

Microsoft Dynamics® AX 2009

Production Training

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This training is intended for professionals who are involved in the implementation and support of the Production module at a customer site, as well as for those who need to advise customers, or make modifications within the area. The paper offers an overview of the principles used within the Production module of Microsoft Dynamics® AX 2009.

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Introduction (Core Concepts in Production)

1. Introduction (Core Concepts in Production)

Hi! Today we will learn what the Production module is used for and understand the basic building blocks of production.

Why does the company need to have the Production module? ...The answer is for managing and accounting the Production. What is Production? Production is a process of creating products. And, what is a product?

From Wikipedia: “The noun **product** is defined as a “thing produced by labor or effort” or the “result of an act or a process”, and stems from the verb **produce**, from the Latin *prōdūce(re)* ‘(to) lead or bring forth’.”

So the Production module is used for the following purposes:

- Setting up materials (product structure) and resources (operations) required for a product creation.
- Accounting the product production process (accounting materials and resources required for producing a product).

In Microsoft Dynamics AX 2009, a product is an item of the *BOM* item type (BOM – Bill of materials). Go to **Inventory management > Common Forms > Item details**.

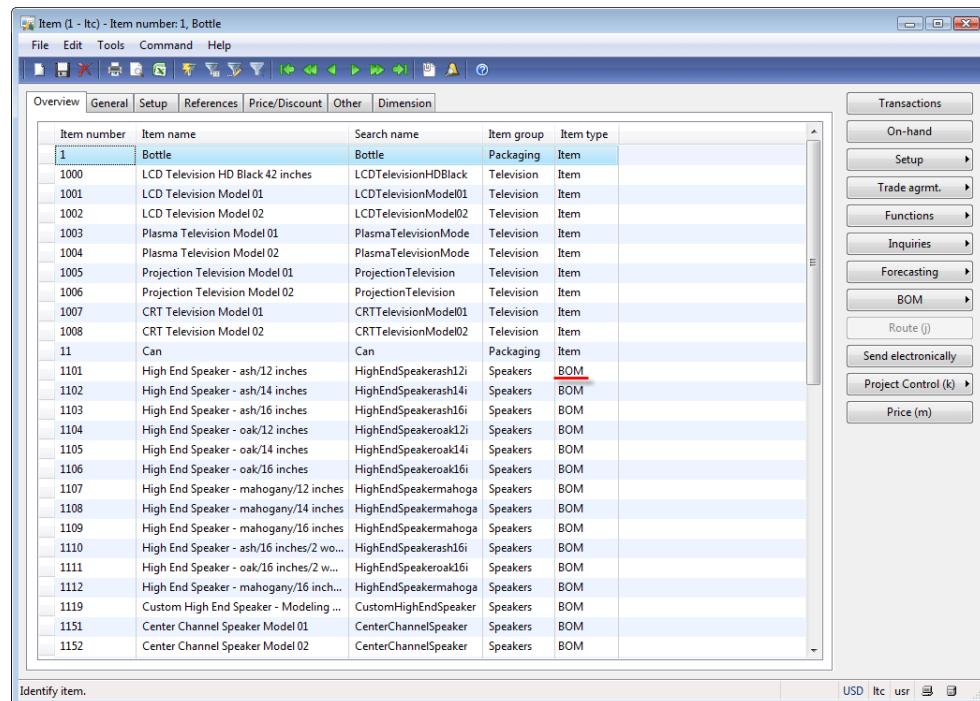


Figure 1.1 Product (Item form)

Introduction (Core Concepts in Production)

Setting Up Materials Required for Product Creation (Product Structure)

Product structure contains the information about the materials that are required for building the product.

Item of the *BOM* item type (product) must be associated with the Bills of Materials.

From Wikipedia: “The **bill of materials (BOM)** is a list of the raw materials, sub-assemblies, intermediate assemblies, sub-components, components, parts and the quantities of each needed to manufacture an end product”.

To view the BOM associated with the item, in the **Item** form, select necessary item and click the **BOM > Lines** menu button.

The screenshot shows the 'BOM line (1 - ltc) - Item number: 1101, High End Speaker - ash/12 inches' window. The top section displays a table for 'Versions' with one entry: 'BOM-1101-1-1' (selected), 'Name: BOM for 100101 version 1', 'Site: 1', 'From date: 0.00', 'To date: 3300', 'Active: checked', and 'Approved by: 3300' (checked). On the right, there are buttons for 'Create BOM', 'Approve (b)', and 'Activation'. Below this is an 'Overview' grid showing the Bill of Materials structure:

