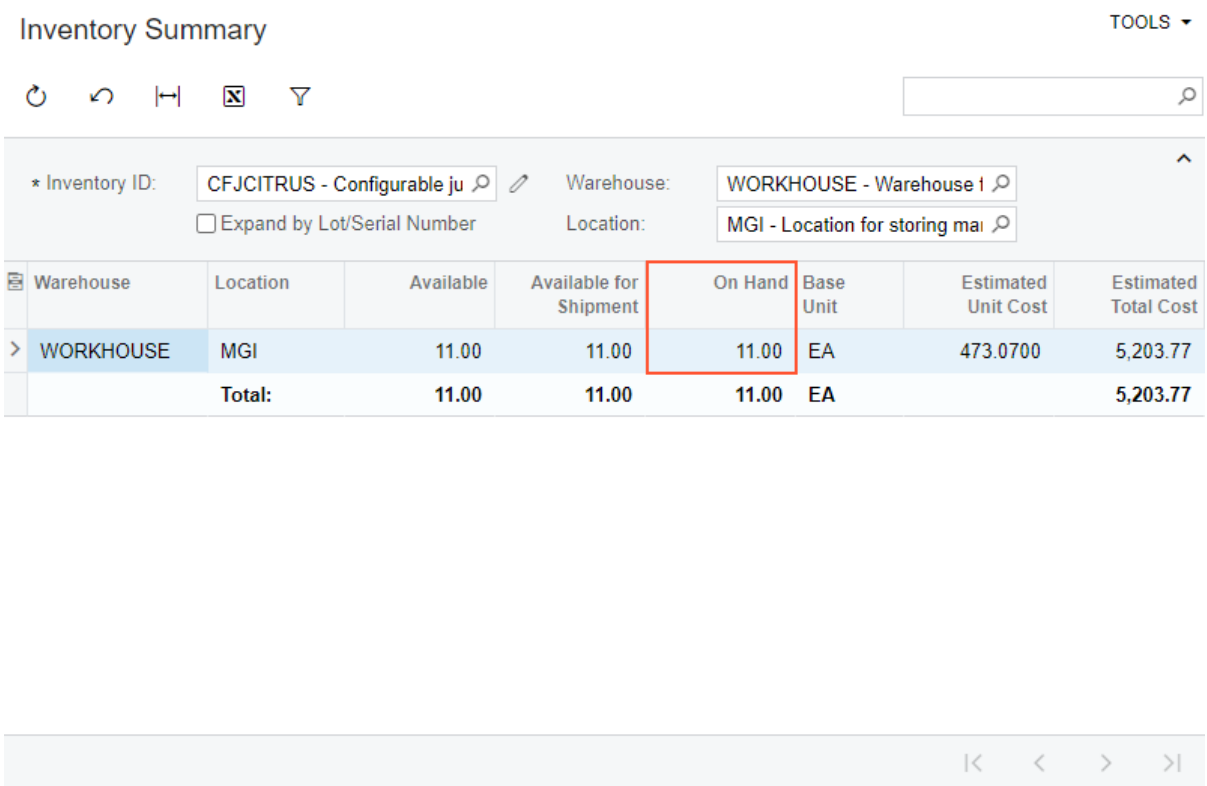
the *WORKHOUSE* warehouse. To record the time spent on juicer assembly and the movement of the assembled juicers, do the following:

1. On the *Labor* (AM301000) form, add a new record.
2. On the table toolbar, click **Add Row**.
3. In the row, specify the following settings:
   - **Labor Type**: *Direct*
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that you created earlier in this activity
   - **Employee ID**: *EP00000027* (Carlos Cruz)
   - **Shift**: *0001*
   - **Start Time**: *09:00 AM*
   - **End Time**: *11:10 AM*
   - **Quantity**: 5
4. On the table toolbar, click **Add Row**.
5. In the row, specify the following settings:
   - **Labor Type**: *Direct*
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that you created earlier in this activity
   - **Employee ID**: *EP00000028* (Casey Burrows)
   - **Shift**: *0001*
   - **Start Time**: *09:30 AM*
   - **End Time**: *11:10 AM*
   - **Quantity**: 6
6. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, specify `Recording the time for assembly of 11 citrus juicers`.
   c. Clear the **Hold** check box. The system changes the transaction status to *Balanced*.
7. On the form toolbar, click **Release**. The system creates and releases the cost transaction to record labor costs, the inventory receipt to record the movement of the assembled juicers to the warehouse location, and the labor transaction itself.

Step 6: Viewing the Availability of Juicers

To make sure that the assembled juicers have been moved to the *MGI* warehouse location, do the following:

1. On the *Receipts* (IN301000) form, open the inventory receipt with the 11 juicers.
2. Make sure that the receipt has the *Released* status.
3. On the *Inventory Summary* (IN401000) form, specify the following settings in the Selection area:
   - **Inventory ID**: *CFJCITRUS*
   - **Warehouse**: *WORKHOUSE*
   - **Location**: *MGI*
4. In the **On Hand** column of the only row listed in the table, make sure that the value is *11* (see the following screenshot).



Warehouse	Location	Available	Available for Shipment	On Hand	Base Unit	Estimated Unit Cost	Estimated Total Cost
WORKHOUSE	MGI	11.00	11.00	11.00	EA	473.0700	5,203.77
	Total:	**11.00**	**11.00**	**11.00**	**EA**		**5,203.77**

Figure: The on hand quantity of the juicers on the Inventory Summary form

Step 7: Viewing the Changes to the Production Order

In this step, you will view the changes the system made to the production order as a result of the previous steps. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
2. On the **General** tab, make sure that the value of the **Qty. Complete** box is *11* and the value of the **Qty. Remaining** box is *1*. This means that 11 out of 12 juicers have been assembled and are available in the warehouse.
3. On the **Events** tab, make sure that records for material, cost, and labor transactions are displayed in the table.

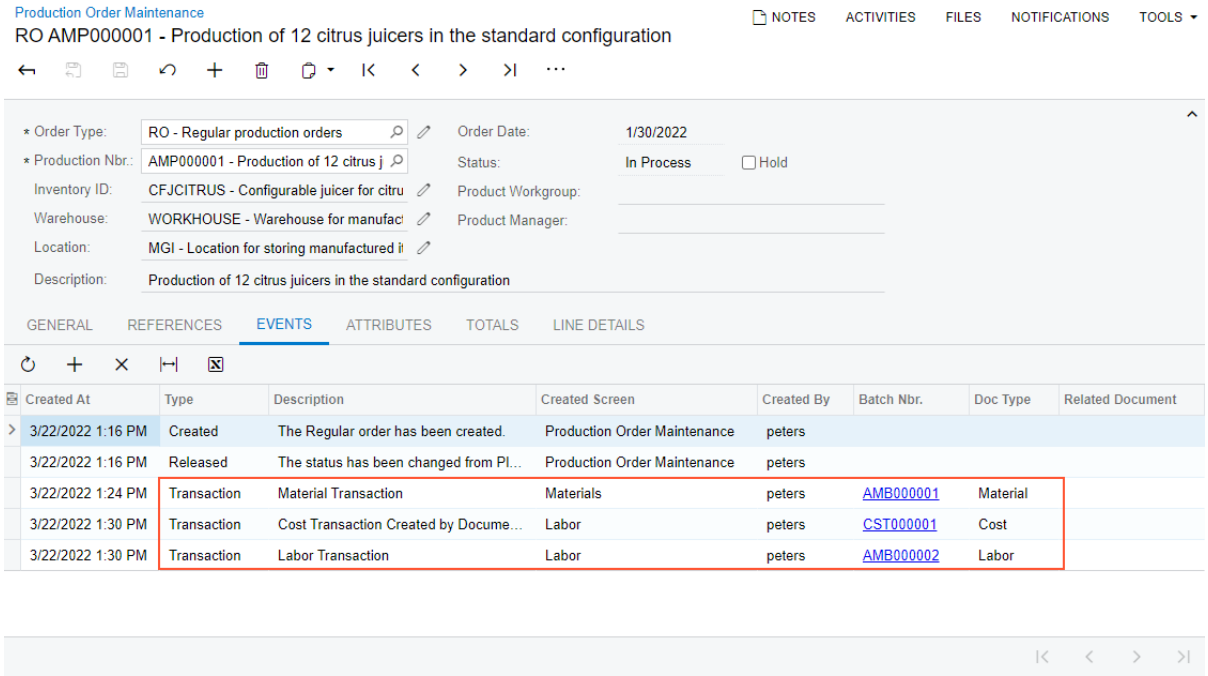


Figure: The Events tab of the Production Order Maintenance form

Step 8: Recording the Produced Items

Suppose that you have been informed that Carlos Cruz produced 6 juicers— not 5, as you recorded earlier in this activity. To record the receipt of one more juicer to the warehouse location, create a move transaction as follows:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Processing**), click **Create Move Transaction**. The system opens the *Move* (AM302000) form with the row for the production order added to the table.
2. Make sure that *1* is specified in the **Quantity** column.
3. In the Summary area, clear the **Hold** check box.
4. On the form toolbar, click **Release**. The system creates and releases the inventory receipt and the cost transaction; it also changes the status of the move transaction to *Released*.
5. On the *Inventory Summary* (IN401000) form, specify the following settings in the Selection area:
   - **Inventory ID**: *CFJCITRUS*
   - **Warehouse**: *WORKHOUSE*
   - **Location**: *MGI*
6. In the **On Hand** column of the only row, make sure that the value is *12*.
7. On the *Production Order Maintenance* form, make sure that the **Qty. Complete** contains *12* and the **Qty. Remaining** contains *0*.
8. Make sure that the status of the order is *Completed*.

Step 9: Viewing Production Order Totals

Before closing the production order, you will view the actual recorded labor time and costs on the *Production Order Maintenance* (AM201500) form, as follows:

1. In the **Actual** section of the **Totals** tab, make sure that the following values are specified (shown in the screenshot below):
   - **Labor Time**: *3 h 50 m*
   - **Labor**: *76.66*
   - **Variable Overhead**: *23.00*

   The other values of the cost boxes are the same as in the **Planned** section. These costs are fixed and do not depend on the recorded labor.
2. In the **Variance** section, review the difference between the planned and actual labor time and costs (see the following screenshot). Notice that the workers spent 40 minutes of work less than the planned time.

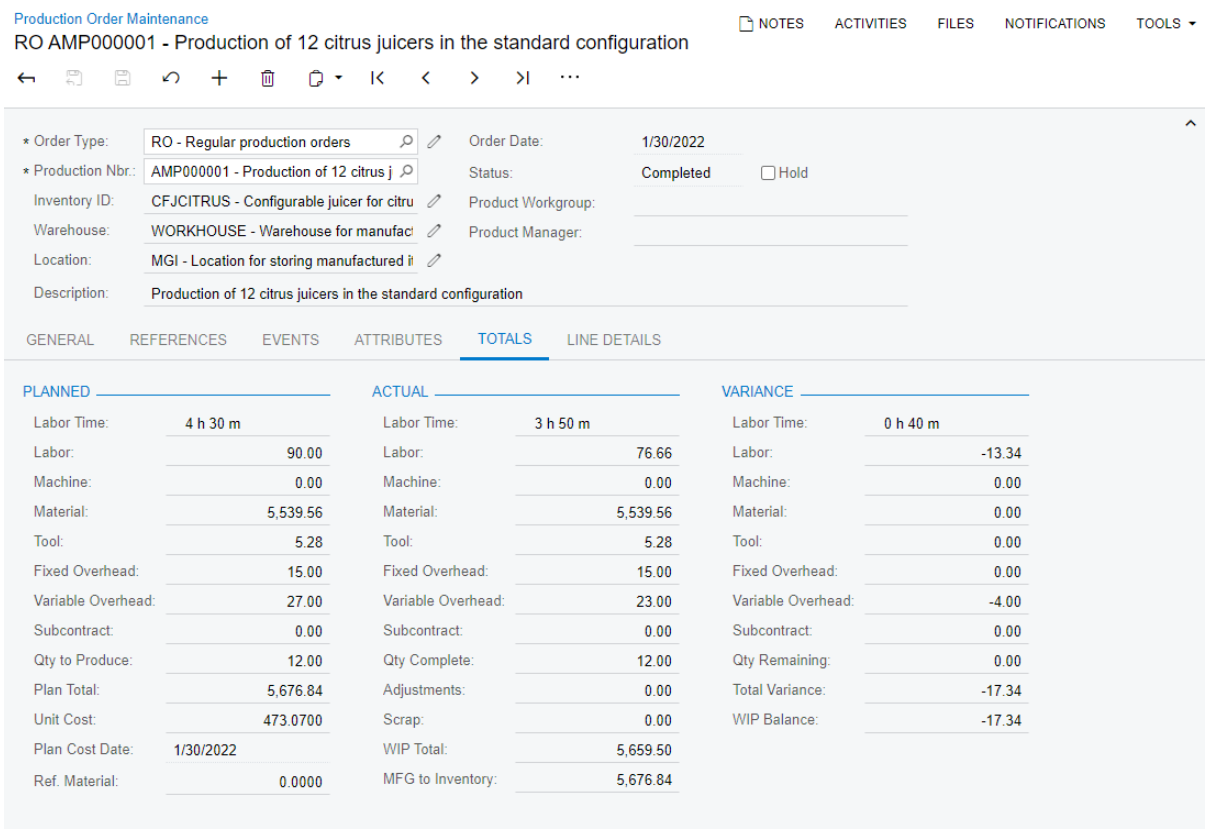


Figure: Actual and variance costs of the production order

Step 10: Closing the Production Order

Now you will close the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu, click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.
2. In the unlabeled column, make sure that the check box is selected.
3. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
4. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

You have successfully processed the production order for 12 citrus juicers.

Lesson 2: Processing Production for Sales

Production Processing: Production for Sales

When you produce items that will be sold to customers, you may need to link a production order for producing an item and a sales order line for the item. When the link is created, the system allocates the produced items for the sales order, and the items become unavailable for sales operations that are not related to the sales order.

You can link the existing production order to the sales order line either by specifying the production order for the sales order line on the *Sales Orders* (SO301000) form or by specifying a sales order line for the production order on the *Production Order Maintenance* (AM201500) form. Additionally, you can remove the link between a sales order line and a production order.

In this topic, you will read about production orders related to sales order lines in Acumatica ERP Manufacturing Edition.

Learning Objectives

In this chapter, you will learn how to do the following:

- Create a production order assigned to a sales order
- View allocation of items to sales and production orders
- View the list of components that are out of stock and create documents for purchasing the components
- Issue the components required to produce the item
- Track the produced quantity of items and the employee time spent on producing the items
- Record the movement of items from a work center to a warehouse

Applicable Scenarios

You assign production orders to sales orders when customers order items that are not in stock and must be produced.

Production Process with a Sales Order

When you create a sales order that contains an item to be produced, the production process is the following:

1. You create the sales order by using the *Sales Orders* (SO301000) form and add the line for the item to be produced to the order.
2. You create a production order for the line by using the **Create Production Orders** command. The system allocates the quantity of the item to be produced for the sales order and adds the link to the production order to the line. The created production order has the *Planned* status.
3. On the *Production Order Maintenance* (AM201500) form, you view the created production order and release it. The order status changes to *Released*.
4. If you would like to give the printed production ticket to the workers who will produce the item, you print the ticket by using *Production Ticket* (AM625000) report.
5. You make sure that the quantity of materials required to produce the item is available on hand by using the *Critical Materials* (AM401000) form. If you find a shortage of any materials, you create a purchase order to purchase the required materials from a vendor.

6. You issue the materials required to produce the item by using the *Materials* (AM300000) form. You either enter the materials manually or use the Materials wizard.

   During the release of materials, the system creates and releases an inventory issue on the *Issues* (IN302000) form. The system also updates the production order's details and costs, and the balance of the WIP account. Also, the status of the production order is changed to *In Process*.

7. When each operation is completed, you create a labor transaction by using the *Labor* (AM301000) form to report the time that employees spent on the operation. The system also creates a cost transaction on the *Cost Transactions* (AM309000) form to record the cost of employees' work.

8. When the finished item is ready to be moved to stock (usually when the last operation in the production process is completed), you create a move transaction by using the *Move* (AM302000) form. The system also creates an inventory receipt on the *Receipts* (IN301000) form and a cost transaction on the *Cost Transactions* form. If the total quantity completed is greater than or equal to the quantity of the item to be produced, the system changes the status of the production order to *Complete*.

   > If you both report labor hours and move the finished good to stock during the last operation in the routing, you can use only the *Labor* form.

9. You close the production order by using the *Close Production Orders* (AM506000) form. The system creates the final adjustment to set the balance of the WIP account to zero by creating a cost transaction on the *Cost Transactions* form and a GL batch on the *Journal Transactions* (GL301000) form. The offset is added to the WIP Variance account.

10. You process the sales order according to the sales process of your organization and ship the items to the customer.

Criteria to Create a Production Order for a Sales Order Line

For you to be able to create a production order for a sales order line on the *Sales Orders* (SO301000) form, the following conditions must be met:

- The status of the sales order must be other than *Pending Approval*.
- The **Mark for Production** check box must be selected in the sales order line.

  > You can select the **Make to Order Item** check box on the **Manufacturing** tab of the *Stock Items* (IN202500) form to make the system select the **Mark for Production** check box on the sales order line by default.

- For the sales order type on the *Order Types* (SO201000) form, the **Allow Production Orders - Approved** or **Allow Production Orders - Hold** check box is selected, or both check boxes are selected.
- The **MTO Order** check box is selected for the sales order type, which makes the **Mark for Production** check box appear on the **Details** tab of the *Sales Orders* form, so that it can be selected in the sales order line.

Linking of an Existing Production Order to a Sales Order Line

In some situations, the sales order and the production order to be associated with the sales order line already exist; for example, the production order may have been created during material requirements planning. You can link the applicable sales order line to the production order in either of the following ways:

- On the *Sales Orders* (SO301000) form, you can do the following:
  a. Click the line on the **Details** tab.
  b. On the table toolbar, click **Link Prod Order** to open the **Production Details** dialog box.
  c. In the dialog box, select the check box in the **Selected** column in the row with the production order to be linked to the sales order line; you then click **Save**.

When the dialog box closes, you can see the identifier of the production order in the **Production Nbr.** column of the linked sales order line.

- On the *Production Order Maintenance* (AM201500) form (in the **SO References** section of the **References** tab), you can do the following:
  a. At the bottom of the section, click the **Link Sales Order** button, which is displayed only if no sales order line has been linked to the production order, to open the **SO Line Details** dialog box.
  b. In the dialog box, select the check box in the **Selected** column for the sales order line to be linked to the production order; you then click **Save**.

     When the dialog box closes, the boxes of the **SO References** section are filled in with the customer, sales order type, sales order, and sales order line.

You can link a production order to a sales order line if all of the conditions specified in the following table are met.

Entity	Requirements
Sales order	The sales order is not assigned the *Canceled*, *Back Order*, or *Completed* status.
Production order	• The production order is not linked to a sales order line. • The order is not assigned the *Completed*, *Canceled*, or *Closed* status.
Stock item	• The same stock item is specified in the production order and in the sales order line. • The stock item is not a configured item. (That is, the **Configurable** check box is cleared for the sales order line on the **Details** tab of the *Sales Orders* form.)
Sales order line	• The **Mark for Production** check box is selected for the sales order line on the *Sales Orders* form. • No production order is linked to the sales order line. • The sales order line has not been canceled.

When you create the link between a sales order line and a production order, the following changes occur in the system:

- The type and number of the production order are displayed in the sales order line on the **Details** tab of the *Sales Orders* form.
- The customer, sales order type, sales order number, and sales order line are displayed in the **SO References** section of the **References** tab on the *Production Order Maintenance* form.
- The item quantity is allocated for production; the item plan can be viewed on the *Inventory Allocation Details* (IN402000) form.

When you link a production order to a sales order line manually, note the following:

- One production order can be linked to only one sales order line, and a sales order line can be linked to only one production order.
- If the *Multiple Warehouses* feature is enabled on the *Enable/Disable Features* (CS100000) form, the same warehouse must be specified in the production order and the sales order line.

Changes to a Link Between a Sales Order Line and a Production Order

You can change or remove the link between a sales order line and a production order only on the *Production Order Maintenance* (AM201500) form because it is usually a production manager who is responsible for changes to production orders. To remove the link, you do the following in the **SO References** section of the **References** tab:

1. Click the **Remove Link** button (which is displayed only if the link has been added previously).
2. Confirm the removal in the **Confirm** dialog box, which is opened.

When the link between a sales order line and a production order is removed, the following changes occur in the system:

- The type and number of the production order are removed from the sales order line on the **Details** tab of the *Sales Orders* (SO301000) form.
- The customer, sales order type, sales order number, and sales order line are removed from the **SO References** section of the **References** tab on the *Production Order Maintenance* form.
- The allocation of the item quantity for production is removed. That is, the item plan is removed on the *Inventory Allocation Details* (IN402000) form.

When the link to the sales order line is removed, you can add the link to another sales order line.

Production Processing: To Process Production for Sales

The following activity will walk you through the creation and processing of production documents related to sales documents.

Story

Suppose that the GoodFood One Restaurant has ordered 15 juicers for citrus from the SweetLife Fruits & Jams company. The 15 juicers include 12 juicers with the 1-liter cup and 3 juicers with the 0.5-liter cup. Further suppose that SweetLife has the 12 juicers with the 1-liter cup in stock, but the 3 juicers with the 0.5-liter cup must be produced. Acting as the sales and production manager, you need to create a sales order for the GoodFood One Restaurant, create a production order for the 3 juicers with the 0.5-liter cup, and process all the related documents and transactions.

Configuration Overview

In the *U100* dataset, the following configuration tasks have been performed to prepare the system for this activity to be performed:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse and the *MGI* and *MTL* locations have been defined.
- On the *Stock Items* (IN202500) form, the *CFJCITRUS*, *JCREAMER*, *JUICECUP1L*, *JUICECUP05L*, *MRBASEHIGH*, *STRBASKET*, and *SPLGUARD* stock items have been predefined.
- On the *Vendors* (AP303000) form, the *JALOOZA* vendor has been created.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJCITRUS* stock item.
- On the *Production Order Types* (AM201100) form, you have created the *RO* production order type for regular production orders.
- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.
- On the *Employees* (EP203000) form, you have selected the **Production Employee** check box for the *EP00000027* (Carlos Cruz) employee.

Process Overview

In this activity, to process the documents and transactions related to the sales and production of the citrus juicers, you will do the following:

1. On the *Sales Orders* (SO301000) form, you will create a sales order for the 15 juicers.
2. On the same form, you will create the production order for 3 of the citrus juicers.
3. On the *Inventory Allocation Details* (IN402000) form, you will view the item plans for the sales order and the production order.
4. On the *Production Order Details* (AM209000) form, you will replace the juicer components.
5. On the *Production Order Maintenance* form, you will release the production order and view the link to the sales order.
6. On the *Critical Materials* (AM401000) form, you will view the list of components that are out of stock and create a purchase order for the components.
7. On the *Purchase Receipts* (PO302000) form, you will create a purchase receipt to record the receipt of the components from the vendor.
8. On the *Materials* (AM300000) form, you will issue the components required for the production order.
9. On the *Labor* (AM301000) form, you will record the labor spent for the juicer assembly and the produced quantity.
10. On the *Close Production Orders* (AM506000) form, you will close the production order.
11. On the *Inventory Allocation Details* (IN402000) form, you will view the changes to the item plans.
12. On the *Sales Orders* form, you will process the documents related to shipping the items to the customer.