Item number	Configuration	Size	Color	Warehouse	Work center consumption	Quantity	Per series	Unit	Configuration group	I..	Item name
2001				11		1.0000	1	ea			Speaker enclosure - ash/12 inches
4001	01			11		1.0000	1	ea			Crossover Printed Circuit Board Assembly
5003				11		2.0000	1	ea			Binding posts
5004				11		1.0000	1	ea			Wiring harness - 12/14/16" high end speaker
3005	01			11		1.0000	1	ea			Tweeter - High End Speaker
3003	06			11		1.0000	1	ea			Mid-Range
3001	10			11		1.0000	1	ea			Woofer
5001	01			11		1.0000	1	ea			Grill
5009		01		11		12.0000	1	ea			4-40 X 1/2" machine screw
5012				11		12.0000	1	ea			4-40 zinc nut
6001				11		1.0000	1	ea			Box - corrugated, 16X18X40
6010				11		2.0000	1	ea			Packaging inserts, preformed/12"

On the right side of the grid, there is a tree view of the components:

- Speaker enclosure - ash/12 inches
- Crossover Printed Circuit Board Assembly
- Binding posts
- Wiring harness - 12/14/16" high end speaker
- Tweeter - High End Speaker
- Mid-Range
- Woofer
- Grill
- 4-40 X 1/2" machine screw
- 4-40 zinc nut
- Box - corrugated, 16X18X40
- Packaging inserts, preformed/12"

At the bottom left, it says 'Number of BOM that the BOM version refers to.' and at the bottom right, there are buttons for 'USD', 'ltc', 'usr', and other icons.

Figure 1.2 BOM Line form

In our demo data, the 1101 item is associated with the *BOM-1101-1-1* BOM. In the **BOM line** form, we can see the components that are used in order to produce the 1101 item.

Setting Up Resources Required for the Product Creation (Operations)

An operation contains information about the resources that are required for building the product.

Introduction (Core Concepts in Production)

An item of the BOM item type must be associated with the Route. A Route defines operations and their sequence required for producing the product. The operation contains information about the working time and the required resources. So, we can say that:

- BOM contains information about the materials required for building the product.
 - Route contains information about the working time and the resources required for building the product.

Resources are presented in Microsoft Dynamics AX as work centers. In Microsoft Dynamics AX 2009, a work center can be of the following types:

- Machine
 - Tool
 - Human
 - Operator
 - Vendor

To view the Route associated with the item, click the **Route** button in the **Item** form.

Figure 1.3 Route form

In our demo data, the **1101** item is associated with the **1001** Route. In the **Route** form, we can see the operations (work centers, working time) that are used for producing the 1101 item. We will learn how to understand the information presented in the **Route** form in the next lesson.

Introduction (Core Concepts in Production)

How are the operations and the materials connected?

Each material is manually associated with a specific operation.

1. In the **Item** form, click the **BOM > BOM lines** menu button.
2. Go to the **General** tab and enter the necessary operation in the **Oper. No.** field.

With the help of the BOM designer, do the following:

1. In the **Item** form, click the **BOM > Designer** menu item.
2. Drag and drop product materials to a specific operation.