Step 1: Creating the Sales Order

To create the sales order for the 15 juicers that the GoodFood One Restaurant has ordered, do the following:

1. On the *Sales Orders* (SO301000) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *SO*
   - **Date**: Today's date (automatically selected)
   - **Customer**: *GOODFOOD*
   - **Description**: `Sale of 15 citrus juicers`
3. On the **Details** tab, add a new row for the citrus juicer with the 1-liter cup, and specify the following settings in the row:
   - **Inventory ID**: *CFJCITRUS*
   - **Quantity**: `12`
   - **Unit Price**: `2000.00`
   - **Mark for Production**: Cleared
4. Add another row for the citrus juicer with the 0.5-liter cup to be produced, and specify the following settings:
   - **Inventory ID**: *CFJCITRUS*
   - **Quantity**: `3`
   - **Unit Price**: `1900.00`
   - **Mark for Production**: Selected

5. On the form toolbar, click **Save**.

Step 2: Creating the Production Order

To create the production order for the three ordered citrus juicers with the 0.5-liter cup, while you are still viewing the sales order on the *Sales Orders* (SO301000) form, do the following:

1. On the More menu (under **Manufacturing**), click **Create Production Orders**.

   You open the More menu by clicking the More button (…) on the form toolbar.

2. In the **Production Orders** dialog box, which opens, do the following:
   a. Select the check box in the unlabeled column in the row with three *CFJCITRUS* items.
   b. Click **Create**.

   The system creates a production order and closes the dialog box.
3. In the **Production Nbr.** column (on the **Details** tab) in the line with three *CFJCITRUS* items, make sure that the link to the production order has been added.

Step 3: Viewing the Allocation of Items

To view the allocation of items for the sales order and the production order, do the following:

1. While you are still viewing the sales order on the *Sales Orders* (SO301000) form, click the row with three juicers and on the table toolbar of the **Details** tab, click **Item Availability**. The system opens the *Inventory Allocation Details* (IN402000) form with the *CFJCITRUS* item and *WORKHOUSE* warehouse selected in the Summary area.
2. On the **Item Plans** tab, make sure that the following plans are displayed:
   - *SO Booked* for 12 items: This quantity is allocated for the sales order.
   - *SO to Production* for 3 items: This quantity of the items to be produced is allocated for the sales order.
   - *Production for SO Prepared* for 3 items: This quantity on the production order is allocated for the sales order.

Step 4: Changing the List of Components

In the bill of material assigned to the *CFJCITRUS* item, the 1-liter juice cup is specified as one of the components, but the customer has ordered three juicers with the 0.5-liter juice cup. You need to change the set of components for the *CFJCITRUS* item in this order only. Do the following:

1. On the *Production Order Details* (AM209000) form, open the production order that the system created earlier in this activity, which is assigned the *Planned* status and contains three *CFJCITRUS* items.
2. In the table of the **Materials** tab in the lower part of the form, remove the *JUICECUP1L* item.
3. Add a row for the *JUICECUP05L* item, and make sure that *1* is specified in the **Qty. Required** column.
4. On the form toolbar, click **Save**.

You have replaced the 1-liter juice cup with the 0.5-liter juice cup in the list of components of the production order.

Step 5: Releasing the Production Order

Before you start processing the production order, you need to release it. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that the system created earlier in this activity.
2. On the More menu (under **Processing**), click **Release Order**. The order's status is changed to *Released*.
3. In the **SO References** section of the **References** tab, make sure that the information about the linked sales order is displayed (see the following screenshot).

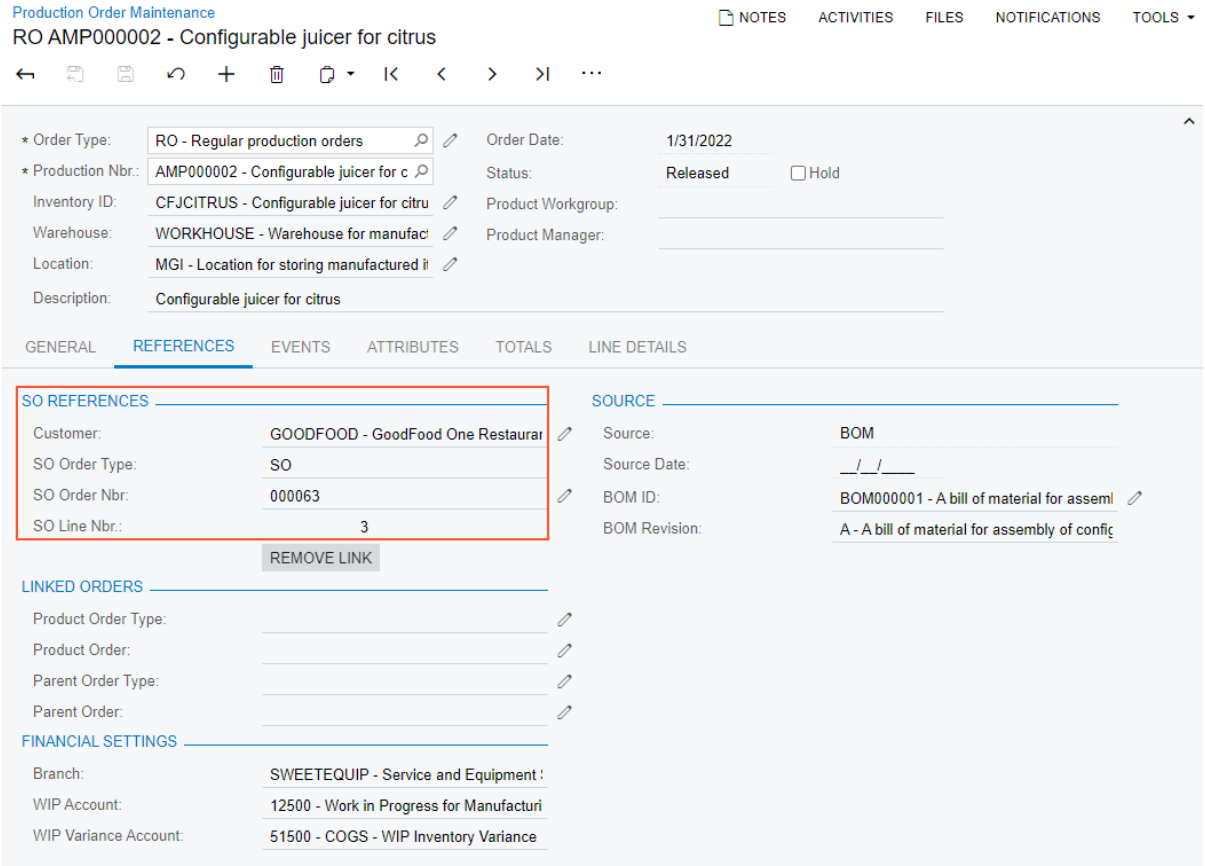


Figure: The References tab on the Production Order Maintenance form

Step 6: Creating a Purchase Order for Components

In this step, you will view the list of components that are required for the production of the juicers and are out of stock, and you will create a purchase order to purchase the materials from the *JALOOZA* vendor. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, click **Critical Material** in the **Other** section of the More menu. The *Critical Materials* (AM401000) form opens with the production order number selected in the **Production Nbr.** box.
2. In the **Qty. On Hand** column, make sure that zeros are specified in all rows. This means that the components required to assemble the juicers (except *JUICECUP05L*) are out of stock and must be purchased.
3. In the column header with the unlabeled check box, select this check box to select all rows.
4. On the form toolbar, click **Purchase**.
5. In the **Create Purchase Order** dialog box, which opens, view the default settings, and click **Create**. The system creates a purchase order and opens it on the *Purchase Orders* (PO301000) form.
6. On the form toolbar, click **Remove Hold**. The status of the purchase order is changed to *Open*.

Step 7: Receiving the Components in a Warehouse

Suppose that you have received the ordered components from the *JALOOZA* vendor and need to create a purchase receipt. The items have been received to the *MTL* location in the *WORKHOUSE* warehouse (this location is dedicated to the storing of materials and components). Do the following:

1. While you are still viewing the purchase order on the *Purchase Orders* (PO301000) form, on the form toolbar, click **Enter PO Receipt**. The system creates the purchase receipt and opens it on the *Purchase Receipts* (PO302000) form.
2. On the **Details** tab, view the list of the received components.
3. In the **Location** column, make sure that *MTL* is specified for each row.
4. On the form toolbar, click **Release**. The system releases the purchase receipt and changes its status to **Released**.
5. On the **Orders** tab, make sure that *Completed* is specified in the **Status** column of the only row.

You have received the required components into stock, and now you can continue processing the production order.

Step 8: Issuing the Components for the Production Order

In this step, you will issue the components for the production order. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that the system created earlier in this activity.
2. On the More menu (under **Processing**), click **Release Materials**. The system opens the *Materials Wizard* (AM300020) form with the list of components from the production order.
3. On the form toolbar, click **Select All**. The system creates the material transaction and opens it on the *Materials* (AM300000) form.
4. In the Summary area, do the following:
   a. In the **Description** box, specify `Materials for 3 citrus juicers`.
   b. Clear the **Hold** check box.
5. On the form toolbar, click **Release**. The system releases the material transaction and changes the status of the transaction to *Released*.

Step 9: Recording the Labor and Produced Items

Suppose that Carlos Cruz, a worker in the work center, spent 30 minutes setting up the working environment for juicer assembly and assembled 3 juicers for 1 hour. The assembled juicers have been moved to the *MGI* location of the *WORKHOUSE* warehouse. To record the time spent on juicer assembly and the movement of the assembled juicers, do the following:

1. On the *Labor* (AM301000) form, add a new record.
2. On the table toolbar, click **Add Row**.
3. In the row, specify the following settings:
   - **Labor Type**: *Direct*
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that the system created earlier in this activity
   - **Employee ID**: *EP00000027* (Carlos Cruz)
   - **Shift**: *0001*
   - **Start Time**: *09:00 AM*

- **End Time**: *10:30 AM*
- **Quantity**: 3

4. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, specify `Recording the time for assembly of 3 citrus juicers`.
   c. Clear the **Hold** check box. The system changes the transaction status to *Balanced*.
5. On the form toolbar, click **Release**. The system creates and releases the cost transaction to record labor costs, the inventory receipt to record the movement of the assembled juicers to the warehouse location, and the labor transaction itself.

Step 10: Closing the Production Order

Now you will close the production order. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that the system created earlier in this activity.
2. In the **Qty. Remaining** box of the **General** tab, make sure that *0* is specified. This means that all juicers have been produced.
3. Make sure that the order status is *Completed*.
4. On the More menu (under **Processing**), click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.
5. In the unlabeled column, make sure that the check box is selected.
6. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
7. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

Step 11: Viewing the Allocation of the Produced Items

To view the allocation details for the produced juicers, do the following:

1. On the *Sales Orders* (SO301000) form, open the sales order that you created earlier in this activity.
2. On the table toolbar of the **Details** tab, click **Item Availability**. The system opens the *Inventory Allocation Details* (IN402000) form with the *CFJCITRUS* item and the *WORKHOUSE* warehouse selected in the Summary area.
3. On the **Item Plans** tab, make sure that the *SO Allocated* item plan for three items and the *SO Booked* item plan for 12 items are displayed. Also, make sure that the following item plans are no longer listed: the *SO to Production* item plan for 3 items and the *Production for SO Prepared* item plan for 3 items (see the screenshot below).
4. In the Summary area, make sure that the **On Hand** value is *15* but the **Available** value is *0* (as shown in the following screenshot). This means that the juicers are allocated for the sales order and are unavailable for other sales orders.

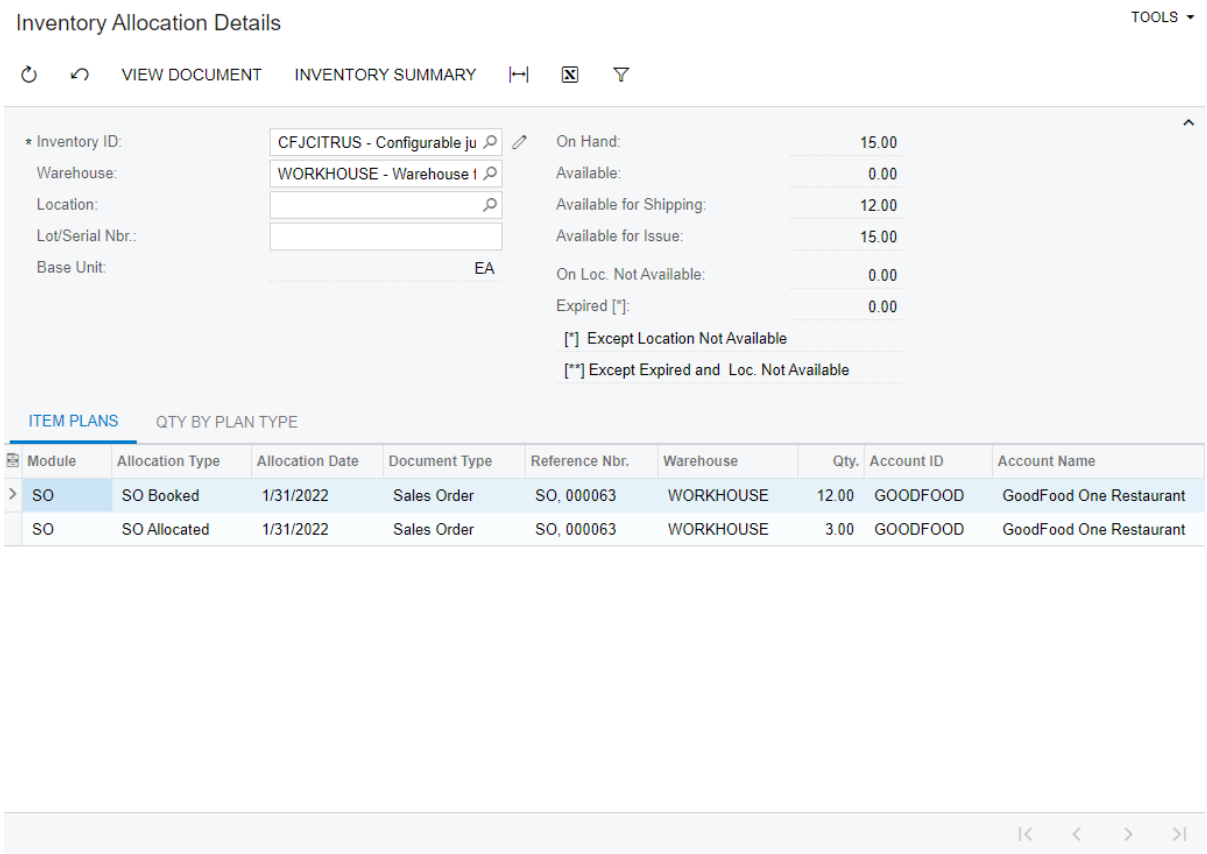


Figure: Allocation details for the sales order

Step 12: Shipping Items to the Customer

To ship the items to the customer, do the following:

1. On the *Sales Orders* (SO301000) form, open the sales order that you created earlier in this activity.
2. On the More menu (under **Processing**), click **Quick Process**.
3. In the **Process Order** dialog box, which opens, select the **Release Invoice** check box in the **Invoicing** section. (Leave the default values as they are for the rest of the settings.)
4. Click **OK**, and wait until the system processes the related documents and transactions.
5. In the **Processing Results** dialog box, click **OK**.
6. Make sure that the status of the sales order has been changed to *Completed*.

You have successfully processed the sales order and the related production documents and transactions.

Lesson 3: Material Requirements Planning

Material Requirements Planning: General Information

Material requirements planning (MRP) helps your organization to balance demand and supply documents by managing production based on the data analysis. Acumatica ERP Manufacturing Edition provides you with the tools to maintain the data underlying MRP, run MRP, and analyze the results. This topic describes the material requirements planning process and the related processes.

For details about configuring MRP, see *MRP Configuration: General Information*.

The MRP functionality is available only when the *Material Requirements Planning* feature is enabled on the *Enable/Disable Features* (CS100000) form.

Learning Objectives

In this chapter, you will learn how to run material requirements planning, analyze its results, and create production orders, purchase orders, and transfer orders based on the results.

Applicable Scenarios

You perform material requirements planning when you would like to plan production based on demand and supply data.

Performing of Material Requirements Planning

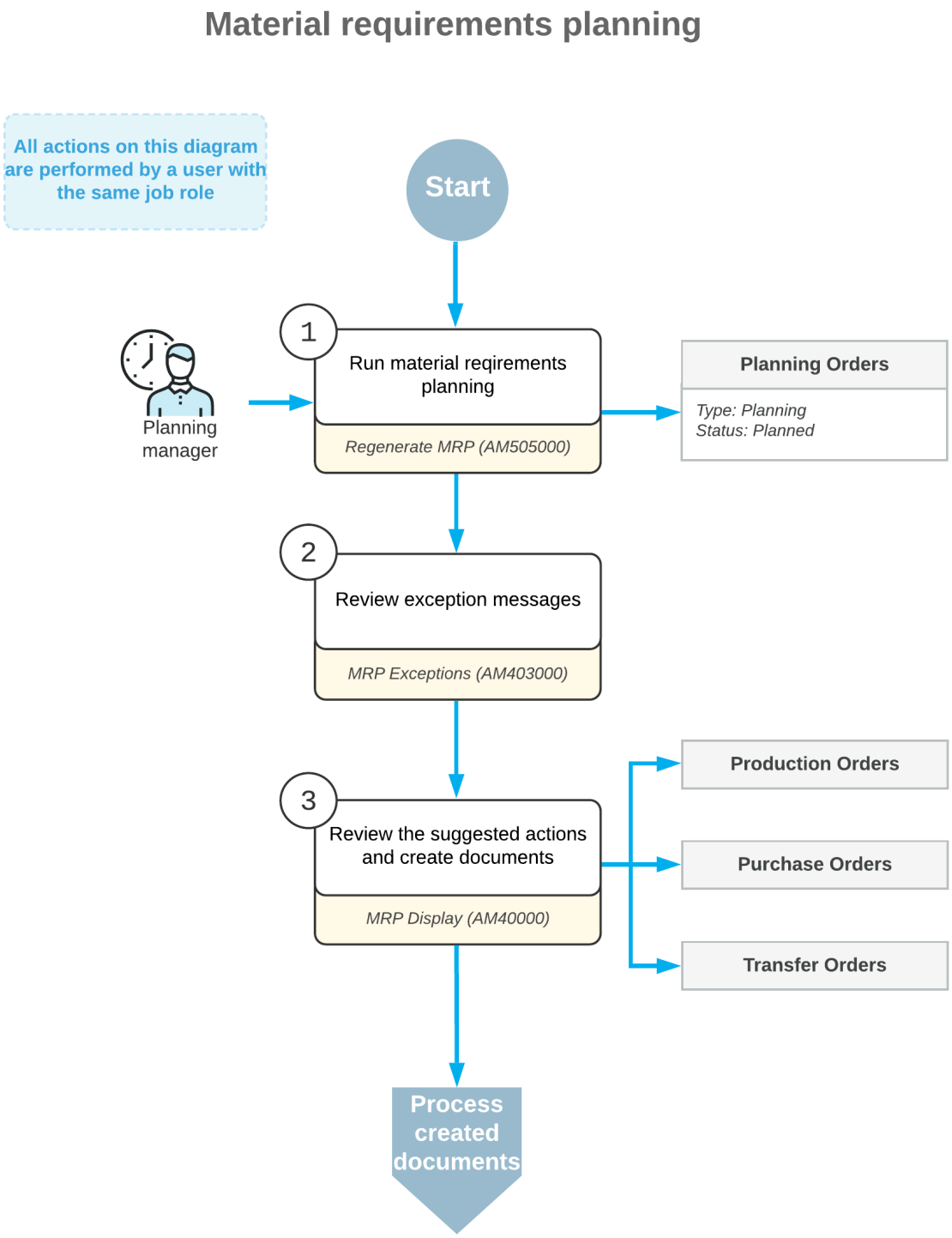
Generally, it is recommended that you run MRP before each business day after all of the previous day's sales and purchase orders have been entered and its transactions affecting inventory have been posted. Because this is a very resource-dependent process, it should be run in a time frame that does not conflict with database maintenance processes.

You do the following to perform material requirements planning:

1. Process and release all documents and transactions that affect inventory, such as sales invoices, purchase receipts, and production orders.
2. Run MRP regeneration by using the *Regenerate MRP* (AM505000) form. (We recommend that you schedule the running of MRP. For details, see *MRP Configuration: General Information*.)
3. Review exception messages by using the *MRP Exceptions* (AM403000) form.
4. Correct the planned dates of documents, if needed.
5. Review the results of MRP regeneration by using the *MRP Display* (AM400000) form.
6. Create the required documents (such as production orders, purchase orders, or transfer orders) by using the same form.

Workflow of Material Requirements Planning

The typical process of material requirements planning involves the actions and documents shown in the following diagram.



MRP Exception Analysis

Exception messages suggest actions that you should take to balance supply and demand. You can view the actions on the *MRP Exceptions* (AM403000) form after MRP has been regenerated. The types of exception messages that the system displays on this form are the following:

- *Defer*: You can defer the supply order (a production order or a purchase order) to a later date because the order date is outside the period specified in the **Days Before** box but still within the period specified in the **Grace Period** box on the *MRP Preferences* (AM100000) form.
- *Delete*: You can delete the supply order because the order date does not fall within the grace period specified on the *MRP Preferences* form and therefore the order is not needed.
- *Expedite*: You should expedite the supply order so that it meets the ship dates because the order date is within the period specified in the **Grace Period** box but outside the period specified in the **Days After** box specified on the *MRP Preferences* form.
- *Order on Hold*: You may want to consider the order to be a supply order.
- *Late Order*: You may want to exclude this order from the potential supply because the order date is outside of the grace period defined on the *MRP Preferences* form.
- *Transfer Available*: You can create a transfer order to move the items required for shipping from another warehouse because the needed item quantity is available in that warehouse.

Creation of Documents Suggested by MRP

When MRP is regenerated (manually or automatically), the system creates a list of suggested supply orders, or *planned* orders, which you then can convert to purchase, production, or transfer orders. You can view the list of planned orders and create the supply orders by using the *MRP Display* (AM400000) form.

You can create any type of supply order regardless of the source (*Purchase* or *Manufacturing*) specified for the planned order. That is, you can create a purchase order or transfer order for an item with a source of *Manufacturing*.

Material Requirements Planning: Process Details

When material requirements planning (MRP) is performed, the system analyzes particular data based on MRP settings and existing open documents that may influence the planning. In this topic, you will find information about how MRP works in Acumatica ERP Manufacturing Edition.

Data Used in MRP

The system considers the following during material requirements planning:

- Forecasts
- Sales orders that are not processed till completion, including open transfer orders

  Blanket sales orders (that is, sales orders of the *BL* type) are not considered during MRP.

- Shipments with not issued items
- Inventory on hand
- MPS orders
- Production orders that are not processed till completion
- Purchase orders that are not processed till completion

During MRP, the system uses supply and demand entities. Supply entities are transactions or documents that register the receipt of inventory items in a warehouse—that is, purchase orders and production orders. Demand entities are transactions or documents that issue inventory items from a warehouse—that is, sales orders and forecast records.

You manage the set of entities included in planing at the warehouse level. For details, see *MRP Configuration: General Information*.

Components Used for MRP

During material requirements planning, the system analyzes which components of items to be produced will be needed and suggests creating purchase orders if it discovers any shortage. The system determines the needed components as follows:

- For production orders, the material details with a quantity remaining are always used.
- For planned orders, the most recent active revision of the bill of material, whose identifier is specified in the **Planning BOM ID** box on the **Manufacturing** tab of the *Stock Items* (IN202500) is used. If this box is empty, the bill of material specified in the **Default BOM ID** box on the same tab is used.
- For master production schedule (MPS) orders, the bill of material specified in the order is used.

Additionally, the system uses the effective start date and effective end date specified for each material line in the bill of material to determine if a component is effective at the time when planned orders are generated.

The system selects the active bill of material based on the effective dates of the BOM revision. For example, if a revision exists for a future start date, it will be used for planned orders with a start date on or after this date.

Order of Creating Planning Orders

During MRP, the system analyzes the hierarchy of items based on the bills of material assigned to items and starts creating planning orders from the top-level items. It generates low-level codes for each item and component. The top-level items, such as items to be produced, are assigned the zero code. Then the system analyzes the components of the top-level items and assigns them the 1 code. If any of the components is a subassembly, which also should be produced, the system then analyzes its components and assigns them the 2 code. This procedure is repeated until the lowest level of components is reached.

Dates on Supply and Demand Orders Used in MRP

The system uses the following dates specified in supply and demand documents during MRP:

- Sales orders and transfer orders: The **Ship On** date in each document line on the *Sales Orders* (SO301000)
- Purchase orders: The **Promised** date in each document line on the *Purchase Orders* (PO301000)
- Production orders: The **Start Date** of each operation on the *Production Order Details* (AM209000) form
- MPS orders: The **Start Date** of each operation on the *MPS Listing* (AM000004) form

Material Requirements Planning: Process Activity

The following activity will walk you through the process of running material requirements planning (MRP).

Story

Suppose that GoodFood One Restaurant ordered five citrus juicers from SweetLife Fruits & Jams. The company does not have the juicers in stock, so the juicers must be assembled to satisfy the customer's order. The company also does not have the components required for the juicer assembly in stock, so the components must be ordered from the Jalooza Inc. vendor. The default lead time of the vendor is seven days.

Acting as the sales manager, you need to create the sales order with the juicers and then create a production order to request the production of the juicers. Acting as the planning manager, you need to run material requirements planning, analyze the results, and take the required actions to cause the juicers to be produced and shipped to the customer by the requested date.

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Customers* (AR303000) form, the *GOODFOOD* customer has been created.
- On the *Vendors* (AP303000) form, the *JALOOZA* vendor has been configured.
- On the *Stock Items* (IN202500) form, the *CFJCITRUS*, *JCREAMER*, *JUICECUP1L*, *MRBASEHIGH*, *STRBASKET*, and *SPLGUARD* stock items have been predefined.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJCITRUS* stock item.
- On the *Production Order Types* (AM201100) form, you have created the *PL* production order type for planning production orders.
- On the *MRP Preferences* (AM100000) form, you have specified *PL* as the default order type for planning production orders.

Process Overview

In this activity, to perform material requirements planning and process the results, you will do the following:

1. On the *Sales Orders* (SO301000) form, you will create a sales order with a citrus juicer to generate demand for MRP analysis.
2. On the same form, you will create a production order linked to the sales order to generate the supply that will satisfy the customer's order.
3. On the *Regenerate MRP* (AM505000) form, you will run material requirements planning, and then on the *MRP Exceptions* (AM403000) form, you will view the list of exception messages.
4. On the *MRP Display* (AM40000) form, you will view the list of actions the system has suggested as a result of material requirements planning and create a purchase order for the materials required to produce the citrus juicers.
5. On the *Regenerate MRP* form, you will rerun material requirements planning, and on the *MRP Exceptions* form, you will view the changes in the list of exception messages.
6. On the *Sales Orders* form, you will change the requested date for the juicers to be shipped to the customer; on the *Purchase Orders* (PO301000) form, you will change the promise date to an earlier date to meet the date the customer wanted the juicers to be shipped; on the *Production Order Maintenance* (AM201500) form, you will change the production end date (at which the juicers will be ready for shipping).
7. On the *Regenerate MRP* form, you will rerun material requirements planning, and on the *MRP Exceptions* form, you will make sure that no exception messages are listed.

Step 1: Creating a Sales Order

To create a sales order for the GoodFood One Restaurant customer with five citrus juicers, do the following:

1. On the *Sales Orders* (SO301000) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Customer**: *GOODFOOD*
   - **Requested On**: Today's date plus 6 days
   - **Description**: `Sale of 5 citrus juicers to GoodFood One Restaurant`
3. On the **Details** tab, add a new row and specify the following settings in the row:

- **Inventory ID**: *CFJCITRUS*
- **Quantity**: 5
- **Unit Price**: 2000

4. On the form toolbar, click **Save**.

Step 2: Creating a Production Order

To create a production order from the sales order, do the following:

1. While you are still viewing the sales order on the *Sales Orders* (SO301000) form, on the More menu, under the **Manufacturing** section, click **Create Production Orders**.

   > You open the More menu by clicking the More button (…) on the form toolbar.

2. In the **Production Orders** dialog box, which opens, select the unlabeled check box in the only row, and click **Create**. The system creates the production order and closes the dialog box.
3. In the **Production Nbr.** column of the **Details** tab for the only line, make sure that the system has added the reference number of the production order.
4. In the column, click the link to open the production order on the *Production Order Maintenance* (AM201500) form.
5. In the **End Date** box of the **General** tab, make sure that the today's date plus 6 days is specified.

Step 3: Running MRP and Viewing Exception Messages

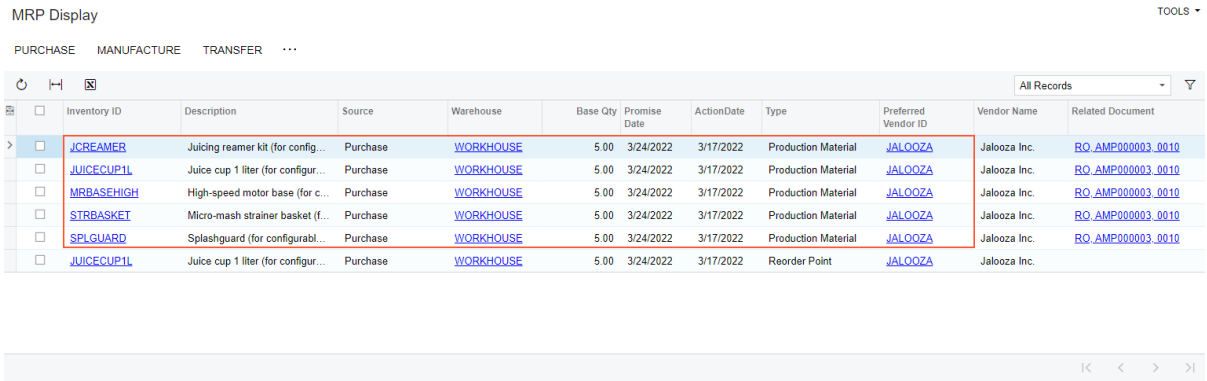
To run material requirements planning and view exception messages, do the following:

1. Open the *Regenerate MRP* (AM505000) form.
2. On the form toolbar, click **Process**.
3. In the form title bar, click the form name to view the log records, which appear in the table.
4. Open the *MRP Exceptions* (AM403000) form.
5. Make sure that no exception messages are displayed in the table.

Step 4: Creating a Purchase Order

To create a purchase order for the components, do the following:

1. Open the *MRP Display* (AM40000) form.
2. Make sure that the table contains five rows of the *Production Material* type (see the following screenshot). These rows correspond to the components required for the juicer assembly. In the **Source** column, notice that *Purchase* is specified, which is the replenishment source for the items.



Inventory ID	Description	Source	Warehouse	Base Qty	Promise Date	ActionDate	Type	Preferred Vendor ID	Vendor Name	Related Document
JCREAMER	Juicing reamer kit (for config...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Production Material	JALOOZA	Jalooza Inc.	RO, AMP000003, 0010
JUICECUP1L	Juice cup 1 liter (for configur...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Production Material	JALOOZA	Jalooza Inc.	RO, AMP000003, 0010
MRBASEHIGH	High-speed motor base (for c...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Production Material	JALOOZA	Jalooza Inc.	RO, AMP000003, 0010
STRBASKET	Micro-mash strainer basket (f...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Production Material	JALOOZA	Jalooza Inc.	RO, AMP000003, 0010
SPLGUARD	Splashguard (for configurabl...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Production Material	JALOOZA	Jalooza Inc.	RO, AMP000003, 0010
JUICECUP1L	Juice cup 1 liter (for configur...	Purchase	WORKHOUSE	5.00	3/24/2022	3/17/2022	Reorder Point	JALOOZA	Jalooza Inc.	

Figure: The MRP Display form

3. Select the unlabeled check box in each of the five rows.
4. On the form toolbar, click **Purchase** to create a purchase order for the components.
5. In the **Create Purchase Order** dialog box, which opens, make sure that in the **Vendor** box, the *JALOOZA* vendor is selected, and in the table, all five components are listed.
6. Click **Create**. The system creates the purchase order and shows its reference number in the **Purchase Order Created** dialog box, which opens.
7. Click **OK** to close the dialog box.
8. Open the created purchase order on the *Purchase Orders* (PO301000) form.
9. Make sure that the **Promised On** box contains the date that is the today's date plus 7 days, which is the default lead time of the *JALOOZA* vendor. This purchase order does not satisfy the demand of the sales order because the components will be delivered later than the customer expected to receive the juicers.

Step 5: Rerunning MRP and Viewing Exception Messages

You will view how the list of MRP exception messages has changed due to the creation of the purchase order. Do the following:

1. Open the *Regenerate MRP* (AM505000) form.
2. On the form toolbar, click **Process** and wait till the system completes processing.
3. Open the *MRP Exceptions* (AM403000) form.
4. Make sure that the *Expedite* messages for the component lines from the purchase order have appeared in the list. This means that to satisfy the demand, you need to negotiate an earlier delivery date with the vendor or a later shipping date with the customer (or both).

Step 6: Changing the Dates in the Documents

Suppose that you have negotiated with the vendor an earlier delivery date of 4 days after the today's date for the juicer components. Do the following to change the date in the purchase order:

1. On the *Purchase Orders* (PO301000) form, open the purchase order that you created earlier in this activity.
2. In the **Promised On** box of the Summary area, change the value to the today's date plus 4 days.
3. On the form toolbar, click **Save**.

Step 7: Rerunning MRP and Viewing Exceptions

You will rerun MRP and make sure that all exception messages have been processed. Do the following:

1. Open the *Regenerate MRP* (AM505000) form.
2. On the form toolbar, click **Process** and wait till the system completes processing.
3. Open the *MRP Exceptions* (AM403000) form.
4. Make sure that no exception messages are displayed in the list.

You have successfully processed all the exception messages.

Lesson 4: Producing Lot- or Serial-Tracked Items

Production of Lot- or Serial-Tracked Items: General Information

Acumatica ERP Manufacturing Edition provides you with the ability to record the production of lot- or serial-tracked items and the usage of lot- or serial-tracked materials in production, as described in this topic.

For more information about lot- or serial-tracked items, see *Items with Lot and Serial Numbers: General Information*.

Learning Objectives

In this chapter, you will learn how to do the following:

- Preassign lot or serial numbers to produced items
- Assign the lot or serial numbers of the produced item to the lot- or serial-tracked materials used for this item
- View the hierarchy of lot or serial numbers for produced items

Applicable Scenarios

You track the production of lot- or serial-tracked items in the following cases:

- When you want the units of items to be traceable through the whole lifecycle, from production to the people who consume or use the units of the item
- When you guarantee the quality of produced items, with replacement if the customer is not satisfied, and thus need these numbers to track quality issues and ensure that the items were produced by your organization
- When you produce items with expiration dates
- When you organize the produced items in lots

Assignment of Lot or Serial Numbers to Produced Items

Depending on the lifecycle of the lot- or serial-tracked items that your organization produces, you can assign lot or serial numbers to items at the following stages:

- After the item is produced and moved to stock, such as when you sell the item: You assign the lot or serial number when receiving the item in a warehouse or shipping the item for a sales order. For details, see *Items with Lot and Serial Numbers: General Information*.
- Before the item is produced: You assign the lot or serial number before you release a production order. For details, see the *Preassignment of Lot or Serial Numbers to Produced Items* section below.

  Also, during the processing of production transactions, you can assign the lot or serial numbers of produced items (which have been preassigned) to lot- or serial-tracked materials. For more information, see the *Assignment of Parent Lot or Serial Numbers to Materials* section below.

Preassignment of Lot or Serial Numbers to Produced Items

To assign lot or serial numbers to the units of a produced item in a production order, on the *Production Order Maintenance* (AM201500) form, you do the following:

1. Create a production order for the lot- or serial-tracked item.

2. On the **General** tab, make sure that the **Allow Preassigning Lot/Serial Numbers** check box is selected.

   The system copies the state of this check box from the settings of the production order type selected in the **Order Type** box.

3. If the item is serialized, on the **Line Details** tab, add a row for each unit of the item to be produced, and specify its serial number in the **Lot/Serial Nbr.** column. When you finish entering this data, the number of rows on this tab must be equal to the **Qty. to Produce** value on the **General** tab.
4. If the item is tracked by lot, on the **Line Details** tab, add one row for each lot number (and enter this number in the **Lot/Serial Nbr.** column) to which units are assigned, and specify the quantity of units to which this lot number is assigned. The total sum in the **Quantity** column of all rows must be equal to the **Qty. to Produce** value on the **General** tab.

You can release the production order only when you have assigned lot or serial numbers to all units of the produced item. Otherwise, the system displays an error message and does not release the order.

Assignment of Parent Lot or Serial Numbers to Materials

You can assign the lot or serial number of the item being produced (the *parent item*) to lot- or serial-tracked materials when processing production transactions. You can also set up the system so that it verifies that the parent lot or serial number has been assigned to materials. To do this, you select the needed option in the **Require Parent Lot/Serial Number** box of the *Production Order Maintenance* (AM201500) form as follows:

- If you do not want the system to verify that the lot or serial numbers of a parent item have been assigned to lot- or serial-tracked materials, you select *Never*. With this option selected for the production order, you still can assign the parent lot or serial numbers to materials on the *Materials* (AM300000) or *Late Assignment*(AM312000) forms, but the system does not require this.
- If you want the system to verify that the lot or serial numbers of a produced item have been assigned to lot- or serial-tracked materials when a user releases a material transaction on the *Materials* form, you select *On Issue*. The system will not release the transaction until the user assigns the lot or serial number of the produced item to each material. For more information, see the *Assignment of Parent Lot or Serial Numbers on the Issue of Materials* section below.

  With this option, backflushing of lot- or serial-tracked materials is not supported, because this setting requires a lot or serial number to be assigned to the parent item at the moment when the materials are issued.

- If you want the system to verify that the lot or serial numbers of a produced item have been specified for lot- or serial-tracked materials before users move the produced items into stock (by releasing the appropriate transaction on the last operation), you select *On Completion*. For details, see the *Assignment of Parent Lot or Serial Numbers to Materials on Completion* section below.

For a production order type, you can also specify the default option in the **Require Parent Lot/Serial Number** box on the *Production Order Types* (AM201100) form; the system will initially insert this option for each production order of the type.

Assignment of Parent Lot or Serial Numbers on the Issue of Materials

To assign the lot or serial numbers of the item being produced to lot- or serial-tracked materials when you issue materials for a production order—which you do when the *On Issue* value is specified in the **Require Parent Lot/Serial Number** box of the *Production Order Maintenance* (AM201500) form for the production order—you do the following:

1. On the *Materials* (AM300000) form, add the materials required for producing the lot- or-serial tracked item for a particular production order.

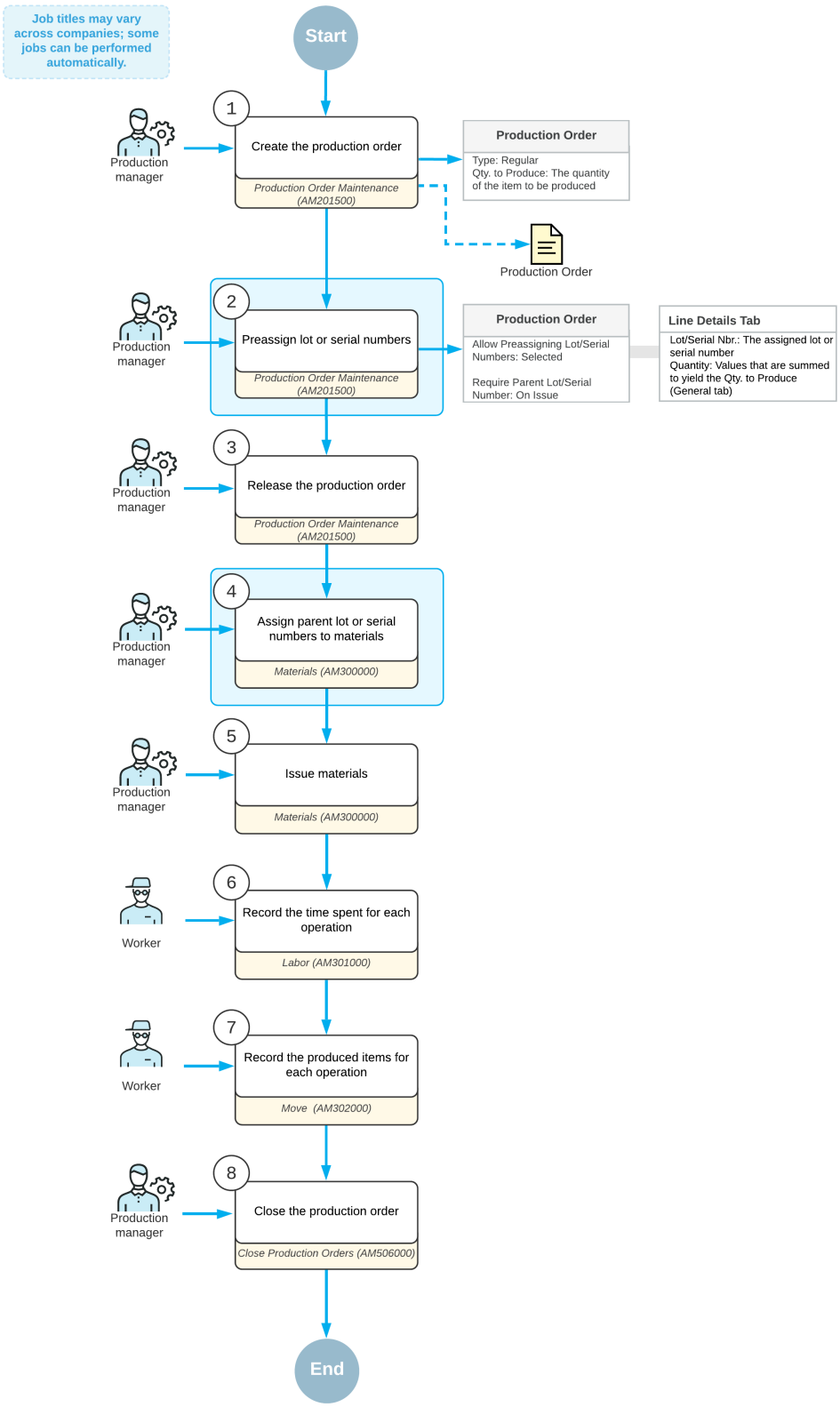
2. Click the row with the lot- or serial-tracked material, and click **Line Details** on the table toolbar. The system opens the **Line Details** dialog box.
3. If the material is serialized, add a row in the dialog box for each unit of the material item and either specify its serial number in the **Lot/Serial Nbr.** column or make sure that the serial numbers have been generated automatically, depending on the settings of the serial class.
4. If the material is tracked by lot, add one row for each lot number to which units are assigned and specify the quantity of units to which this lot number is assigned.
5. In the **Parent Lot/Serial Nbr.** column, specify the lot or serial number of the parent item to be assigned to each row.
6. Click **OK** to save the changes and close the dialog box.
7. Release the material transaction by clicking **Release** on the form toolbar.

If you do not assign the lot or serial numbers of the parent item to any lot- or serial-tracked materials, the system displays an error message and does not release the transaction.

Workflow of the Assignment of Parent Lot or Serial Numbers to Materials on Issue

For preassigning lot or serial numbers to parent items and assigning parent lot or serial numbers to materials on issue of the materials, the typical process involves the actions and generated documents shown in the following diagram.

Assigning Parent Lot or Serial Numbers to Materials on Issue



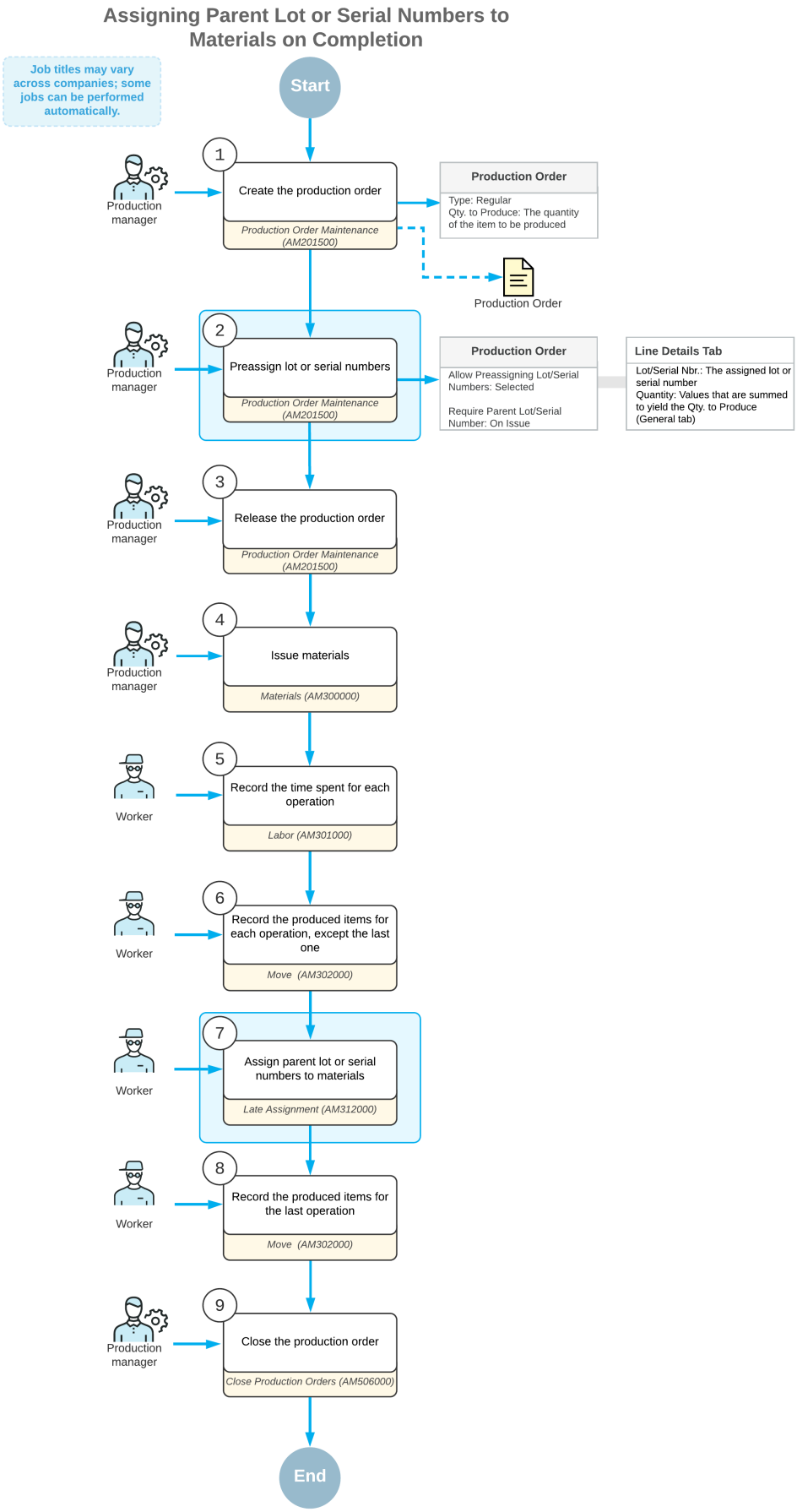
Assignment of Parent Lot or Serial Numbers to Materials on Completion

To assign the lot or serial numbers of the item to be produced to lot- or serial-tracked materials before you record movement of the produced parent item to stock—that is, when the *On Completion* value is specified in the **Require Parent Lot/Serial Number** box of the *Production Order Maintenance* (AM201500) form for the production order—you do the following:

1. On the *Materials* (AM300000) form, release the material transaction with the materials required for producing the item in a particular production order, including the lot- or serial-tracked materials.
2. On the *Labor* (AM301000) or *Move* (AM302000) form, record the movement of the produced items between the operations involved in production, except the last operation.
3. When you record the movement of the produced items for the last operation on the *Labor* or *Move* form, click **Late Assignment** on the table toolbar to open the *Late Assignment* (AM312000) form.
4. Assign the parent lot or serial number to each material as follows:
   a. In the **Lot/Serial Nbr.** box of the Summary area, select the lot or serial number of the parent that will be assigned to materials.
   b. In the **Unallocated Components** table, click the material row to be assigned.
   c. On the form toolbar, click **Allocate**. The system assigns the lot or serial number to the material and moves the material row to the **Allocated Components** table.
   d. Repeat the previous subinstructions for each material to be allocated to the lot or serial number you have selected in the **Lot/Serial Nbr.** box.
5. When you have allocated all needed materials to parent lot or serial numbers, open the *Labor* or *Move* form, and release the transaction for the last operation.