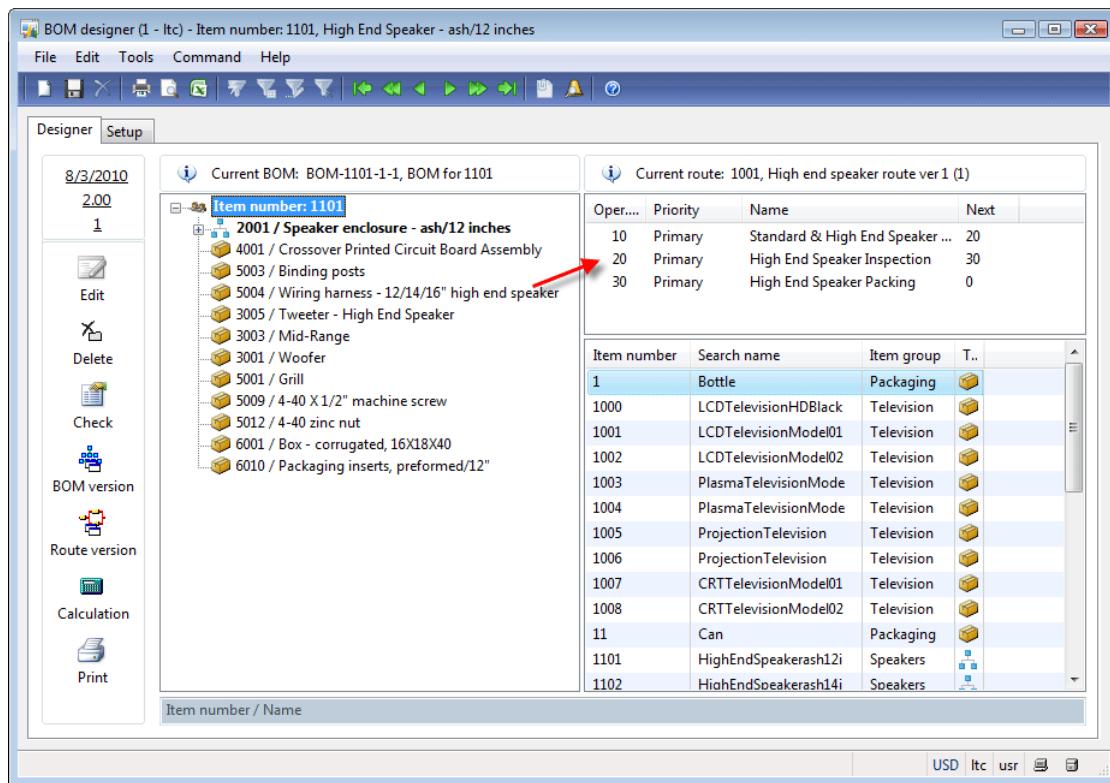


Figure 1.4 BOM designer form

Accounting materials and resources required for production of a product

A production order is used for managing the product creation process. It can be created from a sales order.

The production order follows a sequential “production life cycle”. The life cycle reflects the actual steps that are taken to manufacture an item. It begins with the creation of a production order and ends with a finished, manufactured item that is ready for the customer. Each step in the life cycle requires different kinds of information.

Introduction (Core Concepts in Production)

When the production order is ended, items that will be consumed are deducted from the inventory, the created product is added to the inventory and the costs of materials and resources are recorded to the general ledger accounts.

We will study the production order life cycle in detail later in the future lesson.

Training lesson summary

In this training lesson we have studied:

1. Production module is used for:
 - o Setting up materials (product structure) and resources (operations) required for creating a product
 - o Accounting product production process (accounting materials and resources required for producing a product)
2. Product is an item of the BOM item type.
3. Product is associated with a BOM and a Route.
 - o *Bills of Material* – BOMS
A Bill of Material or a BOM defines the recipe for making a product. Think of it as a list of ingredients which includes all the sub-assemblies, components, and raw materials required for making a single finished product.
 - o *Routes and Operations*
A production route defines the process which is used for making a finished product. Sequential steps, or operations, are created which describe the Work Centres involved in the production process and how much time it takes to carry out each operation.
 - o *Work Centres*
Work Centres represent production resources available to a company for making products. In Microsoft Dynamics AX 2009, a Work Centre can be a Machine, a Tool, a Human Operator, or a Vendor.
4. A Production order is used for managing the product creation process.

In the next training lesson, we will create and set up a new product.

2. Bills of Material

Hi there! Today we will work with Bill of materials (BOM) and cover the following topics:

- Create a BOM items and a component items
- Create a Bill of materials (BOM)
- Configure a Bills of materials. Working with a BOM configuration and an item configuration.
- Setup relations between a BOM item and a BOM
- Sales order and BOM.

Let's assume that our Company has decided to start producing a chair. As Product Designers, we will create a new BOM in the Microsoft Dynamics AX.

A Product Designer analyzes what components are required for build a chair.

The chair has the following components:

- Back
- Seat
- Chair base
- Castors
- Arm pads
- Arm brackets
- Task chair control



Figure 2.1 Chair

First, the Product Designer must create the components required for the BOM.

Creating Components

Let's create the back, seat, chair base, castors, arm pads, arm brackets, and task chair control items. I will use the same demo data. Just to recall, our demo data is accessible [here](#).

We have already created the Bottle and Can items in [this training lesson](#). So, now it must be easier to create new items. To create an item perform the following steps:

1. Go to **Inventory Management > Common Forms > Item details**. The **Item** form opens.
2. Create a new line (Click CTRL + N).
3. Select the *Blank record* template (if you have more than one record template).
4. Fill in the fields with the following values:
 - o The **Item number** field with the *0001* value.
 - o The **Item name** field with the *Back* value.
 - o The **Item group** field with the *Packaging* value. If you don't understand what the item group is used for, read [this lesson](#).
 - o Go to the **General** tab.
 - o The **Inventory model group** field with the *FIFO* value. If you don't understand what the inventory model group is used for, read [this lesson](#).
 - o The **Dimension group** field with the *CF-W* (Color, Configuration, and Warehouse dimensions) value. If you don't understand what the dimension group is used for, read [this lesson](#).
5. Save the line (CTRL + S).
6. Set up dimensions for the Back item. We assume that the Back item has two configurations: [Cruiser](#) and [Bigboy](#), and two colors: Black and Silver.
 - o Click **Setup >Configurations** button. The **Configuration** form opens.
 - o Create the Cruiser configuration dimension. Click CTRL + N.
 - o Fill in *Cruiser* in the **Configuration** and **Name** fields. Save the line.
 - o Create and save the *Bigboy* configuration.