Workflow of the Assignment of Parent Lot or Serial Numbers to Materials on Completion

For preassigning lot or serial numbers to parent items and assigning parent lot or serial numbers to materials on completion of a production order with the parent items, the typical process involves the actions and generated documents shown in the following diagram.


Assigning Parent Lot or Serial Numbers to Materials on Completion
Job titles may vary across companies; some jobs can be performed automatically.
Start
1
Production manager
Create the production order
Production Order Maintenance (AM201500)
Production Order
Type: Regular
Qty. to Produce: The quantity of the item to be produced
Production Order
2
Production manager
Preassign lot or serial numbers
Production Order Maintenance (AM201500)
Production Order
Allow Preassigning Lot/Serial Numbers: Selected
Require Parent Lot/Serial Number: On Issue
Line Details Tab
Lot/Serial Nbr.: The assigned lot or serial number
Quantity: Values that are summed to yield the Qty. to Produce (General tab)
3
Production manager
Release the production order
Production Order Maintenance (AM201500)
4
Production manager
Issue materials
Materials (AM300000)
5
Worker
Record the time spent for each operation
Labor (AM301000)
6
Worker
Record the produced items for each operation, except the last one
Move (AM302000)
7
Worker
Assign parent lot or serial numbers to materials
Late Assignment (AM312000)
8
Worker
Record the produced items for the last operation
Move (AM302000)
9
Production manager
Close the production order
Close Production Orders (AM506000)
End

Production of Lot- or Serial-Tracked Items: To Assign Parent Serial Numbers to Materials on Issue

The following activity will walk you through the process of creating and processing a production order with a serial-tracked item and serial-tracked material. During processing, you will assign the serial numbers of the item to be produced (the parent item) to the units of serial-tracked materials when the materials are issued.

Story

Suppose that based on the analyzed sales demand from previous periods, the sales department of SweetLife has asked the production department to produce five juicers. These juicers are serial-tracked and include a serial-tracked motor base as one of the materials, according to the bill of material dedicated to the juicer's production. Further suppose that the serial number of each motor base must be assigned to the serial number of a juicer for whose assembly the motor base was used. The production manager should assign the serial numbers when the materials for a production order are issued. The information about the serial numbers must be stored in the system because SweetLife provides service for juicer repairing and replacement. They must be able to confirm that the juicer and its parts were bought from SweetLife and to track the components that were used in the production of this specific juicer.

The materials required for the juicer's production are in stock; you do not need to purchase any of them. Also suppose that the scheduling priority is standard (that is, you do not need to produce the juicers more quickly or more slowly than the other items in the queue).

Acting as a production manager, you will create a production order for producing five juicer units, generate serial numbers for the juicer units, issue the materials required for the juicer's production, assign the generated serial numbers to the motor base units, and process the other related transactions.

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse has been defined, and its locations include *MGI* and *MTL*.
- On the *Stock Items* (IN202500) form, the *CFJFRUITSN*, *PULPCONT1L*, *JUICECUP05L*, *MRBASESN*, *FNSIEVE*, and *GRDISC01* stock items have been defined.
- On the *Lot/Serial Classes* (IN207000) form, the *SNJCRPRT* and *ASNCFGJCR* serial classes have been created.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJFRUITSN* stock item.
- On the *Production Order Types* (AM201100) form, you have done the following:
  - Created the *RO* production order type for regular production orders.
  - Specified the default settings for the preassignment of serial numbers in regular production orders of the *RO* type.
- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.

Process Overview

In this activity, to process the documents and transactions related to the production of the juicers, you will do the following:

1. On the *Production Order Maintenance* (AM201500) form, you will create the production order for the serialized item and specify the serial number tracking settings.
2. On the *Materials* (AM300000) form, you will issue the components required for the production order and assign the serial numbers of the parent item to the serial-tracked material units.
3. On the *Move* (AM302000) form, you will record the produced quantity of the items.
4. On the *Close Production Orders* (AM506000) form, you will close the production order.
5. On the *Lot/Serial Hierarchy* (AM600000) report, you will review the serial numbers used for the produced units, for the material units; you will also review the serial numbers of the produced units assigned to the serial-tracked material units.

Step 1: Creating the Production Order

To create the production order for five juicers and specify the serial number tracking settings, do the following:

1. On the *Production Order Maintenance* (AM201500) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *RO*
   - **Inventory ID**: *CFJFRUITSN*
   - **Warehouse**: *WORKHOUSE*
   - **Location**: *MGI*
   - **Order Date**: Today's date
   - **Hold**: Cleared
   - **Description**: `Production of 5 fruit juicers`
3. On the **General** tab, specify the following settings:
   - **Qty. to Produce**: `5`
   - **Require Parent Lot/Serial Number**: *On Issue*
4. On the form toolbar, click **Save**.
5. On the **Line Details** tab, make sure that the system has generated five serial numbers (one for each unit to be produced), as shown in the following screenshot.

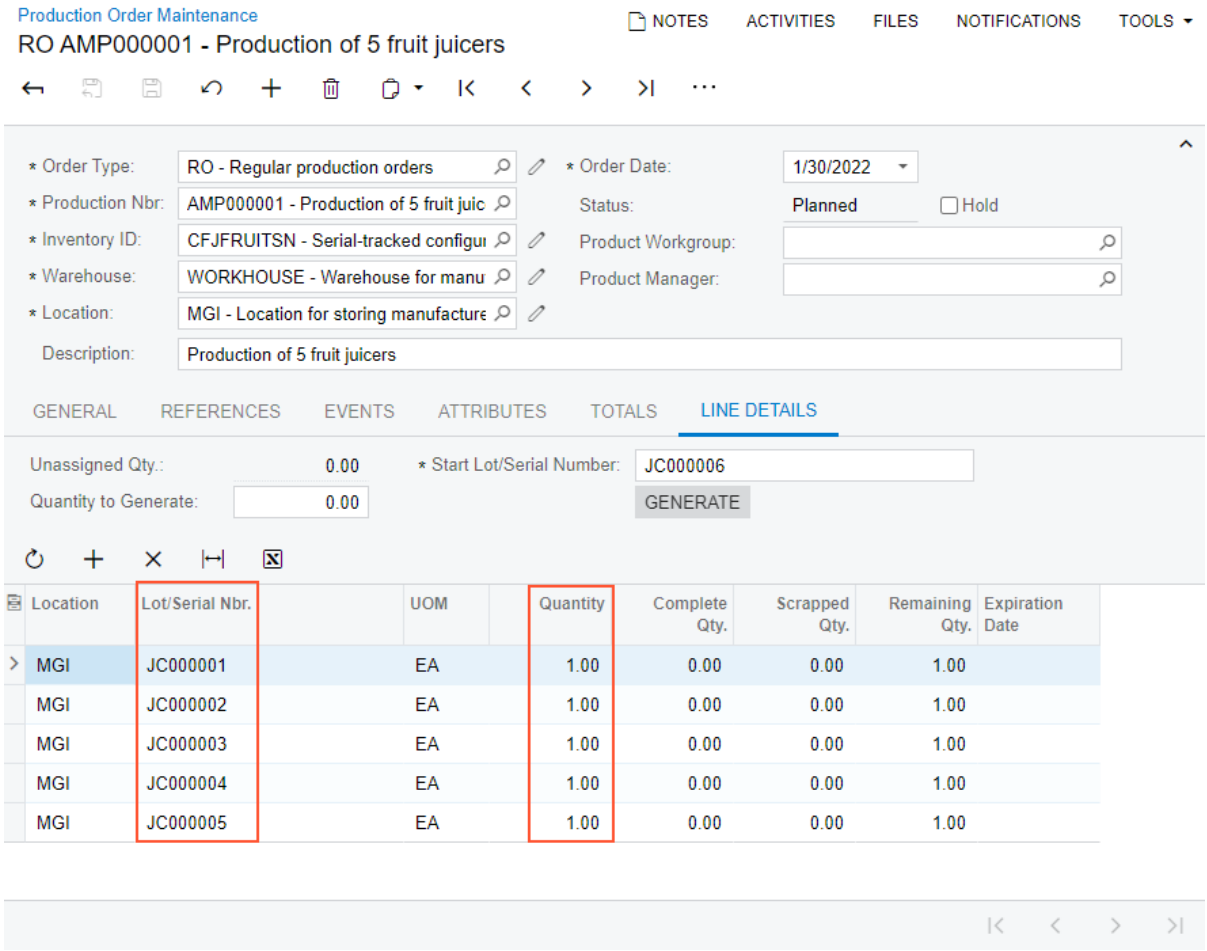


Figure: Serial numbers generated for the production order

6. On the More menu (under **Processing**), click **Release Order**. The order status is changed to *Released*.

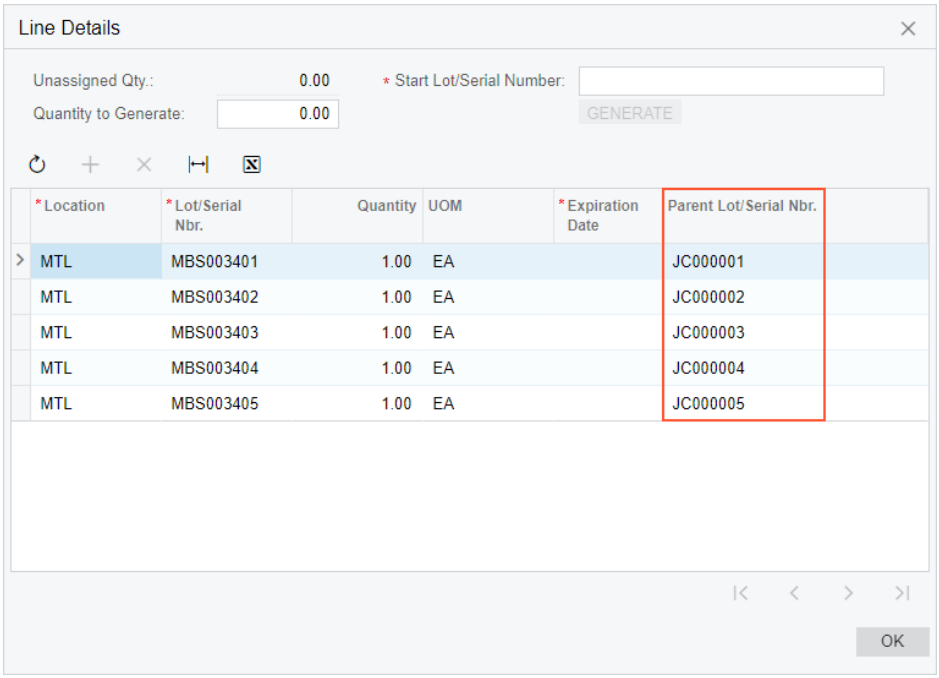
> You open the More menu by clicking the More button (…) on the form toolbar.

Step 2: Issuing the Components for the Production Order

In this step, you will issue the components for the production order and assign the serial numbers of the juicer units to the motor base units. Do the following:

1. While you are still viewing the production order you have created on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Processing**), click **Release Materials**. The system opens the *Materials Wizard* (AM300020) form with the list of components from the production order.
2. On the form toolbar, click **Select All**. The system creates the material transaction, add the selected components to the transaction, and opens the transaction on the *Materials* (AM300000) form.
3. In the **Description** box of the Summary area, enter `Materials for 5 fruit juicers`.
4. Try to release the material transaction as follows:
   a. In the Summary area, clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
   b. On the form toolbar, click **Release**. The system returns an error message stating that you need to assign parent serial numbers to the serial-tracked materials before releasing the material transaction.
5. In the Summary area, select the **Hold** check box. The system changes the transaction's status to *On Hold*.

6. In the table, click the row with the *MRBASESN* item.
7. On the table toolbar, click **Line Details**.
8. In the **Line Details** dialog box, which opens, do the following:
   a. In the **Parent Lot/Serial Nbr.** column of each row, select a serial number from the list of numbers that have been preassigned to the production order (see the following screenshot). You must assign a unique parent serial number to each material row.



* Location	* Lot/Serial Nbr.	Quantity	UOM	* Expiration Date	Parent Lot/Serial Nbr.
MTL	MBS003401	1.00	EA		JC000001
MTL	MBS003402	1.00	EA		JC000002
MTL	MBS003403	1.00	EA		JC000003
MTL	MBS003404	1.00	EA		JC000004
MTL	MBS003405	1.00	EA		JC000005

Figure: The parent serial numbers assigned to the material units

   b. Click **OK** to save your changes and close the dialog box.
9. In the **Lot/Serial Nbr.** column and **Parent Lot/Serial Nbr.** column of the row with the *MRBASESN* item, make sure that *<SPLIT>* is specified. This means that multiple serial numbers have been selected for the material units.
10. In the Summary area, clear the **Hold** check box.
11. On the form toolbar, click **Release**. The system successfully releases the material transaction and changes the status of the transaction to *Released*.

Step 3: Recording the Produced Items

Suppose that warehouse workers have assembled all five juicers and moved them to the *MGI* location of the *WORKHOUSE* warehouse. In the production environment, you would record the workers' time spent on juicer assembly, but in this activity, for simplicity, you will record only the movement of the assembled juicers. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
2. On the More menu (under **Processing**), click **Create Move Transaction**. The system opens the *Move* (AM302000) form with the row for the production order added to the table.
3. On the table toolbar, click **Line Details**. The system opens the **Line Details** dialog box.
4. In each table row, in the **Lot/Serial Nbr.** column, select a serial number from the list of numbers that have been generated for to the production order (see the following screenshot).

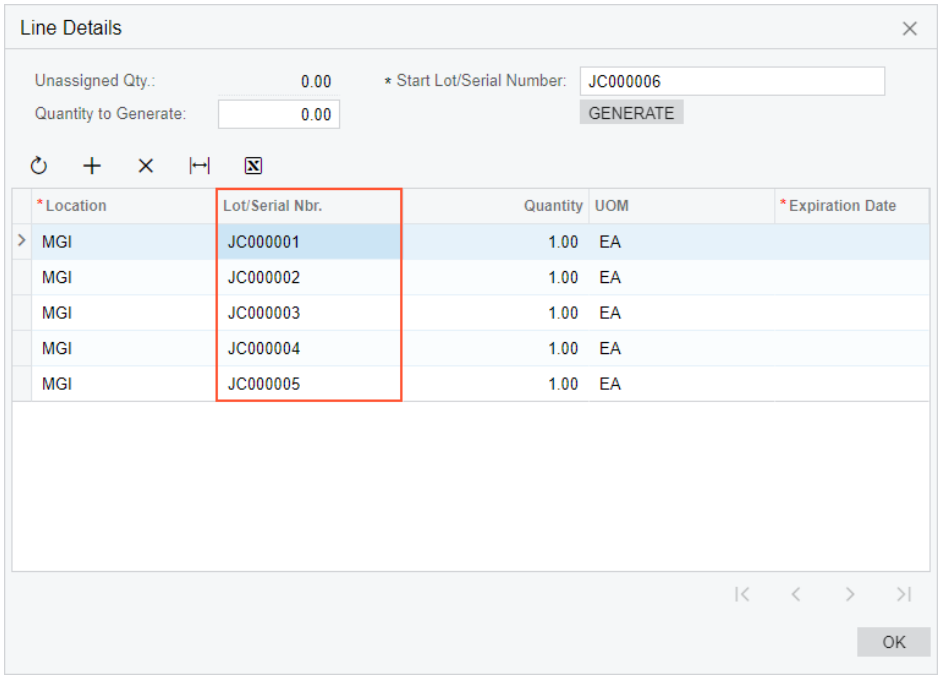


Figure: The serial numbers in the Line Details dialog box on the Move form

5. Click **OK** to save your changes and close the dialog box.
6. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, enter `Recording the movement of 5 fruit juicers.`
   c. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
7. On the form toolbar, click **Release**. The system releases the move transaction.
8. Open the production order on the *Production Order Maintenance* form and make sure that it is assigned the *Completed* status.

Step 4: Closing the Production Order

Now you will close the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu, click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.
2. In the unlabeled column, make sure that the check box is selected.
3. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
4. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

Step 5: Reviewing the Serial Numbers Specified in the Production Order

You will review the list of serial numbers specified for the juicer units and the motor base units in the production order you created in earlier in this activity. Do the following:

1. Open the *Lot/Serial Hierarchy* (AM600000) report.

2. On the **Report Parameters** tab, specify the following settings:
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that you created in earlier in this activity
   - **Inventory ID**: Empty
3. On the report form toolbar, click **Run Report**.
4. In the report, review the serial numbers for the juicers (Item 1 in the following screenshot), for the motor base units (Item 2), and of the juicers assigned to the motor base units (Item 3).

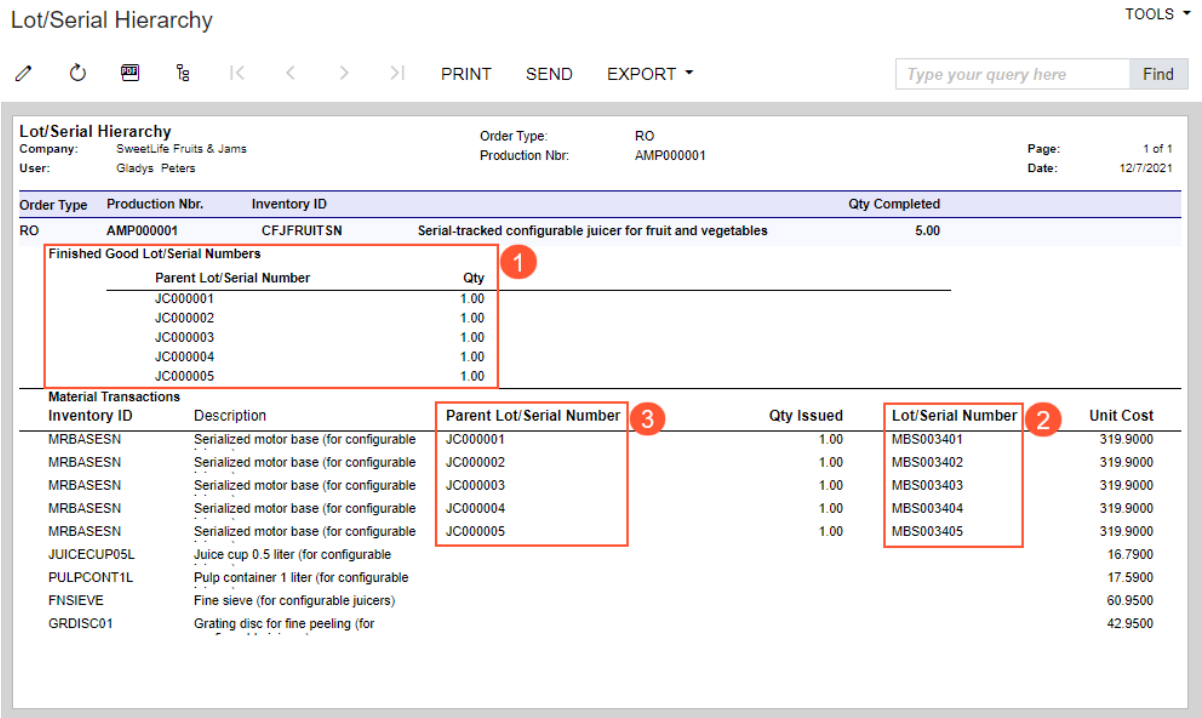


Figure: The Lot/Serial Hierarchy report

You have processed the production order with the serialized item and assigned the parent serial numbers to the serialized material units.

Production of Lot- or Serial-Tracked Items: To Assign Parent Serial Numbers to Materials on Completion

The following activity will walk you through the process of creating and processing a production order with a serial-tracked item and serial-tracked material. During processing, you will assign the serial numbers of the item to be produced (the parent item) to the units of serial-tracked materials when the units of the produced item are moved to stock.

Story

Suppose that based on the analyzed sales demand from previous periods, the sales department of SweetLife has asked the production department to produce three juicers for fruit. These juicers are serial-tracked and include a serial-tracked motor base as one of the materials, according to the bill of material dedicated to the juicer's production. Further suppose that the serial number of each motor base must be assigned to the serial number of the juicer in whose assembly the motor base was used. The production manager should assign the serial numbers when the assembled juicers are moved to stock. The information about the serial numbers must be stored in the

system because SweetLife provides service for juicer repairing and replacement. They must be able to confirm that the juicer and its parts were bought from SweetLife and to track the components that were used in the production of this specific juicer.

The materials required for the juicer's production are in stock; you do not need to purchase any of them. Also suppose that the scheduling priority is standard (that is, you do not need to produce the juicers more quickly or more slowly than the other items in the queue).

Acting as a production manager, you will create a production order for producing three fruit juicer units, generate serial numbers for the juicer units, issue the materials required for the juicer's production, and while you are recording the movement of the assembled juicers to stock, assign the generated serial numbers to the motor base units.

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse has been defined, and its locations include *MGI* and *MTL*.
- On the *Stock Items* (IN202500) form, the *CFJFRUITSN*, *PULPCONT1L*, *JUICECUP05L*, *MRBASESN*, *FNSIEVE*, and *GRDISC01* stock items have been defined.
- On the *Lot/Serial Classes* (IN207000) form, the *SNJCRPRT* and *ASNCFGJCR* serial classes have been created.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJFRUITSN* stock item.
- On the *Production Order Types* (AM201100) form, you have done the following:
  - Created the *RO* production order type for regular production orders.
  - Specified the default settings for the preassignment of serial numbers in regular production orders of the *RO* type.
- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.

Process Overview

In this activity, to process the documents and transactions related to the production of the juicers, you will do the following:

1. On the *Production Order Maintenance* (AM201500) form, you will create the production order for the serialized item and specify the serial number tracking settings.
2. On the *Materials* (AM300000) form, you will issue the components required for the production order.
3. On the *Late Assignment* (AM312000) form, you will assign the serial numbers of the parent item to the serial-tracked material units.
4. On the *Move* (AM302000) form, you will record the produced quantity of the items.
5. On the *Close Production Orders* (AM506000) form, you will close the production order.
6. On the *Lot/Serial Hierarchy* (AM600000) report, you will review the serial numbers used for the produced units, for the material units; you will also review the serial numbers of the produced units assigned to the serial-tracked material units.

Step 1: Creating the Production Order

To create the production order for three jsuicers and specify the serial number tracking settings, do the following:

1. On the *Production Order Maintenance* (AM201500) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *RO*
   - **Inventory ID**: *CFJFRUITSN*
   - **Warehouse**: *WORKHOUSE* (selected automatically)
   - **Location**: *MGI* (selected automatically)
   - **Order Date**: Today's date (selected automatically)
   - **Hold**: Cleared
   - **Description**: `Production of 3 fruit juicers`
3. On the **General** tab, specify the following settings:
   - **Qty. to Produce**: 3
   - **Require Parent Lot/Serial Number**: *On Completion*
4. On the form toolbar, click **Save**.
5. On the **Line Details** tab, make sure that the system has generated three serial numbers (one for each unit to be produced), as shown in the following screenshot.

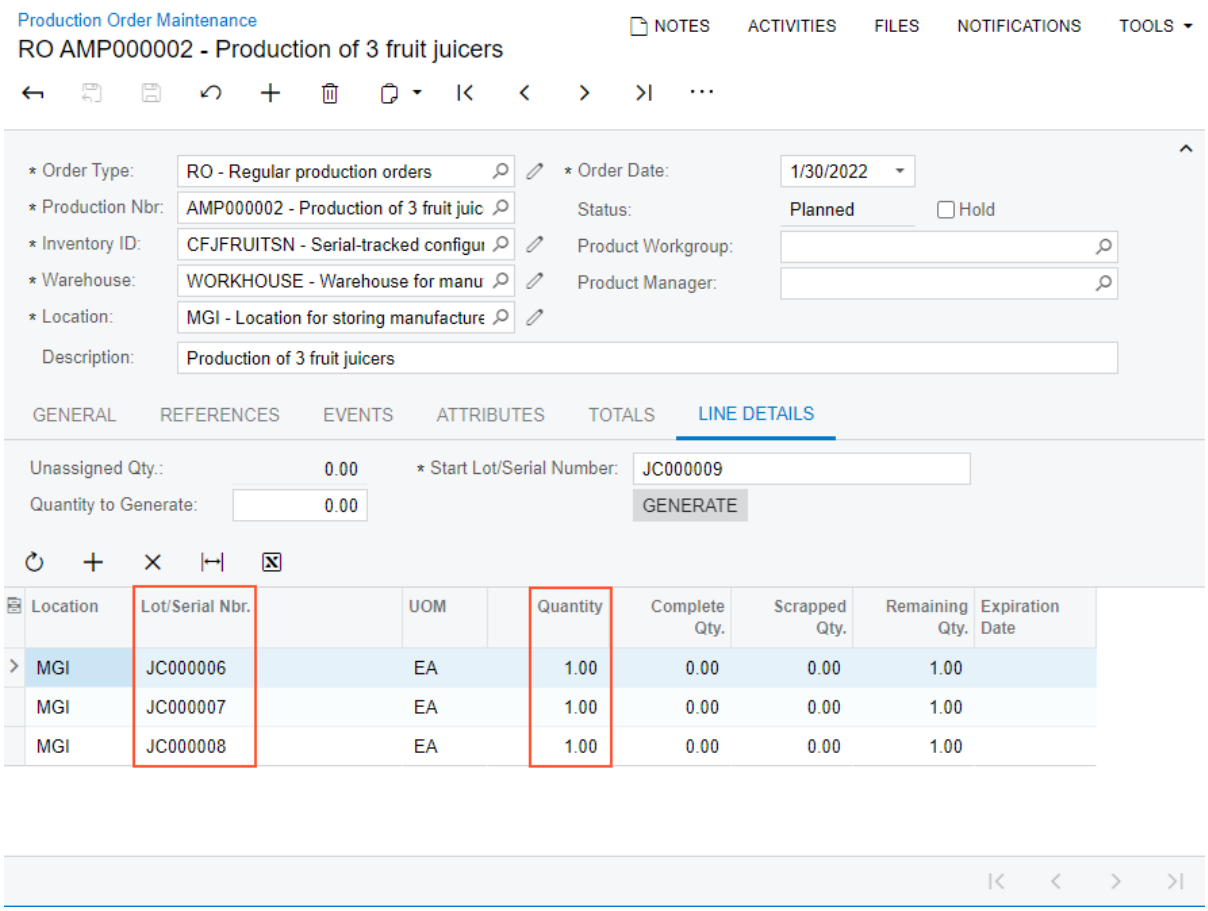


Figure: Serial numbers generated for the production order

6. On the More menu (under **Processing**), click **Release Order**. The order status is changed to *Released*.

> You open the More menu by clicking the More button (…) on the form toolbar.

Step 2: Issuing the Components for the Production Order

In this step, you will issue the components for the production order. Do the following:

1. While you are still viewing the production order you have created on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Processing**), click **Release Materials**. The system opens the *Materials Wizard* (AM300020) form with the list of components from the production order.
2. On the form toolbar, click **Select All**. The system creates the material transaction, adds the selected materials to the transaction, and opens the transaction on the *Materials* (AM300000) form.
3. In the **Description** box of the Summary area, enter `Materials for 3 fruit juicers`.
4. In the Summary area, clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
5. On the form toolbar, click **Release**. The system releases the material transaction and changes the status of the transaction to *Released*.

Step 3: Assigning the Parent Serial Numbers to Material Units

Suppose that warehouse workers have assembled all three juicers and moved them to the *MGI* location of the *WORKHOUSE* warehouse. Before you record the movement of the juicers, you will assign the serial numbers of the juicer units to the motor base units. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created in earlier in this activity.
2. On the More menu (under **Other**), click **Late Assignment**. The system opens the *Late Assignment* (AM312000) form with the production order whose reference number was specified in the **Production Nbr.** box.
3. In the **Lot/Serial Nbr.** box of the Summary area, select one of the serial numbers generated for the production order.
4. In the **Unallocated Components** table, click the first material line to be allocated.
5. On the table toolbar, click **Allocate**. The system allocates the material for the lot or serial number and moves the material line to the **Allocated Components** table.
6. Repeat the previous three instructions for each of the two remaining serial numbers for the juicers.

You have assigned the serial numbers of the juicer to the motor base units.

Step 4: Recording the Produced Items

In the production environment, you would now record the workers' time spent on juicer assembly. In this activity, for simplicity, you will record only the movement of the assembled juicers. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created in earlier in this activity.
2. On the More menu (under **Processing**), click **Create Move Transaction**. The system opens the *Move* (AM302000) form with the row for the production order added to the table.
3. On the table toolbar, click **Line Details**. The system opens the **Line Details** dialog box.
4. In each table row, in the **Lot/Serial Nbr.** column, select a serial number from the list of numbers that have been generated for the production order (see the following screenshot).

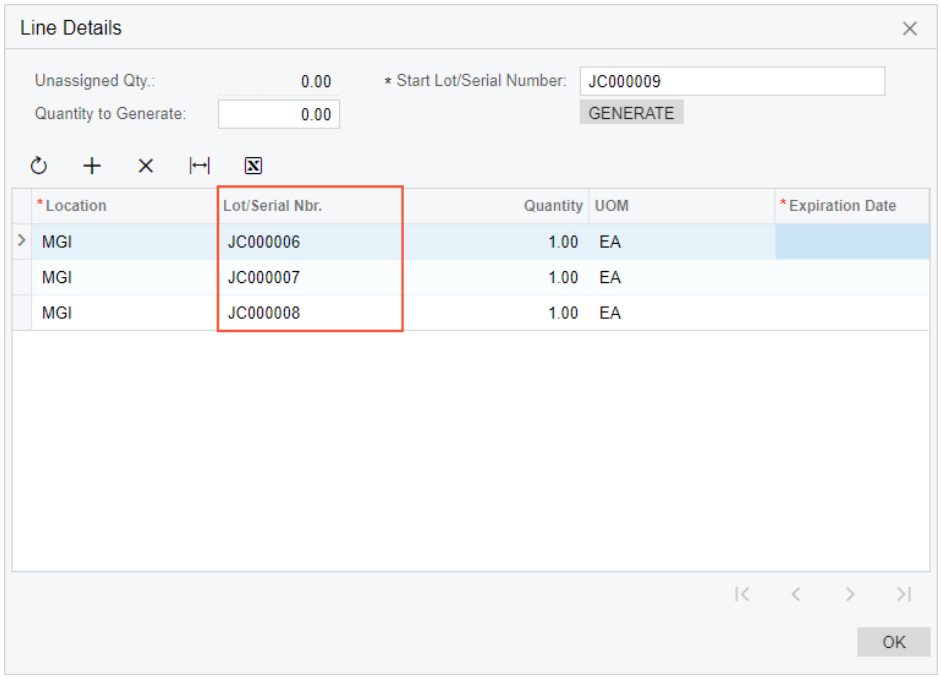


Figure: The serial numbers in the Line Details dialog box of the Move form

5. Click **OK** to save your changes and close the dialog box.
6. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, enter `Recording the movement of 3 fruit juicers.`
   c. Clear the **Hold** check box. The system changes the transaction' status to *Balanced*.
7. On the form toolbar, click **Release**. The system releases the move transaction.
8. Open the production order on the *Production Order Maintenance* form and make sure that it is assigned the *Completed* status.

Step 5: Closing the Production Order

Now you will close the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu, click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.
2. In the unlabeled column, make sure that the check box is selected.
3. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
4. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

Step 6: Viewing the Serial Numbers Specified in the Production Order

You will view the list of serial numbers specified for the juicer units and to the motor base units in the production order you created in earlier in this activity. Do the following:

1. Open the *Lot/Serial Hierarchy* (AM600000) report.

2. On the **Report Parameters** tab, specify the following settings:
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that you created in earlier in this activity
   - **Inventory ID**: Empty
3. On the report form toolbar, click **Run Report**.
4. In the report, review the serial numbers for the juicers (Item 1 in the following screenshot), for the motor base units (Item 3), and of the juicers assigned to the motor base units (Item 2).

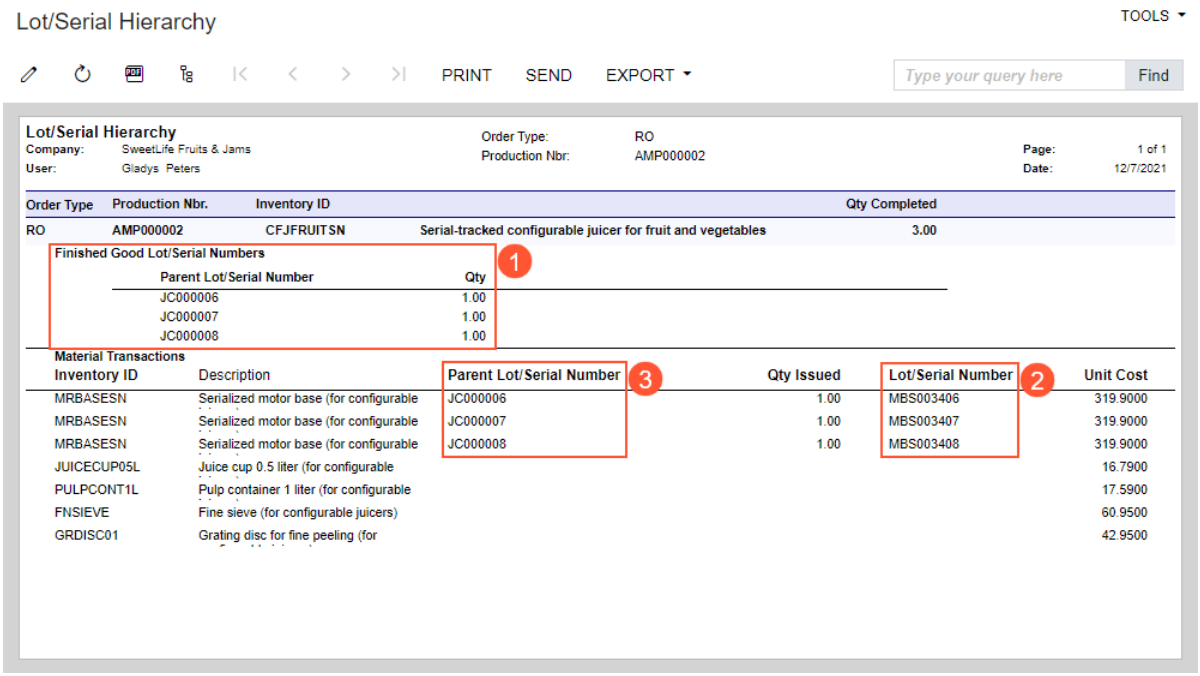


Figure: The Lot/Serial Hierarchy report

You have processed the production order with the serialized item and assigned the parent serial numbers to the serialized material units.

Lesson 5: Producing Items with Outside Processing

Outside Processing: General Information

An organization may contract out to outside organizations (vendors or subcontractors) particular operations related to the production of items. Contract manufacturing is common in some industries, such as circuit boards, food and beverage, pharmaceuticals, nutraceuticals and cosmetics, aerospace, and defense. An organization might engage a subcontractor when the organization has insufficient production capacity or does not have the specific facilities to perform particular operations, such as plating or heat treating.

Acumatica ERP Manufacturing Edition gives you the ability to track outside processing in the production process and account for the costs related to outside processing in the cost of produced items, as described in the following sections.

Learning Objectives

In this chapter, you will learn how to process production orders that contain outside operations.

Applicable Scenarios

You process production orders with outside operations when your organization contracts out particular operations in the production process to subcontractors.

Outside Processing Operations

When you involve subcontractors in production of items, you add outside processing operations to the production routing (for details on configuration of such operations and bills of material, see *Outside Processing Configuration: General Information*). These operations require specific processing, which differs from processing of operations performed inside you organization. You may need to do any of the following for outside operations:

- If you store materials for the outside operation at your facility, you use vendor shipments to record shipping of the materials to the subcontractor. For details about storing materials in outside processing, see *Outside Processing Configuration: Material Storage and Delivery*.
- You usually use purchase orders to pay for subcontractor's services. For more information, see *Outside Processing Configuration: Charges for Subcontractor Services*.

To indicate that the subcontractor completed the operation, you create a move transaction for the outside operation by using the *Move* (AM302000) form.

Outside Processing by Using Production Orders

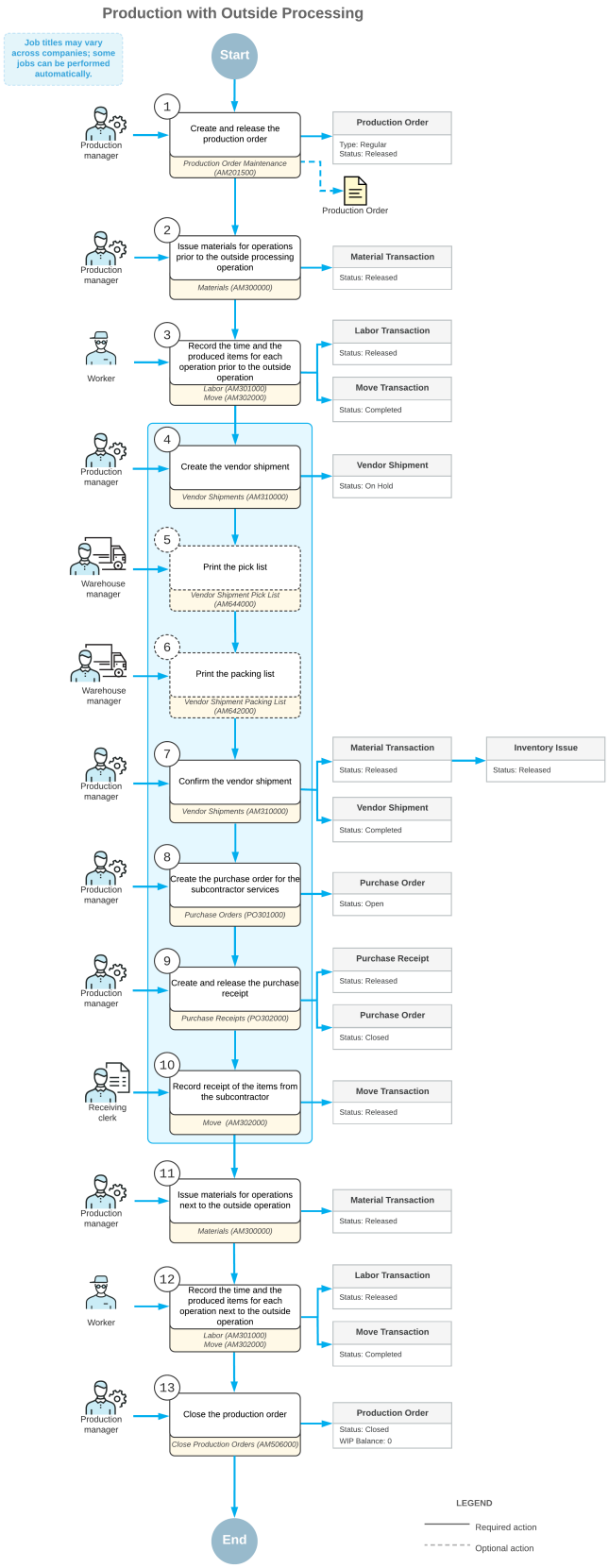
Suppose that you use production orders for tracking outside processing performed by a subcontractor. Further suppose that you have created a non-stock item in Acumatica ERP Manufacturing Edition for this subcontractor's charges, and you will process vendor shipments in the system when you ship materials to the subcontractor. To process of such a production order, you perform the following general steps:

1. On the *Production Order Maintenance* (AM201500) form, do the following:
   a. Create the production order.
   b. Release the production order.
   c. Issue the materials required for the operations you perform prior to the outside operation

2. By using the *Move* (AM302000) or *Labor* (AM301000) form, create and release the move or labor transactions for the operation you perform in-house prior to the outside operation.
3. Create a shipment for the materials required for the outside operation, which are stored in a warehouse at your facility. You do this by clicking the **Create Vendor Shipment** button on the *Production Order Details* (AM209000) form. The system does the following:
   - Creates a vendor shipment for the vendor specified on the **Outside Process** tab. (If no vendor is specified on the tab, you must specify the vendor manually in the corresponding box.)
   - Adds to the shipment items with the *Ship to Vendor* subcontract source.
   - Opens the shipment on the *Vendor Shipments* (AM310000) form.
   - Adds the following rows to a vendor shipment: a row for the item to be produced (for informational purposes), which has the *WIP* type; and a row for each material to be shipped, which has the *Material* type.
4. For lot- or serial-tracked materials, enter lot or serial numbers for materials on the *Vendor Shipments* form.
5. Optional: Print the pick list by using the *Vendor Shipment Pick List* (AM644000) report.
6. Optional: By using the *Vendor Shipment Packing List* (AM642000) form, print the packing lists that will accompany the items being sent to the subcontractor.
7. On the *Vendor Shipments* form, confirm the shipment. The system creates the material transaction on the *Materials* (AM300000) form, issues the materials from the warehouse by using an inventory issue it creates on the *Issues* (IN302000) form, and updates the cost in the **Subcontractor** box of the **Actual** section on the **Totals** tab of the *Production Order Maintenance* form. You can also view the quantity of items shipped to the vendor on the **Outside Process** tab of the *Production Order Details* form.
8. Create the purchase order to pay the subcontractor for the service by clicking the **Create Purchase Order** button on the *Production Order Details* form. The system creates a purchase order on the *Purchase Orders* (PO301000) form for the vendor specified on the **Outside Process** tab (if no, you must specify the vendor manually in the corresponding box) and adds items with the *Purchase* subcontract source to the order. The system inserts the purchase order number in the **PO Order Nbr.** box on **Outside Process** tab of the *Production Order Details* form.
9. Create a purchase receipt for the purchase order on the *Purchase Orders* form. This will update the cost in the **Subcontractor** box of the **Actual** section on the **Totals** tab with the actual purchase cost on the *Production Order Details* form.
10. Create and release the move transaction for the outside processing operation by using the *Move* form to record the receipt of the items from the subcontractor.
11. If needed, on the *Production Order Maintenance* form, issue the materials for the remaining operations performed in-house.
12. Complete the remaining operations for the production order by creating move or labor transactions on the *Move* or *Labor* form.
13. Review the production order variances in the **Variances** section of the **Totals** tab of the *Production Order Maintenance* form, and resolve any discrepancies.
14. Close the production order by using the *Close Production Orders* (AM506000) form.

Workflow of Outside Processing

For production with outside processing, the typical process involves the actions and generated documents shown in the following diagram.


Production with Outside Processing
Job titles may vary across companies; some jobs can be performed automatically.
Start
1
Production manager
Create and release the production order
Production Order Maintenance (AM201500)
Production Order
Type: Regular
Status: Released
Production Order
2
Production manager
Issue materials for operations prior to the outside processing operation
Materials (AM300000)
Material Transaction
Status: Released
3
Worker
Record the time and the produced items for each operation prior to the outside operation
Labor (AM301000)
Move (AM302000)
Labor Transaction
Status: Released
Move Transaction
Status: Completed
4
Production manager
Create the vendor shipment
Vendor Shipments (AM310000)
Vendor Shipment
Status: On Hold
5
Warehouse manager
Print the pick list
Vendor Shipment Pick List (AM664000)
6
Warehouse manager
Print the packing list
Vendor Shipment Packing List (AM642000)
7
Production manager
Confirm the vendor shipment
Vendor Shipments (AM310000)
Material Transaction
Status: Released
Inventory Issue
Status: Released
Vendor Shipment
Status: Completed
8
Production manager
Create the purchase order for the subcontractor services
Purchase Orders (PO301000)
Purchase Order
Status: Open
9
Production manager
Create and release the purchase receipt
Purchase Receipts (PO302000)
Purchase Receipt
Status: Released
Purchase Order
Status: Closed
10
Receiving clerk
Record receipt of the items from the subcontractor
Move (AM302000)
Move Transaction
Status: Released
11
Production manager
Issue materials for operations next to the outside operation
Materials (AM300000)
Material Transaction
Status: Released
12
Worker
Record the time and the produced items for each operation next to the outside operation
Labor (AM301000)
Move (AM302000)
Labor Transaction
Status: Released
Move Transaction
Status: Completed
13
Production manager
Close the production order
Close Production Orders (AM506000)
Production Order
Status: Closed
WIP Balance: 0
End
LEGEND
Required action
Optional action

Calculation of Costs for Outside Services

The planned cost for outside services in a production order includes the cost of the materials you ship to a vendor (that is, material lines with the *Ship to Vendor* subcontract source) and the cost of the outside services (that is, material lines with the *Purchase* subcontract source). For a particular production order, you can view planned cost for outside services in the **Subcontract** box of the **Planned** section on the **Totals** tab of the *Production Order Maintenance* (AM201500) form.

When you release the purchase receipt for a purchase order with the subcontractor service charges and the material used for the charges is not backflushed, the system adds the total cost of the purchase receipt to the **Subcontract** box of the **Actual** section on the **Totals** tab of the *Production Order Maintenance* form. When you confirm the vendor shipment with materials to be shipped to the vendor, the system adds the total cost of the shipment to the same box. If the material is backflushed, the system adds the amount to the box when you record the movement of items from the outside operation.