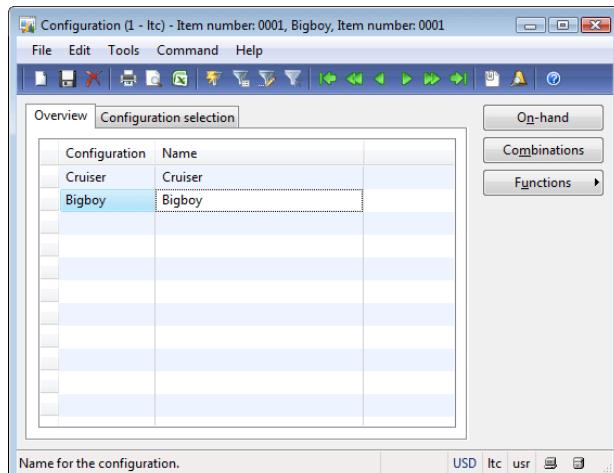


Figure 2.2 Back configurations

- o Close the **Configuration** form.
- o Click **Setup >Colors**. The **Colors** form opens.

Bills of Material

- Create the **Black** color dimension. Click CRTL + N.
- Fill in **Black** in the **Color** and **Name** fields. Save the line.
- Create the **Silver** color dimension.

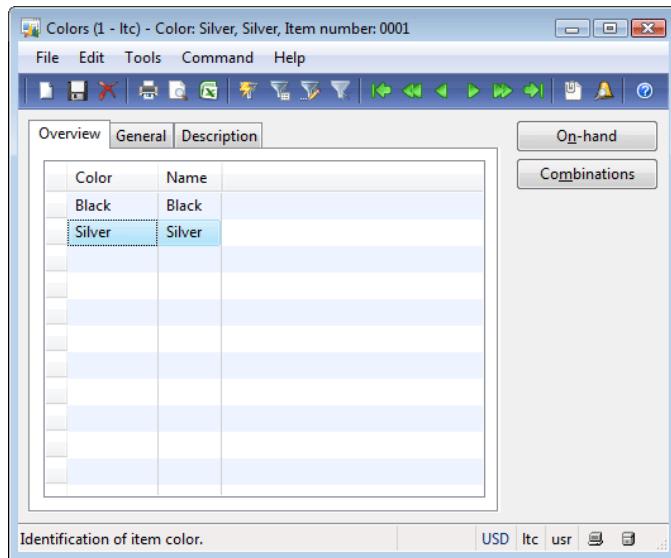


Figure 2.3 Back Colors

- Create dimension combinations. Read more about dimension combinations [here](#).
- In the **Colors** form, click the **Combinations** button. The **Combinations of item dimensions** form opens.
- Click the **Create combinations** button. The **Combinations of item dimensions** form opens.
- Click the **Select all** button. All dimension combinations are selected.

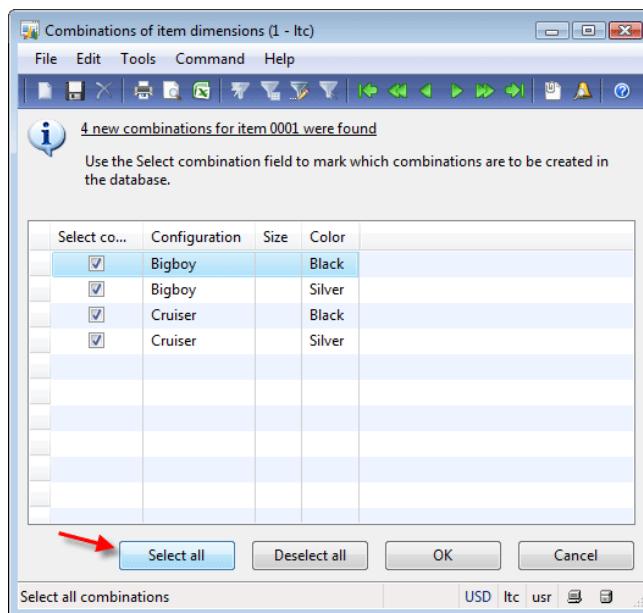


Figure 2.4 Combinations of item dimensions form

Bills of Material

- Click **OK**. The **Combinations of item dimension** form shows only two combinations. That is because this form shows the combinations for the Silver color.
 - Close the **Combinations of item dimensions** form.
 - Close the **Colors** form.
 - Make sure that all dimensions combinations are created.
 - In the **Item** form, click **Setup > Item dimension combinations** button. Make sure that all combinations are created.

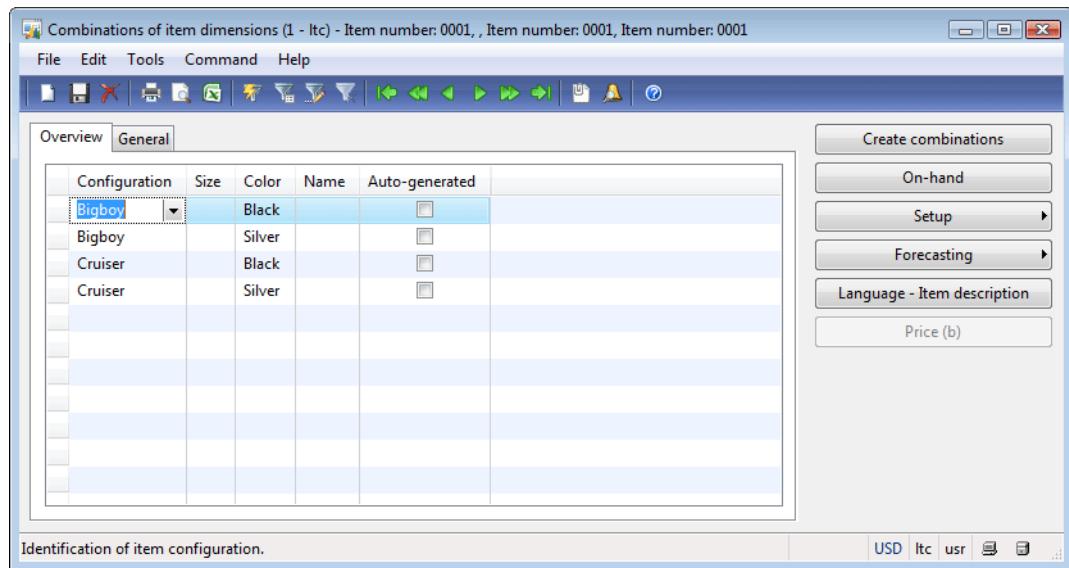


Figure 2.5 Combinations of item dimensions

We have created the Back item with the following configurations: Bigboy, Cruiser and with colors: Black and Silver.

Repeat the same steps and create items with the following dimensions:

- Seat item. Item number 0002. Seat configuration: [round seat](#) and [grubby seat](#). Seat colors: Black and Silver.
 - Chair base item. Item number 0003. Chair base dimension group is F-W (configuration and warehouse). Chair bases configuration: [highrise alloy](#) and [alloy base](#).
 - Castor item. Castor dimension group is F-W (configuration and warehouse). Item number 0004. Castor configuration: [standard](#) and [chrome hooded](#).
 - Arm pad item. Item number 0005. Arm pad configuration: [AP1](#) (Flat polyurethane arm pad) and [AP2](#) ("Z" polyurethane arm pad). Arm pad colors: Black and Silver.
 - Arm bracket item. Item number 0006. Arm bracket configuration: [AAB1](#) (Adjustable arm bracket) and [AAB3](#) (Adjustable trigger arm bracket). Arm bracket colors: Black and Silver.
 - Task chair control item. Item number 0005. Task chair control dimension group is F-W (configuration and warehouse). Task chair control configuration: [STENO04 \(steno lever lock\)](#) and [STENO22 \(steno reflex control\)](#).

Bills of Material

I have prepared the data and definition files with the above-mentioned items. If you don't want to repeat the same steps, just download [these files](#) and import them to Microsoft Dynamics AX. If you don't know how to import demo data, read [this lesson](#). During import, you will be asked to overwrite several tables, in this case select all tables and click **OK**. After the end of process, go to the **Item** form and make sure that all items are there. Do this in the test environment (test company), because your custom items will be overwritten.

Creating BOM Item

Now, the Product Designer creates the Chair item. To create the Chair item, he or she performs the same steps as when creating an ordinary item: BOM item type.

1. Open the **Item** form (**Inventory Management > Common Forms > Item details**).
2. Create a new line.
3. Fill the **Item number** field with the *0050* value.
4. Fill the **Item name** field with the *Chair* value.
5. **Item group** = *Packaging*
6. **Item type** = *BOM*
7. Go to the **General** tab.
8. **Inventory model group** = *FIFO*
9. **Dimensions group** = *F-W*
10. Save the line.

We assume that the company has the following types of chairs: Black and Silver with Standard, Business, and President configurations.

You can ask why the Product Designer creates the Chair item only with the Configuration item dimension (Dimension group = F-W, i.e. Configuration and Warehouse) and without the Color dimension? This is because **in Microsoft Dynamics AX, only Configuration dimension of a BOM item can affect the configuration of BOM components**. In other words, the Product Designer can't set up relations between the Chair colors and the Chair component colors.

So, the Product Designer creates the following configuration dimensions: StandardB (Standard + Black), StandardS (Standard + Silver), BusinessB (Business + Black), BusinessS (Business + Silver), PresidentB (President + Black), and PresidentS (President + Silver).

Create these dimensions for the Chairs item in the same way as for the other items:

1. In the **Item** form, click **Setup > Configurations**. The **Configurations** form opens.
2. Create the StandardB (Standard + Black), StandardS (Standard + Silver), BusinessB (Business + Black), BusinessS (Business + Silver), PresidentB (President + Black), and PresidentS (President + Silver) configurations.