Outside Processing: Process Activity

The following activity will walk you through the process of creating and processing a production order that contains an outside processing operation.

Story

Suppose that the GoodFood One Restaurant has ordered 10 juicers from the SweetLife Fruits & Jams company. Production managers have analyzed the workload of the production department and decided to outsource the assembly of these juicers to a subcontractor, Custom Assembly Services. Further suppose that all components required for the assembly of the juicer are available in SweetLife Fruits & Jams's warehouse and will be shipped to the subcontractor. Also, SweetLife Fruits & Jams will pay for the subcontractor's service of $50 for each juicer by using a purchase order.

Acting as a production manager, you will create a production order for producing 10 juicers, create a vendor shipment with the required materials for the juicer assembly, create the purchase order for the subcontractor's service, and process all transactions related to the production order.

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse has been defined, and its locations include *MGI* and *MTL*.
- On the *Stock Items* (IN202500) form, the *CFJFRUIT*, *PULPCONT1L*, *JUICECUP05L*, *MRBASE*, *FNSIEVE*, and *GRDISC01* stock items have been defined.
- On the *Vendors* (AP303000) form, the *CSEMBLY* vendor (which provides the subcontractor services for juicer assembly) has been defined.
- On the *Non-Stock Items* (IN202000) form, the *MFGSUBCON* non-stock item has been created.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJFRUIT* item; the bill of material includes the operation for outside processing.
- On the *Production Order Types* (AM201100) form, you have created the *RO* production order type for regular production orders.

- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.

Process Overview

In this activity, to process the documents and transactions related to the production of the juicers, you will do the following:

1. On the *Production Order Maintenance* (AM201500) form, you will create a production order for the juicer assembly.
2. On the *Vendor Shipments* (AM310000) form, you will create and process the vendor shipment, which records the delivery of the materials required for the juicer assembly to the subcontractor.
3. On the *Purchase Orders* (PO301000) form, you will create and process the purchase order for the subcontractor service, and on the *Purchase Receipts* (PO302000) form, you will create and process the related purchase receipt.
4. On the *Move* (AM302000) form, you will record the receipt of the assembled juicers from the subcontractor to the dedicated warehouse location.
5. On the same form, you will record the movement of the inspected juicers to the warehouse location.
6. On the *Production Order Maintenance* form, you will review the production order's balance.
7. On the *Close Production Orders* (AM506000) form, you will close the production order.

Step 1: Creating the Production Order

To create the production order for 10 juicers, do the following:

1. On the *Production Order Maintenance* (AM201500) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *RO*
   - **Inventory ID**: *CFJFRUIT*
   - **Warehouse**: *WORKHOUSE* (selected automatically)
   - **Location**: *MGI* (selected automatically)
   - **Order Date**: Today's date (selected automatically)
   - **Hold**: Cleared
   - **Description**: `Production of 10 juicers`
3. In the **Qty. to Produce** box of the **General** tab, specify `10`.
4. On the form toolbar, click **Save**.
5. On the More menu (under **Processing**), click **Release Order**. The order status is changed to *Released*.

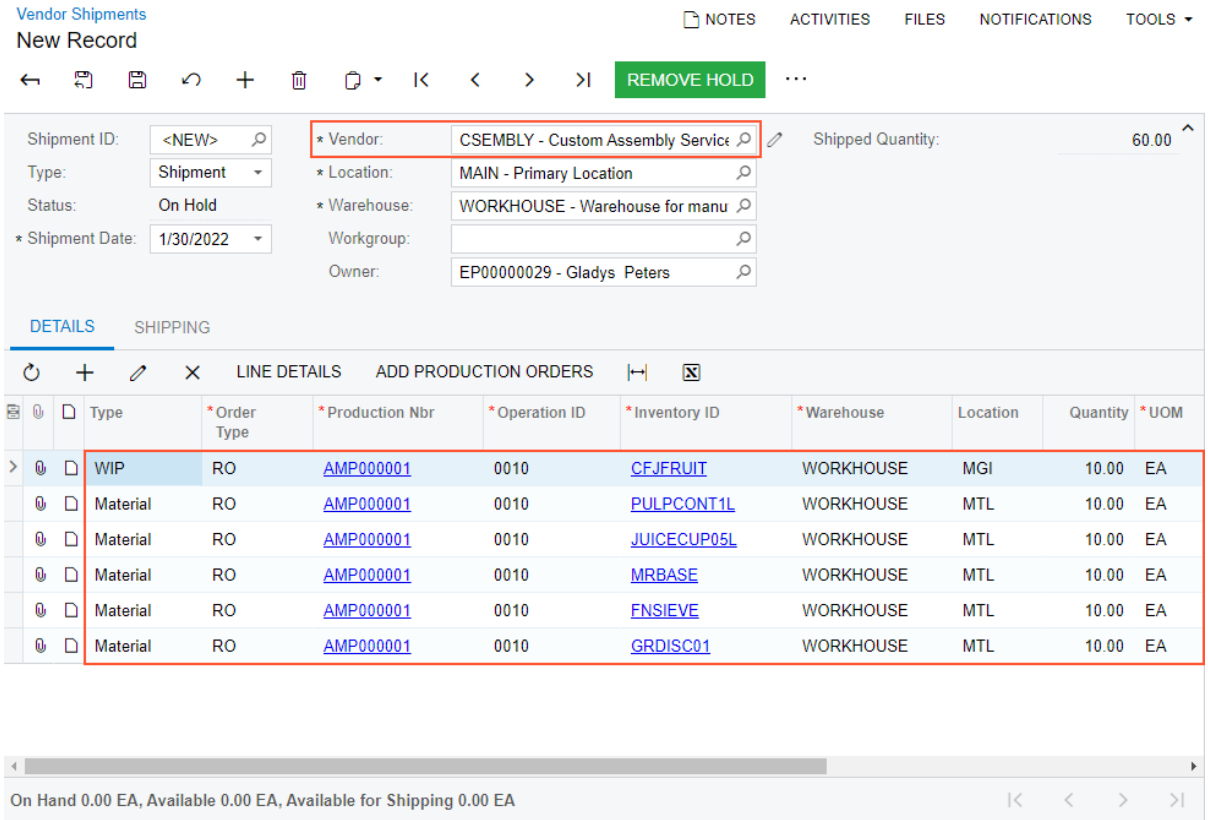
   You open the More menu by clicking the More button (…) on the form toolbar.

Step 2: Creating a Vendor Shipment

To create a vendor shipment for the materials required for the juicer assembly, do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Other**), click **Production Detail**. The system opens the *Production Order Details* (AM209000) form for the production order.
2. In the Operations table, click the row with the *OUTPROC* work center.

3. On the table toolbar, click **Create Vendor Shipment**. The system creates the vendor shipment for the subcontractor specified on the **Outside Process** tab and opens the shipment on the *Vendor Shipments* (AM310000) form.
4. Review the details of the vendor shipment (shown in the screenshot below) as follows:
   a. In the **Vendor** box of the Summary area, make sure that *CSEMBLY* is specified, which is the subcontractor.
   b. On the **Details** tab, make sure that the system has added one row of the *WIP* type for the *CFJFRUIT* item and five rows of the *Material* type for each of the materials required for the juicer assembly.



Type	* Order Type	* Production Nbr	* Operation ID	* Inventory ID	* Warehouse	Location	Quantity	* UOM
WIP	RO	AMP000001	0010	CFJFRUIT	WORKHOUSE	MGI	10.00	EA
Material	RO	AMP000001	0010	PULPCONT1L	WORKHOUSE	MTL	10.00	EA
Material	RO	AMP000001	0010	JUICECUP05L	WORKHOUSE	MTL	10.00	EA
Material	RO	AMP000001	0010	MRBASE	WORKHOUSE	MTL	10.00	EA
Material	RO	AMP000001	0010	FNSIEVE	WORKHOUSE	MTL	10.00	EA
Material	RO	AMP000001	0010	GRDISC01	WORKHOUSE	MTL	10.00	EA

Figure: The vendor shipment on the Vendor Shipments form

5. On the form toolbar, click **Remove Hold**. The system changes the status to *Open*.
6. On the form toolbar, click **Confirm**. The system changes the status to *Completed*.
7. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
8. On the **Totals** tab, make sure that in the **Subcontract** box of the **Actual** section, *4,641.70* is specified (see the following screenshot). This amount is the cost of the materials that have been shipped to the subcontractor.

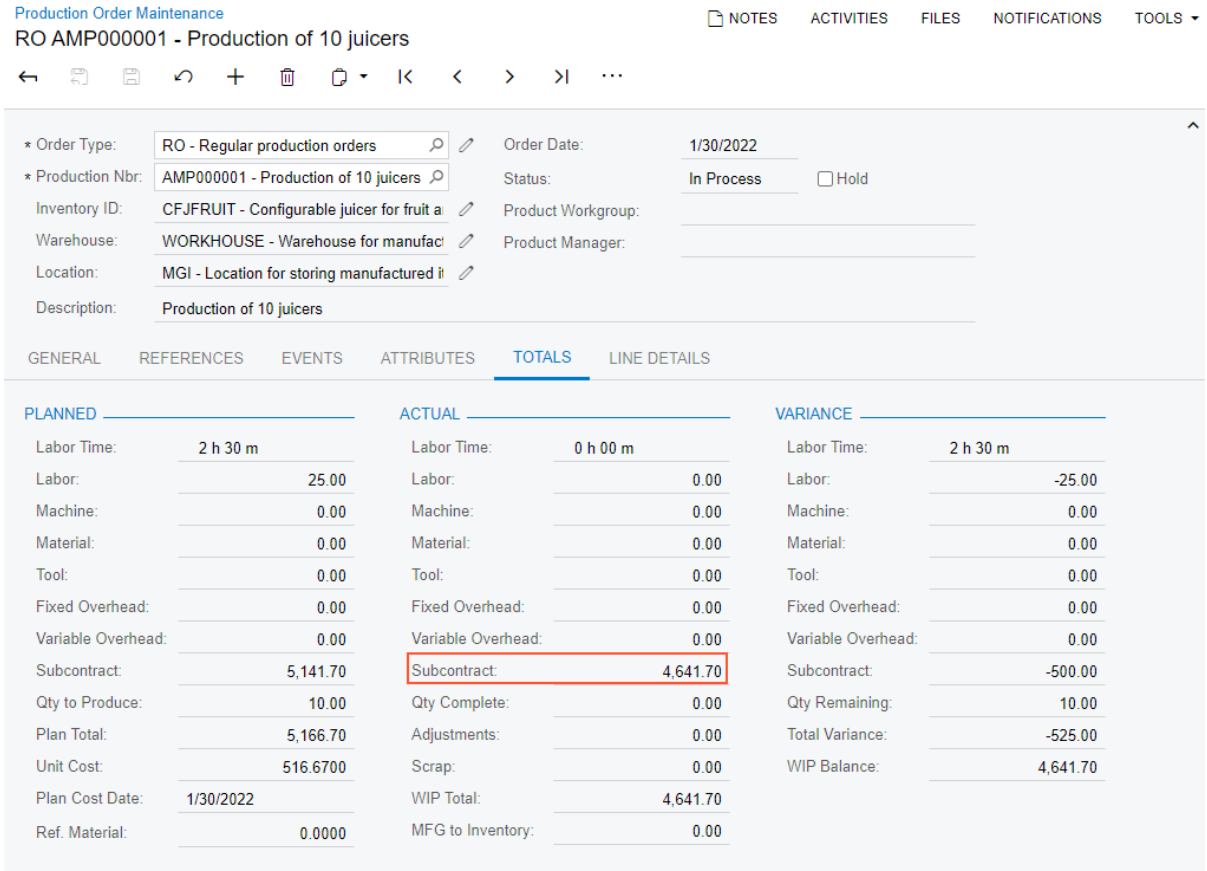


Figure: The actual subcontract amount after the confirmation of the vendor shipment

Step 3: Creating a Purchase Order for the Subcontractor's Service

To create a purchase order for the subcontractor service, do the following:

1. On the *Production Order Details* (AM209000) form, open the production order you created earlier in this activity.
2. In the Operations table, click the row with the *OUTPROC* work center.
3. On the table toolbar, click **Create Purchase Order**. The system creates the purchase order for the subcontractor specified on the **Outside Process** tab and opens the document on the *Purchase Orders* (PO301000) form.
4. Review the purchase order details (shown in the following screenshot) as follows:
   a. In the **Vendor** box of the Summary area, make sure that *CSEMBLY* is specified, which is the subcontractor.
   b. On the **Details** tab, make sure that the system has added one row of the *Non-Stock for MFG* type for the *MFGSUBCON* item with an extended cost of $500.

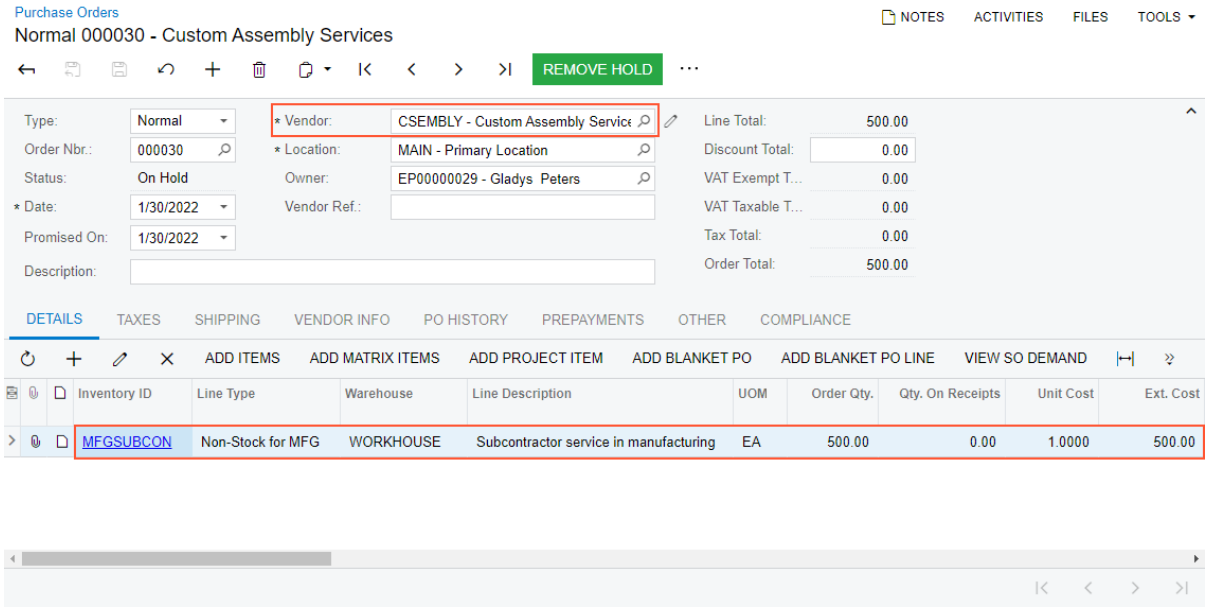


Figure: The purchase order for the subcontractor services

5. In the **Description** box of the Summary area, enter `Payment for the subcontractor service`.
6. On the form toolbar, click **Remove Hold**. The system changes the status of the purchase order to *Open*.
7. On the form toolbar, click **Enter PO Receipt**. The system creates the purchase receipt and opens it on the *Purchase Receipts* (PO302000) form.
8. On the form toolbar, click **Release**. The system changes the status of the purchase receipt to *Released*.

Step 4: Receiving Items from the Subcontractor

Suppose that the subcontractor has assembled the juicers and delivered them to the warehouse. To record the receipt of the juicers, you will create the move transaction for the first operation of the production order. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
2. On the More menu (under **Processing**), click **Create Move Transaction**. The system creates the move transaction for the *0010* operation and opens it on the *Move* (AM302000) form.
3. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, enter `Recording the receipt of 10 juicers from the subcontractor`.
   c. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
4. On the form toolbar, click **Release**. The system releases the move transaction.
5. Close the window with the *Move* form.
6. On the **Totals** tab of the *Production Order Maintenance* form, make sure that in the **Subcontract** box of the **Actual** section, *5,141.70* is specified (see the following screenshot), which is the cost of the materials that have been shipped to the subcontractor plus the cost of the services. The service amount has been backflushed. Therefore, the system has added the amount to the actual subcontract amount when you recorded the operation completion.

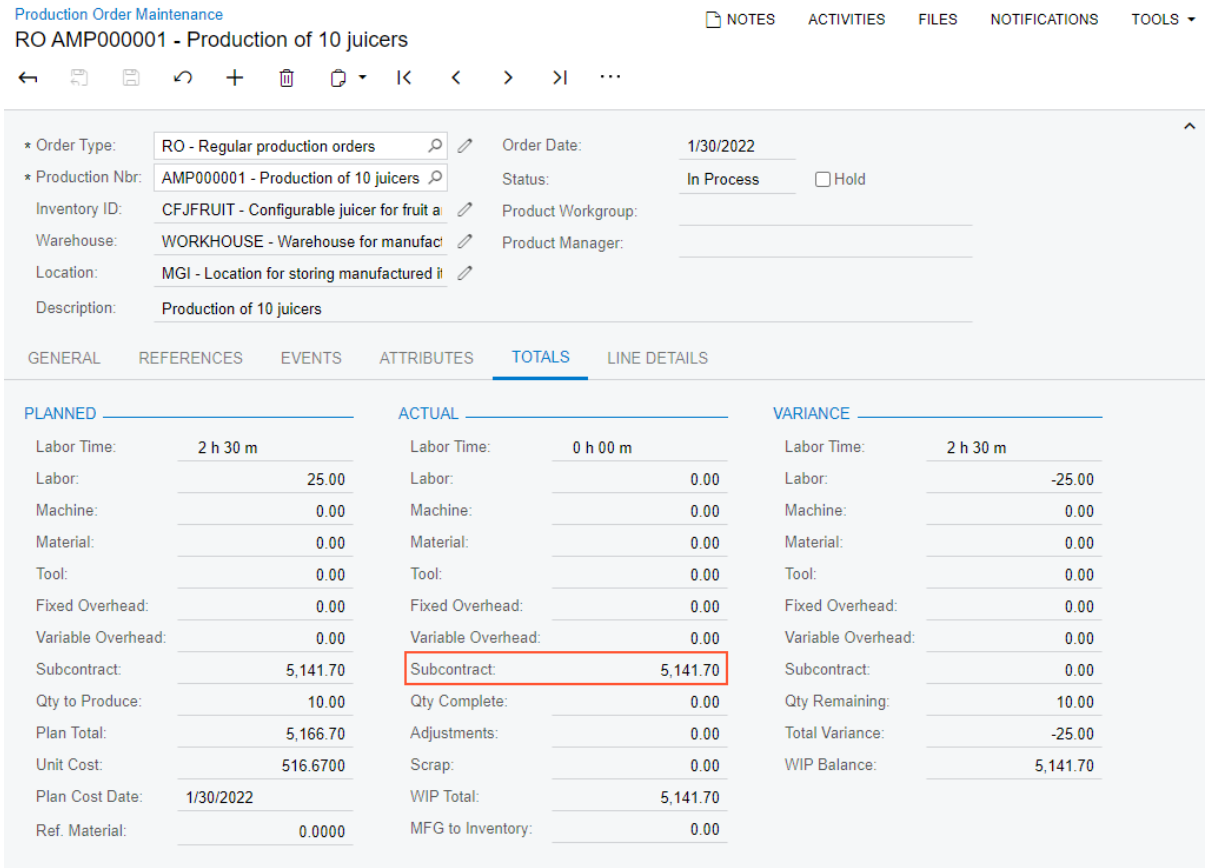


Figure: The actual subcontract amount after the movement of the item for the outside operation

Step 5: Recording the Inspected Items

Suppose that a warehouse worker has inspected all 10 juicers and moved them to the *MGI* location of the *WORKHOUSE* warehouse. Labor is backflushed for this operation so you will record only the movement of the juicers. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order that you created earlier in this activity.
2. On the More menu (under **Processing**), click **Create Move Transaction**. The system creates the move transaction for the *020* operation and opens it on the *Move* (AM302000) form.
3. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, enter `Recording the movement of 10 juicers to the warehouse`.
   c. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
4. On the form toolbar, click **Release**. The system releases the move transaction.
5. Close the window with the *Move* form.
6. Open the production order on the *Production Order Maintenance* form, and make sure that it is assigned the *Completed* status.

Step 6: Reviewing the Production Order's Balance

Before closing the production order, you will review its balance. Do the following:

1. On the *Production Order Maintenance* (AM201500) form, open the production order you created earlier in this activity.
2. On the **Totals** tab, review the balance of the production order as follows (see the following screenshot):
   a. In the **Actual** section, make sure that the value in the **Labor Time** box is *2 h 30 m* and the value of the **Labor Cost** box is *25.00*. The actual values are the same as the planned values.
   b. Make sure that the value of the **Subcontract Cost** box is *5,141.70* and has not been changed after you created the move transaction for the *010* operation.
   c. Make sure that the **WIP Total** and **MFG to Inventory** boxes both contain *5,166.70*, which is the sum of the values in the **Labor** and **Subcontract** boxes.
   d. In the **Variance** section, make sure that the values in the **Total Variance** and **WIP Balance** boxes are *0*.

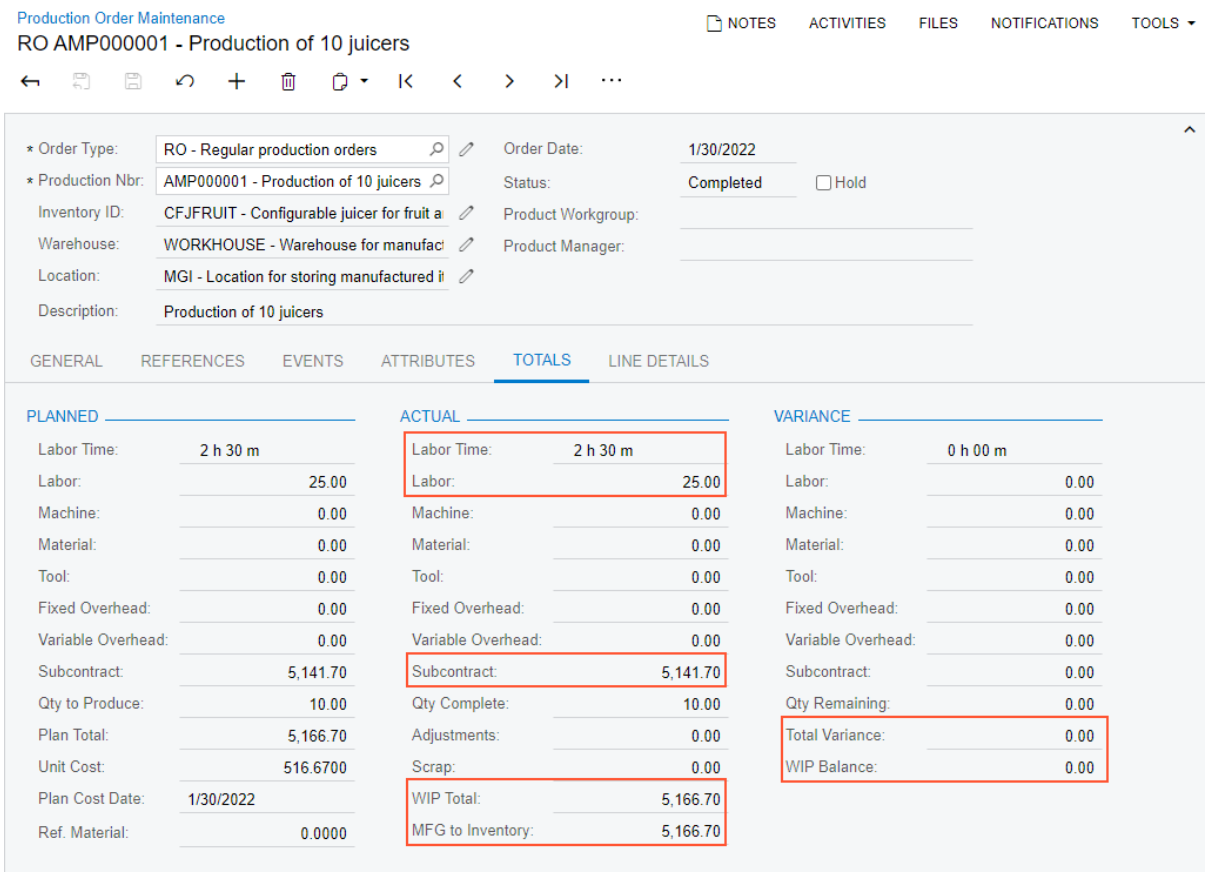


Figure: The balance of the production order

All costs have been applied correctly to the production order, so you can close the order.