Bills of Material

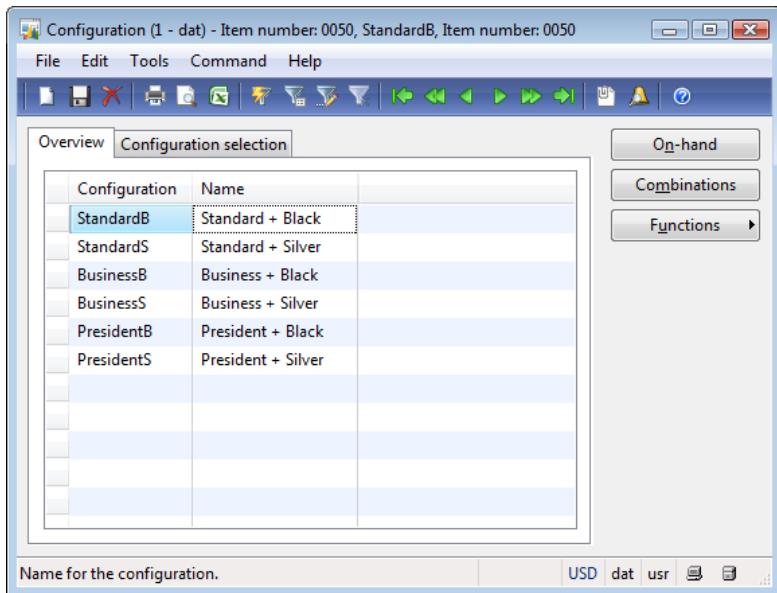


Figure 2.6 Chair configurations

3. Close the **Configurations** form.

As we can see, there is no difference between the item with the *Item* item type and the item with *BOM* item type. The only difference is when the cursor is on the item of the BOM item type, the **Route** button and the **BOM** menu button are available in the **Item** form. As I know, in the new version of Microsoft Dynamics AX, the **Item type** field will be removed from the **Item** form.

We create the BOM item but this item doesn't have the receipt of components. The BOM will be created a bit later.

Creating Sub-BOM Items

The Product Designer decides to create additional BOM items: Chair arm and Substructure. This is because the Chair arms items are produced and stored independently and the Substructure items must be referenced as one item (what for, we will know a bit later).

The Chair arm item will contain the Arm pad and the Arm bracket components.

Substructure will contain the Chair base, Castors, and Task Chair control components.

These BOM items will be used as components of the Chair item and will be called sub-BOMs.

Note: Create a sub-BOM item for BOM components if these components are managed together. Generally, several BOM components need its own level in the BOM if, at a particular stage, the components must be:

Bills of Material

- Tracked
- Stored
- Sold

We already know that BOM item should contain only configuration dimension active.

Let's assume that the Substructure item must have the following configuration dimension: Base, Business, and Lux.

And the Chair arm item must have the following configuration dimension: StandardB (Standard + Black), StandardS (Standard + Silver), ExtendedB (Extended + B), and ExtendedS (Extended + Silver).

In the next chapter, will specify the combination of components + dimensions that must be used for each chair item configuration dimension.

Let's create sub-BOM items. Sub-BOM item is the ordinary item with the BOM item type:

1. Open the **Item** form (**Inventory management > Common Forms > Item details**).
2. Create a new line.
3. Fill the **Item number** field with the *0010* value.
4. Fill the **Item name** field with the *Chair arm* value.
5. **Item group** = *Packaging*
6. **Item type** = *BOM*
7. Go to the **General** tab.
8. **Inventory model group** = *FIFO*
9. **Dimensions group** = *F-W*
10. Save the line.
11. Create configurations.
12. In the **Item** form, click **Setup > Configurations**. The **Configurations** form opens.
13. Create the StandardB (Standard + Black), StandardS (Standard + Silver), ExtendedB (Extended + Black), and ExtendedS (Extended + Silver) configurations.
14. Close the **Configurations** form.
15. Repeat the same steps for the Substructure item. Item number is 00020, Configuration dimension: Base, Business, and Lux.

I have created data file with the BOM and Sub-BOM items. You can download it [here](#).

Creating BOM

We create the BOM items but these items don't have the receipt of components. Let's create the BOM.

As we learned from the [previous training lesson](#), BOM is used to set up materials required for a product. BOM is a list of raw materials, sub-assemblies, intermediate assemblies, sub-components, components, parts and the quantities of each needed to manufacture an [end product](#).

Bills of Material

Let's create a new BOM for the Chair item:

1. Go to the **Inventory Management > Common Forms > Bills of materials**. The **BOM** form opens.
2. Create a new line (click CTRL + N).
3. The **BOM** field will be filled in automatically. It is because the number sequence for BOM is set up. (**Inventory Management > Setup > Parameters > Number sequences** tab > "BOM" line.)
4. Fill in the *BOM for Chair* value in the **Name** field.
5. Select site 2 in the **Site** field.
6. Save the line (click CTRL + S).