Step 7: Closing the Production Order

Now you will close the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu, click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.

2. In the unlabeled column, make sure that the check box is selected.
3. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
4. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

You have created the production order that includes an outside processing operation, created a vendor shipment for materials provided to the subcontractor, created a purchase order to pay for the subcontractor services, and processed the production order to the closing.

Lesson 6: Producing Items with Backflushing

Production with Backflushing: General Information

Backflushing is a method for issuing materials or applying labor costs to production orders when workers record the items produced at a specific operation. Acumatica ERP Manufacturing Edition gives you the ability to backflush material and labor costs during item production, as described in the following sections.

Learning Objectives

In this chapter, you will learn how to process production orders with operations for which material and labor costs will be backflushed.

Applicable Scenarios

You process production orders with operations for which material and labor costs are backflushed in the following cases:

- In the production operations, scrap is common in the finished product. Workers continue to produce the item until they have produced items whose quality is acceptable in a quantity equal to the quantity to produce in the production order.
- Workers record production at milestone operations but would like to also record materials being consumed at operations that are not milestones.
- Workers perform operations for multiple production orders simultaneously or in a continuous run. These operations might include cleaning, painting, or plating. In this case, it would be difficult to post labor costs to individual orders. A similar situation occurs in production areas—such as filling, testing, packing, or assembly—where multiple operators work on any item that appears at their work station, and these operators do not record their time against specific production orders.
- Bills of material contain floor stock items whose costs are not significant; examples of such items include lubricants, labels, hardware, wiring, and packing materials. In this case, a production or warehouse manager periodically reconciles the on-hand balance of the items in stock.
- Your organization uses bulk materials, such as bar stock, roll stock, sheet goods, and dry goods or liquids in bulk containers. The exact quantity of these materials cannot be specified.

Backflushing in Production

Backflushing is commonly referred to as *postproduction issuing*. This approach differs from *preproduction issuing*,for which materials are pulled from stores and issued to production orders prior to the start of an operation, and labor is directly reported for each operation.

With backflushing, material and labor costs are flushed backwards through operations to assign costs to products based on the quantity produced at the operations. This eliminates detailed tracking of costs. With backflushing, employees involved in production can save time on preliminary issue of materials, on recording the labor amount and produced items for each operation, and on recording returns of any unused materials.

Backflushing can ensure that the full cost of production is recognized when workers record labor and produced items for the final operation in the routing. In the backflushing process, the system adjusts the materials consumed or labor reported for any operations for which the full material or labor costs have not been posted. Thus, you can make the cost of the product more representative and minimize cost variances.

Backflushing is not appropriate if any of the following conditions are met:

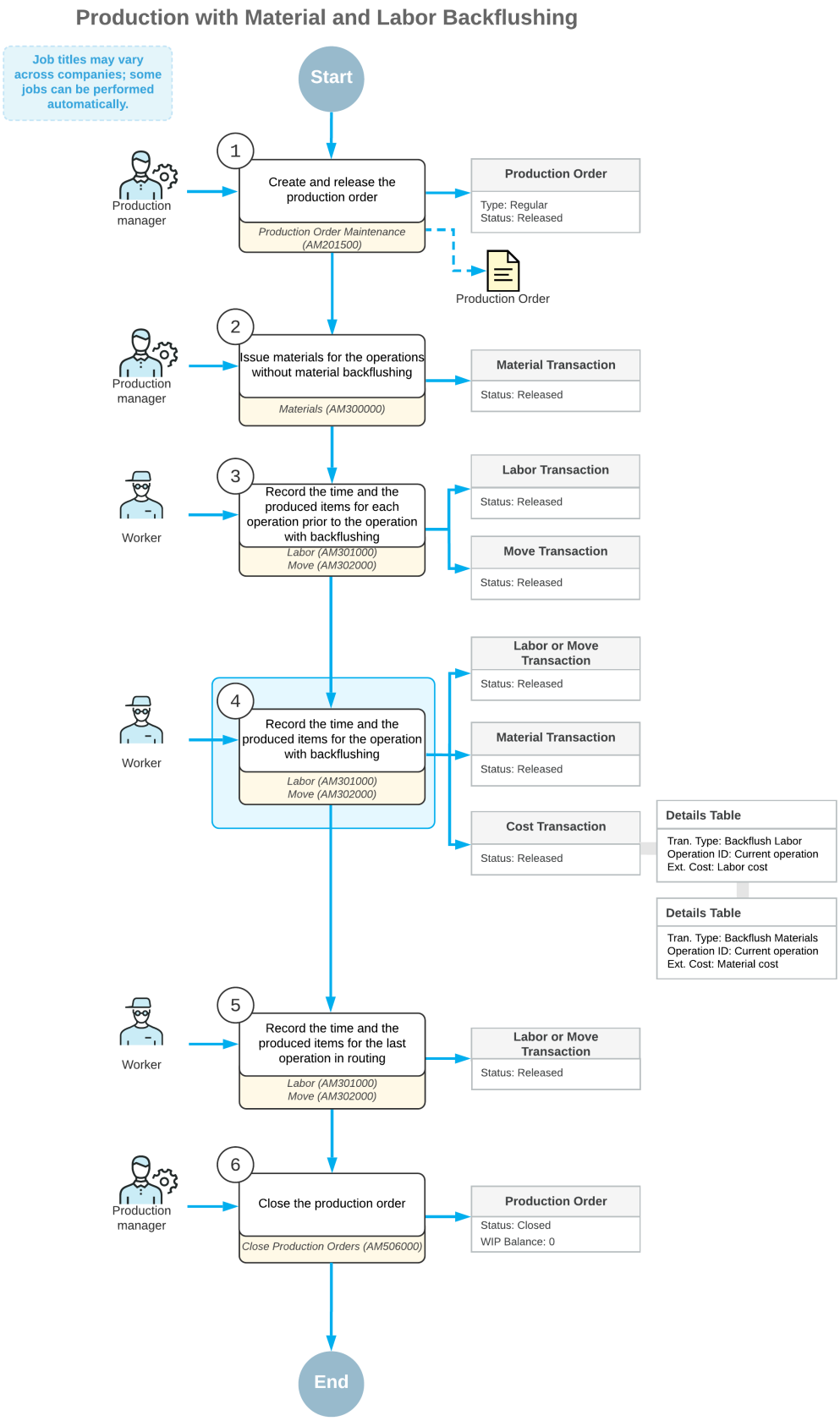
1. The amount of labor recorded for operations may vary from one production run to another. This amount may represent a significant cost of the product.
2. Your organization tracks employees for the product being produced, and traceability is desired.
3. You use lot- or serial-tracked materials in production. Although the system can automatically issue lot- or serial-tracked items during backflushing, in this case, backflushing is generally not recommended.
4. Material consumption is variable, or significant waste of materials may occur.
5. Material substitutions are common and allowed during the production process.
6. Labor transactions for each employee need to be reconciled with time and attendance for payroll purposes, or a shop data collection system is used.

The Production Process with Material and Labor Backflushing

Suppose that a production order has the operations defined in the Operations table of the *Production Order Details* (AM209000) form with the settings shown in the following table.

Operation ID	Backflush (Labor)	Backflush (Materials)
0010	Cleared	Cleared
0020	Selected	Selected
0030	Selected	N/A

In the following diagram, you can view the actions and generated documents for this production order.



The employees involved do the following to process the production order and the related transactions:

1. *Create and release the production order.*

   On the *Production Order Maintenance* (AM201500) form, the production manager creates and releases the production order.

2. *Issue the materials for the first operation*

   On the *Materials* (AM300000) form, the production manager issues the materials required for the first operation.

   > If a material has the **Backflush** check box selected in the production order settings, it does not need to be issued before employees record the quantity of the item that is produced.

3. *Record the time spent and the quantity of completed items for the first operation.*

   On the *Labor* form, workers record the time they spent on the first operation and the item quantity they produced during the operation.

4. *Record the quantity of the completed items for the second operation.*

   On the *Move* form, a worker records the completion of the items for the second operation. When the worker releases the move transaction, the system also does the following:

   - Creates and releases the material transaction on the *Materials* form with the backflushed materials.
   - Creates and releases the cost transaction on the *Cost Transactions* (AM309000) form. The transaction includes the cost of the backflushed labor and the cost of the backflushed materials.

   > If the worker also records the time for the operation, they use the *Labor* form instead of the *Move* form.

5. *Record the time spent and the quantity of completed items for the last operation.*

   On the *Labor* form, the worker records the time they spent on the last operation and the item quantity they produced during the operation.

6. *Close the production order.*

   On the *Close Production Orders* (AM506000) form, the production manager closes the production order.

Material Transaction for Backflushed Materials

When the system creates the material transaction for backflushed materials on the *Materials* (AM300000) form, the system issues each material from the warehouse and warehouse location specified in the material row of the production order. If the warehouse or location is not specified, the system issues the items from the default issue location specified for each stock item that represents the material. For more information, see *Production Processing: Selection of Warehouse Locations*.

If the on-hand quantity of any material in stock is less than the recorded quantity of the produced item, the system will not release the material transaction and will display an error message. If you want the system to be able to release transactions that will cause a negative quantity in stock, you should select the **Allow Negative Quantity** check box on the *Item Classes* (IN201000) form for the item class selected on the *Stock Items* (IN202500) form for the stock item that represents the material.

Material and Labor Cost Adjustments

The purpose of the material and labor cost adjustments is to reconcile the costs charged to the production order accordingly.

If any previous operations contain backflushed materials, the system calculates the material quantity to be issued considering the completed quantity for the previous operations and for the current operation.

If labor should be backflushed for any previous operations, the system adjusts the labor amount, if necessary, to agree with the quantity recorded at the current operation.

Production with Backflushing: Process Activity

The following activity will walk you through the process of producing items with backflushed materials and labor.

Story

Suppose that GoodFood One Restaurant has ordered three juicers from the SweetLife Fruits & Jams company. The production process includes the assembly and packing of the juicers. In the production process of SweetLife Fruits & Jams, materials and labor are backflushed for the packing operation. Further suppose that all components required for the juicer assembly and packing are available in SweetLife Fruits & Jams's warehouse.

Acting as a production manager, you will create a production order for producing the juicers and process all transactions related to production.

Configuration Overview

In the *U100* dataset, the following tasks have been performed for the purposes of this activity:

- On the *Warehouses* (IN204000) form, the *WORKHOUSE* warehouse has been defined, and its locations include *MGI* and *MTL*.
- On the *Stock Items* (IN202500) form, the *CFJFRUIT*, *PULPCONT1L*, *JUICECUP05L*, *MRBASE*, *FNSIEVE*, *GRDISC01*, *PACKTAPE*, *PPEANUTS*, and *PACKBOX* stock items have been defined.

In the company in which you have completed the M100 Basic Manufacturing Implementation training course, you have performed the following tasks for the purposes of this activity:

- On the *Bill of Material* (AM208000) form, you have created the bill of material for the *CFJFRUIT* item; the bill of material includes the packing operation.
- On the *Production Order Types* (AM201100) form, you have created the *RO* production order type for regular production orders.
- On the *Production Preferences* (AM102000) form, you have specified *RO* as the default order type for regular production orders.
- On the *Employees* (EP203000) form, you have selected the **Production Employee** check box for the *EP00000027* (Carlos Cruz) employee.

Process Overview

In this activity, to process the documents and transactions related to the production of the juicers, you will do the following:

1. On the *Production Order Maintenance* (AM201500) form, create and release the production order.
2. On the *Materials* (AM300000) form, issue the material required for the assembly operation.
3. On the *Labor* (AM301000) form, record the labor spent on the juicer assembly and the produced quantity.
4. On the *Production Order Maintenance* form, review the production order balances after the assembly operation.
5. On the *Move* (AM302000) form, record the produced items for the packing operation.
6. On the *Materials* and *Cost Transactions* (AM309000) forms, review the transactions that the system created and released when you released the move transaction.

7. On the *Production Order Maintenance* form, review the production order balances after you have completed the order.
8. On the *Close Production Orders* (AM506000) form, close the production order.

Step 1: Creating the Production Order

To create the production order for three juicers, do the following:

1. On the *Production Order Maintenance* (AM201500) form, add a new record.
2. In the Summary area, specify the following settings:
   - **Order Type**: *RO*
   - **Inventory ID**: *CFJFRUIT*
   - **Warehouse**: *WORKHOUSE* (selected automatically)
   - **Location**: *MGI* (selected automatically)
   - **Order Date**: Today's date (selected automatically)
   - **Hold**: Cleared
   - **Description**: `Production of 3 juicers`
3. In the **Qty. to Produce** box of the **General** tab, specify `3`.
4. In the **BOM ID** box of the **References** tab, select the bill of material with the *A bill of material for the assembly and packing of juicers* description.
5. On the form toolbar, click **Save**.
6. On the More menu (under **Processing**), click **Release Order**. The order's status is changed to *Released*.

   You open the More menu by clicking the More button (…) on the form toolbar.

Step 2: Issuing Materials for the Assembly Operation

In this step, you will issue the materials for the assembly operation of the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Processing**), click **Release Materials**. The system opens the *Materials Wizard* (AM300020) form with the list of materials needed for the assembly operation.
2. On the form toolbar, click **Select All**. The system creates the material transaction and opens it on the *Materials* (AM300000) form.
3. In the Summary area, do the following:
   a. In the **Description** box, specify `Materials for the assembly operation`.
   b. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
4. On the form toolbar, click **Release**. The system releases the material transaction and changes the status of the transaction to *Released*.

Step 3: Recording the Labor and Produced Items for the Assembly Operation

Suppose that Carlos Cruz, a worker in the work center, spent 30 minutes setting up the working environment for juicer assembly and assembled two juicers for 40 minutes. To record the time spent on juicer assembly and the assembled quantity of juicers, do the following:

1. On the *Labor* (AM301000) form, add a new record.

2. On the table toolbar, click **Add Row**.
3. In the row, specify the following settings:
   - **Labor Type**: *Direct*
   - **Order Type**: *RO*
   - **Production Nbr.**: The number of the production order that you created earlier in this activity
   - **Employee ID**: *EP00000027* (Carlos Cruz)
   - **Shift**: *0001*
   - **Start Time**: *09:00 AM*
   - **End Time**: *10:30 AM*
   - **Quantity**: 3
4. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, specify `Recording the time for assembly of 3 juicers and the completed quantity`.
   c. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
5. On the form toolbar, click **Release**. The system creates and releases the cost transaction to record the labor costs and releases the labor transaction.

Step 4: Reviewing the Production Order Balance

To review the production order balance after you have recorded the completion of the assembly operation, do the following on the *Production Order Maintenance* (AM201500) form:

1. Open the production order you created earlier in this activity.
2. On the **Totals** tab, review the production order balance as follows (see the screenshot below):
   a. In the **Actual** section, make sure that the following values are displayed:
      - **Labor Time**: *1 h 30 m*
      - **Labor**: *30.00*
      - **Material**: *1383.63*

      This means that the system applied the labor and material costs of the assembly operation to the production order.
   b. In the **Variance** section, make sure that the following values are displayed:
      - **Labor Time**: *1 h 00 m*
      - **Labor**: *-12.00*
      - **Material**: *-11.16*

      These costs relate to the packing operation and the system has not applied the costs to the production order yet.

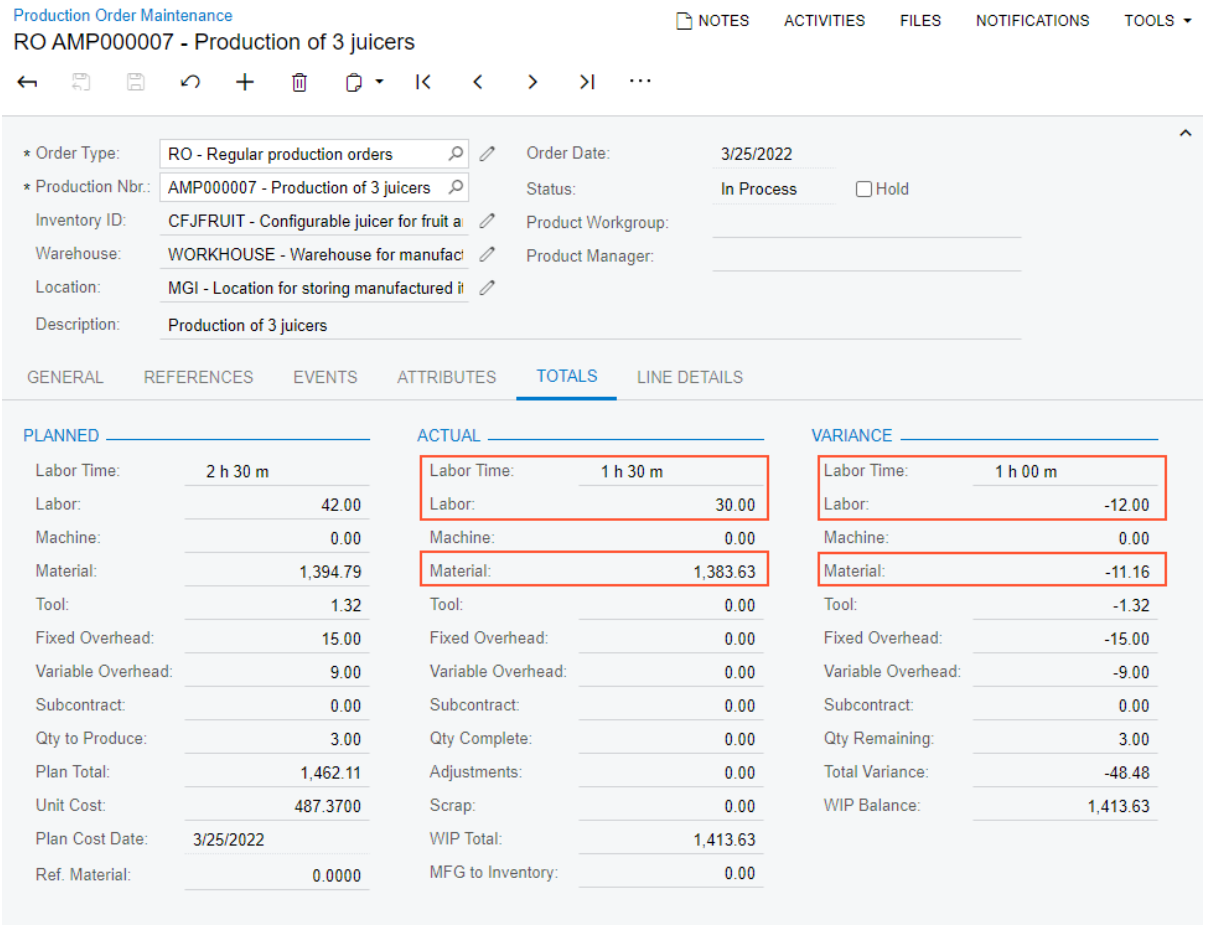


Figure: Production order balances after the first operation

Step 5: Recording the Produced Items for the Packing Operation

Suppose that a worker in the packing work center has packed all three assembled juicers. To record the completion of the packing operation, do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu (under **Processing**), click **Create Move Transaction**. The system creates the move transaction for the *0020* operation and opens it on the *Move* (AM302000) form.
2. In the Summary area, do the following:
   a. In the **Date** box, make sure that the today's date is specified.
   b. In the **Description** box, enter `Recording the completion of packing 3 juicers.`
   c. Clear the **Hold** check box. The system changes the transaction's status to *Balanced*.
3. On the form toolbar, click **Release**. The system releases the move transaction.

Step 6: Reviewing the Transactions for the Packing Operation

In this step, you will review the transactions that the system created and released when you released the move transaction for the packing operation. Do the following:

1. On the *Materials* (AM300000) form, open the transaction for the materials needed for the packing operation with the total amount of $11.16 (see the following screenshot).

2. Make sure that in the **Orig. Batch Nbr.** box, the reference number of the move transaction, which triggered the creation of the material transaction, is displayed.

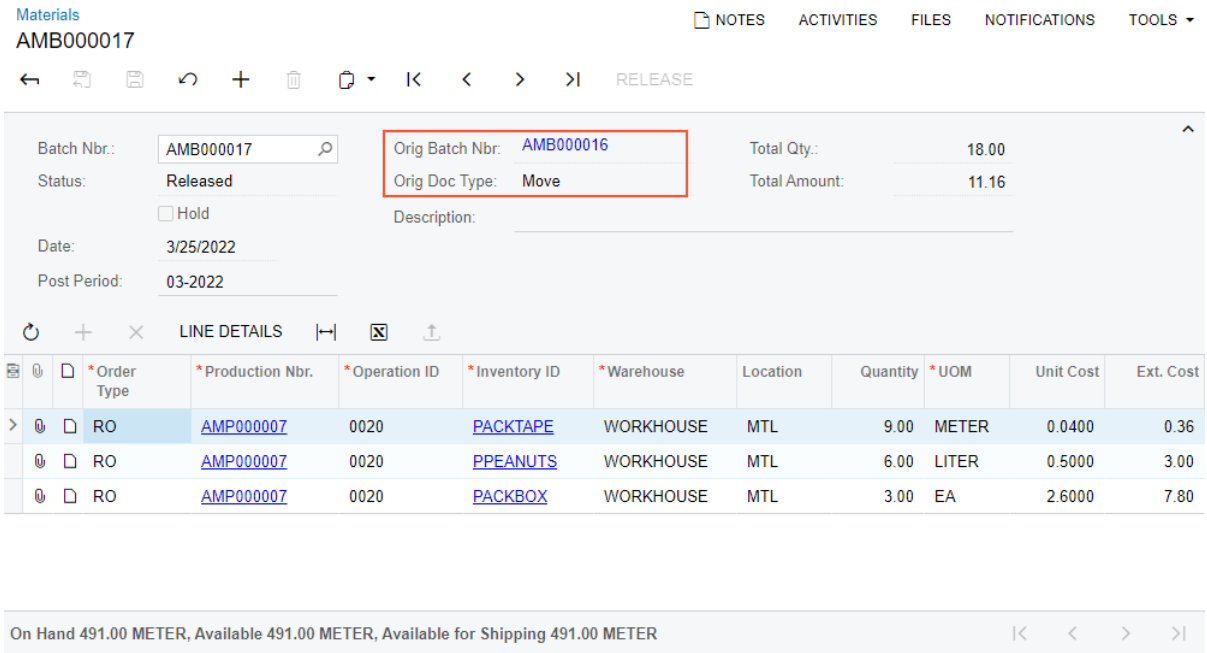


Figure: The material transaction for the packing operation

3. On the *Cost Transactions* (AM309000) form, open the transaction with the total amount of $1474.11 (see the following screenshot).
4. Make sure that in the **Orig. Batch Nbr.** box, the reference number of the move transaction, which triggered the creation of the cost transaction, is displayed.
5. In the table of the form, notice that the transaction contains rows with the following **Tran. Type** values:
   - *Backflush Labor*: The system added the labor cost of $12.00 for the packing operation to the *51000 - Direct Labor Costs* account.
   - *Operation MFG to Inventory* for an extended cost of $23.16: The system applied the cost of the labor and materials for the *0020* operation to the production order.
   - *Operation MFG to Inventory* for an extended cost of $1438.95: The system applied the cost of the labor and materials for the *0010* operation to the production order.

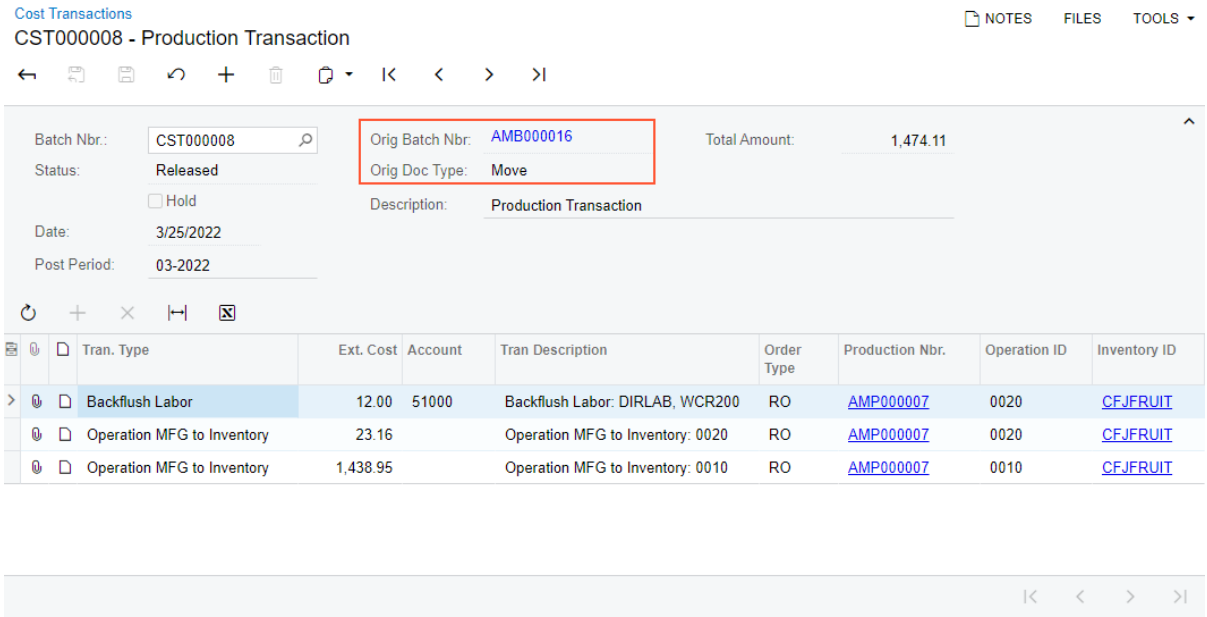


Figure: The cost transaction created on completion of the packing operation

Step 7: Reviewing the Production Order Balance

To review the production order balance after you have recorded the completion of the packing operation, do the following on the *Production Order Maintenance* (AM201500) form:

1. Open the production order you created earlier in this activity.
2. On the **Totals** tab, review the production order balance after the completion of the order as follows (see the following screenshot):
   a. In the **Actual** section, make sure that the value of the **Labor** box is *42.00*, which is the full labor cost for two operations.
   b. Make sure that the value of the **Material** box is *1394.79*, which is the full cost of the materials for two operations.
   c. In the **Variance** section, make sure that the values in the **Total Variance** and **WIP Balance** boxes are *0.00*.

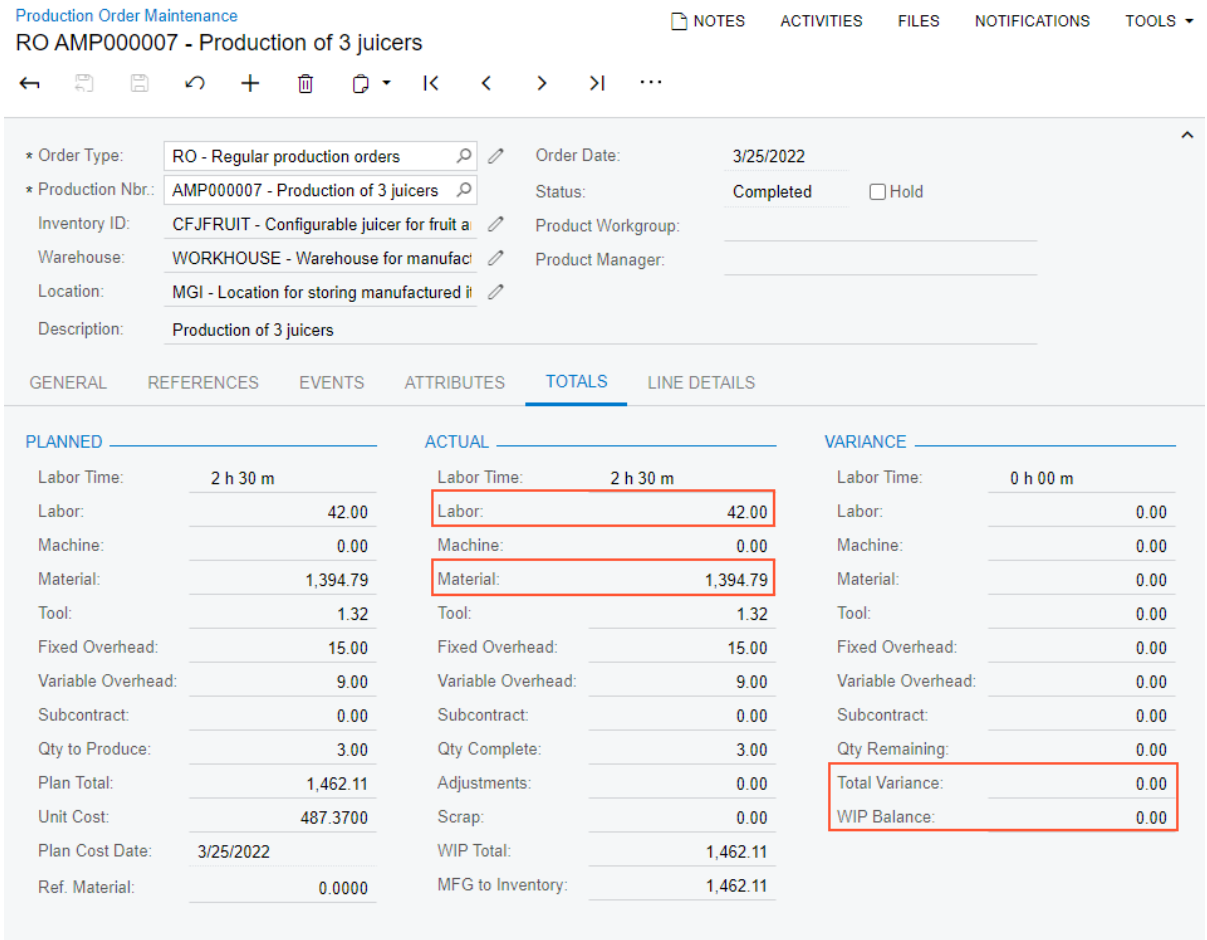


Figure: Production order balances after the completion of the order

Step 8: Closing the Production Order

Now you will close the production order. Do the following:

1. While you are still viewing the production order on the *Production Order Maintenance* (AM201500) form, on the More menu, click **Close Order**. The system opens the *Close Production Orders* (AM506000) form with the row for the production order added.
2. In the unlabeled column, make sure that the check box is selected.
3. On the form toolbar, click **Process**. In the **Processing** dialog box, which opens, view the processing details, and when the processing is completed, click **Close**.
4. On the *Production Order Maintenance* form, make sure that the status of the production order has been changed to *Closed*.

You have successfully created the production order for the assembly and packing of three juicers and have processed all the transactions related to the production.

Additional Materials

Appendix A: Production Processing

Production Processing: Generated Transactions

As you perform item production, you create and process a production order and the related transactions to track the movement of produced items and used components between a work center and a warehouse, to record item costs (such as labor, tools, and overhead), and to update the GL balances; details about the transactions are described in the following sections.

A Material Transaction and the Related Transactions

You create a material transaction on the *Materials* (AM300000) form when you need to issue materials to produce items for a production order. When you release the material transaction, the system creates an inventory issue transaction on the *Issues* (IN302000) form and releases it; you can view the reference number of the issue in the **IN Ref. Nbr.** column of the *Materials* form. For the inventory issue transaction, the system generates a batch of the general ledger transactions shown in the following table.

Account	Source of Account	Debit	Credit
Work in Process	The posting class settings on the *Posting Classes* (IN206000) form	Amount	0.00
Inventory Asset	The posting class settings on the *Posting Classes* form	0.00	Amount

A Labor Transaction and Related Transactions

You create a labor transaction on the *Labor* (AM301000) form when you need to record direct labor costs (such as working hours spent for item production) and, optionally, the produced quantity of items or indirect labor costs. When you release the labor transaction that records direct or indirect labor costs, the system creates a cost transaction on the *Cost Transactions* (AM309000) form and releases it. For the cost transaction, the system generates a batch of the general ledger transactions shown in the following table.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* (IN206000) form	Amount	0.00
Direct Labor (if direct labor is recorded)	Labor code settings on the *Labor Codes* (AM206500) form	0.00	Amount

Account	Source of Account	Debit	Credit
Indirect Labor (if indirect labor is recorded)	Labor code settings on the *Labor Codes* form	0.00	Amount

When you record both labor and the produced item quantity in the labor transaction, the system includes in the cost direct labor costs, indirect labor costs (if recorded), and other costs involved in item production, such as machine, tool, and overhead costs, which are specified on the *Work Centers* (AM207000) form. The batch of the general ledger transactions generated for the cost transaction may include the transactions listed in the following table.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* form	Amount	0.00
Direct Labor	Labor code settings on the *Labor Codes* form	0.00	Amount
Indirect Labor	Labor code settings on the *Labor Codes* form	0.00	Amount
Fixed Tool Costs	Tool settings on the *Tools* (AM205500) form	0.00	Amount
Fixed Machine Costs	Machine settings on the *Machines* (AM204500) form	0.00	Amount
Fixed Overhead Costs	Overhead settings on the *Overhead* (AM202500) form	0.00	Amount
Variable Overhead Costs	Overhead settings on the *Overhead* form	0.00	Amount

To track the movement of the produced items to a warehouse, the system creates an inventory receipt on the *Receipts* (IN301000) form, releases the receipt, and creates and releases another batch of general ledger transactions, which are displayed in the following table. You can view the reference number of the inventory issue in the **IN Ref. Nbr.** column on the *Labor* form.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* form	0.00	Amount
Inventory Asset	Posting class settings on the *Posting Classes* form	Amount	0.00

A Move Transaction and Related Transactions

You create a move transaction on the *Move* (AM302000) form when you need to record the movement of produced items to a warehouse. When you release the move transaction, the system creates an inventory receipt on the *Receipts* (IN301000) form and releases it; you can view the reference number of the receipt in the **IN Ref.**

Nbr. column on the *Move* form. For the inventory receipt, the system generates a batch of the general ledger transactions shown in the following table.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* (IN206000) form	0.00	Amount
Inventory Asset	Posting class settings on the *Posting Classes* form	Amount	0.00

If tools or machines are involved in the production of the item, the system also creates a cost transaction on the *Cost Transactions* (AM309000) form and releases it. For the cost transaction, the system generates a batch of the general ledger transactions shown in the following table.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* form	Amount	0.00
Fixed Tool Costs	Tool settings on the *Tools* (AM205500) form	0.00	Amount
Fixed Machine Costs	Machine settings on the *Machines* (AM204500) form	0.00	Amount

Transactions Generated for a WIP Adjustment

You can manually adjust costs for a production order by using the *WIP Adjustment* (AM308000) form. When you release a WIP adjustment, the system creates a batch of the general ledger transactions listed in the following table. You can find the reference number of the GL batch in the **GL Batch Nbr.** column.

Account	Source of Account	Debit	Credit
Work in Process	Posting class settings on the *Posting Classes* (IN206000) form	Amount	0.00
WIP Variance	Posting class settings on the *Posting Classes* form	0.00	Amount

Transactions Generated on the Close of a Production Order

You close a production order on the *Close Production Orders* (AM506000) form when the quantity of the item in the order is produced in full. (Any number of production orders can be closed on this form.) If the balance of the Work in Process account is nonzero, the system creates an adjustment on the *WIP Adjustment* (AM308000) form and the related general ledger batch on the *Journal Transactions* (GL301000) form.

Reversal of Production-Related Transactions

You can reverse all production transactions that you add manually (such as labor and move) by entering a negative quantity or hours on the form, which you use to create the transactions. The easiest way to accomplish this with

a minimum of typing is to find the original transaction and create a new transaction by copying its settings. You change the appropriate transaction line quantities or hours to a negative value, and you delete any other lines that you do not need to correct. If batch control totals are used, they must be negative. Then you release the new batch.

For information about reversing production receipts, see *Reversal of Production Receipts*.

> You cannot manually reverse cost transactions because they are created automatically when you release other production transactions.

Production Processing: Mass Processing

The following sections explain how to process multiple documents and transactions related to production process, and how the system generates, changes, or works with documents as a result of the mass processing.

Mass-Closing Production Orders

You close production orders by using the *Close Production Orders* (AM506000). You can close one order or multiple orders at a time. On this form, you specify the period within which the production orders were created, select the unlabeled check box in each row with a production order to be closed, and click **Process** on the form toolbar. The system closes the selected production orders.

Mass-Creating Production Orders

You can mass-create production orders for sales order lines with the **Mark for Production** check box selected by using the *Create Production Orders* (AM510000) form. To create multiple production orders related to sales order lines, on the form, you specify the selection criteria, select the unlabeled check box in each row for which a production order will be created, and click **Process** on the form toolbar. The system creates a production order for each line and links the production order to the sales order.

Mass-Printing Production Tickets

For any number of production orders, you can print production tickets for workers by using the *Print Production Orders* (AM511000) form. On this form, you specify the selection criteria to filter production orders, select the unlabeled check box in each row of a production order for which you need to print tickets, and click **Process** on the form toolbar.

Mass-Releasing Production Orders

Production orders that have the *Planned* status can be mass-released. To release multiple production orders, you open the *Release Production Orders* (AM500000) form, select the check box in the **Selected** column for each row of a production order to be released, and click **Process** on the form toolbar. The system releases the production orders and changes their status to *Released*.

Mass-Releasing Production-Related Transactions

Production-related transactions—such as material, labor, move, or WIP adjustment transactions—can be mass-released. To release multiple production-related transactions, you open the *Release AM Documents* (AM503000) form, select the unlabeled check box in each row of a transaction to be released, and click **Process** on the form toolbar. The system releases the transactions and changes their status to *Released*.

Production Processing: Related Report and Inquiry Forms

In the following sections, you can find details about the reports and inquiry forms you may want to review to gather information about the production processing.

> If you do not see a particular report or form that is described, you may have signed in to the system with a user account that does not have access rights to the report or form. Contact your system administrator to obtain access to any needed reports or forms.

Printing Production Tickets

To prepare a printable form of the production order that is being processed, you can use the *Production Ticket* (AM625000) or *Production Ticket with Barcode* (AM625010) report.

Viewing Production Orders

To view production orders that have the *Planned*, *Released*, or *In Process* status, you can use the *Production Summary* (AM625200) report.

You can also view all production orders created in the system by using the *Production Summary* (AM000006) form.

Viewing Production Costs

To view the planned production costs, actual production costs, and variance between the planned and actual costs for all production orders or a particular production order, you can use the *Production Order Performance* (AM652000) form.

Viewing Production Transactions

To view information about production-related transactions (such as labor and material transactions), you can use the following reports and inquiries:

- *Production Batch Register* (AM622000): Displays the detailed information about production-related transactions
- *Material Transactions by Order* (AM633000): Displays the material transactions for the production order you select
- *Material Transaction Detail* (AM000015): Displays the materials in the material transactions for all production orders
- *Labor Transactions by Order* (AM634000): Displays the labor transactions for the production order you select

You can also view the full list of production-related transactions in the system by using the *Transactions By Production Order* (AM000011) form.

Viewing the Work-in-Process Balance

To view the balance of the Work in Process account, which contains the costs of the items in production orders that have the *In Process* or *Completed* status, you can use the *Work in Process* (AM654000) report.

Viewing Production Orders by Work Centers

To view the list of operations in the production orders assigned to work centers, you can use the *Work Center Dispatch* (651000) or *Work Center Dispatch* (AM000007) form.

Viewing Labor Efficiency for Production Orders

To view and analyze the labor efficiency of the employees involved in production, you can use the *Production Order Labor Efficiency* (AM653000) report.

Appendix B: Material Requirements Planning

Material Requirements Planning: Forecasts and Master Production Schedule

Forecasts and the master production schedule (MPS) provide data for material requirements planning (MRP). In this topic, you will find details about forecasts and the MPS in Acumatica ERP Manufacturing Edition.

Master Production Schedule

A master production schedule (MPS) is a plan for the production of finished goods in the nearest period of time (such as a week or a month). In the schedule, you specify which items must be produced and when they should be produced. A master production schedule should take into consideration forecasts, sales order backlog, desired inventory levels, storage constraints, and production resources. MPS orders may depend on open production orders. In this case, the system reduces the quantity of the MPS order by the quantity of the item in the open production orders. To make the MPS orders dependent on production orders, you select the **Dependent** check box for the needed MPS type on the *MPS Type* (AM203000) form.

You create MPS orders manually by using the *Master Production Schedule* (AM201000) form.

Forecasts

A forecast predicts future demand (that is, sales orders that will be placed by customers) based on historical data. Forecast may depend on seasonality.

You can generate forecasts automatically by using the *Generate Forecast* (AM502000) form or create a forecast manually by using the *Forecast* (AM202000) form. Forecasts may depend on the sales orders created in the system; that is, the quantity of items in the sales orders will reduce the forecast quantity. For dependent forecasts, you select the check box in the **Dependent** column on the *Forecast* form. For example, suppose that the forecast is an item quantity of 200 for September 1 to September 30, and sales orders with promise dates between September 1 and September 30 have a total open quantity of 150. Then the remaining forecast of 50 is used by MRP.

If you specify a particular customer on a forecast, this forecast will be used by only sales orders for that customer. We do not recommend mixing both customer specific and non-specific forecasts for an inventory item because the both forecasts will be applied to sales orders for that customer. You could, however, extend the non-specific forecast to include the customer-specific forecast.

Material Requirements Planning: Related Report and Inquiry Forms

In the following sections, you can find details about the reports and inquiry forms you may want to review to gather information about material requirements planning.

> If you do not see a particular report or form that is described, you may have signed in to the system with a user account that does not have access rights to the report or form. Contact your system administrator to obtain access to any needed reports or forms.

Printing the List of Suggested Documents for Planning

To prepare a printable list of planned orders the system creates when you regenerate MRP, you can use the *MRP Display* (AM632000) report. You can also view the list of these documents on the *MRP Display* (AM400000) form.

Viewing Documents that Include a Particular Stock Item

To view the list of supply and demand documents that include a specific stock item in a specific warehouse, you can use the *Detail Inquiry* (AM404000) form. On this form, the system displays only the documents that have been created during the last MRP regeneration process.

Viewing the List of MPS Orders

To view the list of orders generated by the master production schedule (MPS) for all stock items of for a particular item-warehouse pair, you can use the *MPS Listing* (AM000004) form.

Viewing Generated Forecasts

To view the forecasts generated by using the *Generate Forecast* (AM502000) form for all stock items or a particular item-warehouse pair, you can use the *Forecast Listing* (AM000005) form.

Viewing MRP Regeneration Results for Stock Items by Period

To view the results of MRP regeneration for a specific item-warehouse pair grouped by periods (or buckets), you can use the *MRP Requirements by Item* (AM402000) form.

Appendix C: Producing Lot- or Serial-Tracked Items

Production of Lot- or Serial-Tracked Items: Related Report and Inquiry Forms

In the following sections, you can find details about the reports and inquiry forms you may want to review to gather information about the lot- or serial-tracked items in production.

> If you do not see a particular report or form that is described, you may have signed in to the system with a user account that does not have access rights to the report or form. Contact your system administrator to obtain access to any needed reports or forms.

Viewing the Lot or Serial Numbers of Produced Items and Materials

To view the lot or serial numbers of a produced item, the lot or serial numbers of the materials used to produce the item, and the lot or serial numbers of the produced item assigned to the materials, you can use either the *Lot/Serial Hierarchy* (AM600000) report or the *As-Built Configuration* (AM401700) form.

Viewing the Lot- or Serial-Tracked Materials Used in Production

To find the items that were produced by using a material with a particular lot or serial number, you can use the *Where Used in Production* (AM402500) form. On this form, you can also view the lot- or serial-tracked subassemblies used to produce the selected material.

Viewing the Materials in Material Transactions

You can use the *Material Transaction Detail* (AM000015) form to view the list of materials issued for production with details about material transactions that have been generated on the *Materials* (AM300000) form. These details include the transaction identifier and date, the lot or serial numbers assigned to each material, and the reference number of the production order for which the material has been issued. In addition, you can select the materials according to particular criteria, such as the lot or serial number of the material and the lot or serial number of the produced item for which the material has been used.

Appendix D: Producing Items with Outside Processing

Outside Processing: Generated Transactions

When you process production orders that include outside operations, you record payments for the subcontractor services (which may include material costs) by creating and processing purchase orders and the related documents and transactions. To track these expenses, the system generates the GL transactions described in the following section.

Transactions Generated for Non-Stock Items Used as Materials

Suppose that for a non-stock item that is used as a material for outside processing, the **Accrue Cost** check box is selected on the **Price/Cost** tab of the *Non-Stock Items* (IN202000) form, and the **Require Receipt** check box is selected on the **General** tab of the same form. As a result, the system posts to the Expense Accrual account the costs of materials when the items are received to a warehouse of your organization and a production order is released. Transactions generated on the inventory receipt release are listed in the following table.

Account	Source of Account	Debit	Credit
Expense Accrual account	Item	Amount	0.00
PO Accrual account	Item	0.00	Amount

On the *Non-Stock Items* form for a non-stock item used for outside services, if the **Accrue Cost** check box is selected on the **Price/Cost** tab and the **Require Receipt** check box is cleared on the **General** tab, then you create the AP bill with this non-stock item. When you release the AP bill, the transactions listed in the following table are generated.

Account	Source of Account	Debit	Credit
Expense account	Item	Amount	0.00
AP account	Item	0.00	Amount

When you issue or backflush the non-stock item for a production order, the transactions listed in the following table are generated.

Account	Source of Account	Debit	Credit
Work in Process account	Item	Amount	0.00
Expense Accrual account	Item	0.00	Amount

If the **Accrue Cost** check box is cleared on the **Price/Cost** tab of the *Non-Stock Items* form, the amounts are posted to the Expense account instead of the Expense Accrual account.

In previous versions of Acumatica ERP Manufacturing Edition, we recommended that when you are using non-stock items for materials in outside processing, you specify the same account for the Expense Accrual GL account and Expense GL account. This ensured the proper accounting. If you use the same account for both the expense and the accrual, the amounts will offset each other; the Work in Process account specified in the production order will hold the expense of outside services to include in the product cost.