The Product Designer decides to create one BOM for all possible Chair configurations and colors instead of creating separate BOMs for each combination of Chair configuration and color. The Microsoft Dynamics AX allows creating one BOM for all possible configurations with the help of BOM configurations and Item configurations.

The advantage of configurations is that only one BOM item and one BOM is required.

The Product Designer sets up the following lists of components for the Chair item:

- The Standard Chair item must contain the following elements:
 - Back – Cruiser
 - Seat – Round seat
 - Substructure – Base
 - Chair arms – without chair arms
- The Business Chair item must contain the following elements:
 - Back – Cruiser
 - Seat – Round seat
 - Substructure – Business
 - Chair arms – Standard
- The President Chair item must contain the following elements:
 - Back – Bigboy
 - Seat – Grubby seat
 - Substructure – Lux
 - Chair arms – Extended

All these three BOMs must be combined into one. Also, all BOMs must exist in two colors: Black and Silver.

To combine all BOMs in one, the Product Designer decides to create the following BOM configurations: BlackCh, SilverCh, Substruct, and Arms. **BOM configurations depend on the BOM item configuration, each BOM configurations can be enabled or disabled.**

Let's create BOM lines for the Chair item.

1. Go to the **Inventory Management > Common Forms > Bills of materials**. The **BOM** form opens.
2. Find the *BOM for Chair* BOM. Click the **Lines** button. The **BOM line** form opens.
3. Create a new line (CTRL + N) for the Black Back component.

Bills of Material

4. Fill in *0001* in the **Item number** field.
5. Select *Black* in the **Color** field.
6. Select *22* in the **Warehouse** field.
7. Set *1* in the **Quantity** field.
8. Type *BlackCh* in the **Configuration group** field. Press the Tab keyboard button.
9. The **Create configuration group** form opens.

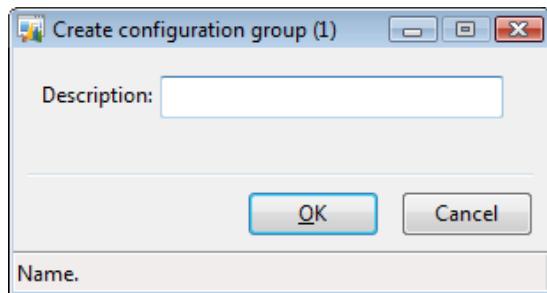


Figure 2.7 Create configuration group form

10. Fill in the BOM configuration description: *Black chair*. Click **OK**. The new BlackCh BOM configuration is created. You can find one in the **Configuration groups** form (**Inventory Management > Setup > Bills of materials > Configuration groups**).
11. In the **BOM line** form, go to the **General** tab and make sure that the **Line type** field contains the *Item* value (the **BOM** field group).
12. Save the line (CTRL + S).
13. Create a new line (CTRL + N) for the Silver Back component.
14. Fill in *0001* in the **Item number** field.
15. Select *Silver* in the **Color** field.
16. Select *22* in the **Warehouse** field.
17. Set *1* in the **Quantity** field.
18. Type *SilverCh* in the **Configuration group** field. Press the Tab keyboard button.
19. The **Create configuration group** form opens.
20. Fill in the BOM configuration description: *Silver chair*. Click **OK**. The new BlackCh BOM configuration is created.
21. In the **BOM line** form, go to the **General** tab and make sure that the **Line type** field contains the *Item* value (the **BOM** field group).
22. Save the line (CTRL + S).
23. Repeat the same steps for the Seat component.
24. Create a BOM line for the Chair arm component. Repeat the same steps but fill in *Arms* in the **Configuration group** field and *2* in the **Quantity** field.
25. Create a BOM line for the Substructure component. Repeat the same steps but fill in *Substruct* in the **Configuration group** field.

Bills of Material

The **BOM line** form will have the following view:

The screenshot shows the 'BOM line (1 - pro) - Item number: 0050, Chair' window. The top menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has tabs for Versions, Overview, General, Setup, and Dimension. The General tab is active, displaying a table of components:

Item number	Configuration	Size	Color	Warehouse	Work center consumption	Quantity	Per series	Unit	Configuration group	I...	Item name
0001			Black	22		1.0000	1	Pcs	BlackCh		Back
0001			Silver	22		1.0000	1	Pcs	SilverCh		Back
0002			Black	22		1.0000	1	Pcs	BlackCh		Seat
0002			Silver	22		1.0000	1	Pcs	SilverCh		Seat
0010				22		2.0000	1	Pcs	Arms		Chair arm
0020				22		1.0000	1	Pcs	Substruct		Substructure

On the right side, there is a vertical toolbar with buttons for Create BOM, Approve (b), Activation, Lines, Where-used, Configuration, Functions, Inventory, and Send electronically. The bottom of the window has buttons for USD, pro, usr, and a close button.

Figure 2.8 Chair components. BOM Line form.

Now the Product Manager must set up how the BOM configuration group depends on the BOM item configuration:

1. Go to the **Inventory Management > Common Forms > Item details**. The **Item** form opens.
2. Set the cursor to the 0050 Chair item.
3. Click the **Setup > Configurations** menu button. The **Configuration** form opens.
4. Select the StandardB (Standard + Black) configuration and go to the **Configuration selection** tab. This tab is used for setting up the actual configuration of the BOM Line (components) for the selected BOM item configuration.
5. For the Chair Standard + Black configuration we should set up:
 - o Back – Cruiser Black
 - o Seat – Round seat Black
 - o Substructure – Base
 - o Chair arms – without chair arms
6. Create a new line.
7. In the **Group** field, select the *BlackCh* configuration group.
8. In the **Item number** field, select the 0001 (Back) item.
9. In the **Configuration** field, select the Cruiser item configuration.
10. Save the line.
11. The Product Manager doesn't create a line for the *SilverCh* configuration group. So, all BOM lines that belong to the *SilverCh* group will be excluded from the Chair item with Black configuration.
12. Now, when the Customer purchases the Standard Black chair, the chair will contain the Black Cruiser back. If it is not clear enough, don't worry as below you can see an example. Let's continue setting up BOM lines for the StandardB (Standard + Black) configuration.
13. Create a new line.
14. In the **Group** field, select the *BlackCh* configuration group.
15. In the **Item number** field, select the 0002 (Seat) item.

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16. In the **Configuration** field, select the *Round* item configuration.
17. Save the line.
18. Create a new line.
19. In the **Group** field, select the *Substruct* configuration group.
20. In the **Item number** field, select the 0020 (Substructure) item.
21. In the **Configuration** field, select the *Base* item configuration.
22. Save the line.

The **Configuration selection** tab of the **Configuration** form will have the following view:

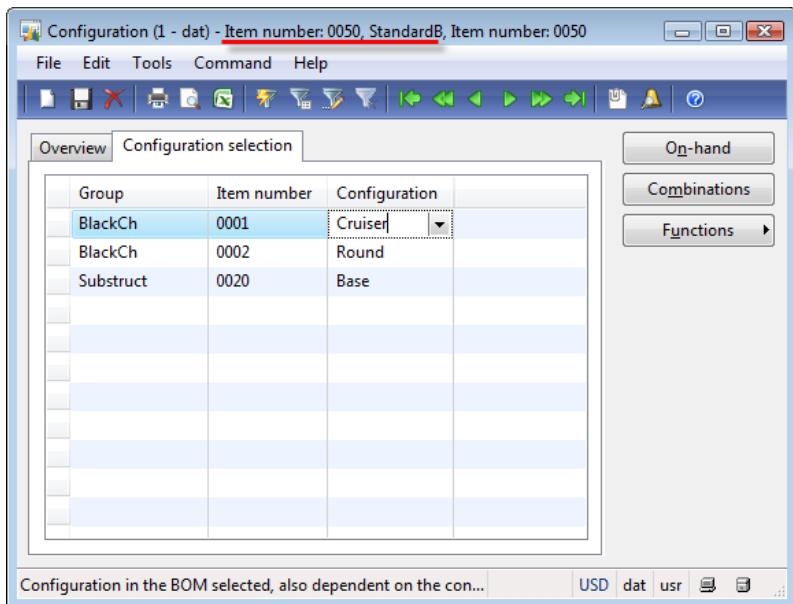


Figure 2.9 Chair Standard Black configuration

We can see that the 0050 item Standard Black Chair doesn't have the *Arms* group on the **Configuration selection** tab. This is because the *Standard Chair* configuration doesn't have the chair arms.

The BOM item configuration is a components combination, such as a chair arms and a back that can be specified for a BOM item during the ordering process.

Set up the remaining chair configuration according to the Product's Designer list of components for the Chair item.

I recommend that you set up at least one configuration yourself. Then, you can [download the file](#) with chair configurations set up.

Checking how it works

Let's check how the Sales Manager will use the BOM item configurations in a daily work. To do this, we assume that the 1101 customer orders the Standard Black Chair item:

1. Go to the **Accounts Receivable > Common Forms > Sales Order Details**. The **Sales order** form opens.
2. Create a new sales order for the 1101 customer.
3. Create a new sales line.
4. In the **Item number** field, select the *Chair* item.
5. In the **Configuration** field, select the *StandardB* (Standard + Black) configuration.
6. Select site 2 in the **Site** field.
7. Save the line.
8. To check what components the standard black chair consists of, do the following.
9. In line area of the **Sales order** form, click the **Functions > Explode BOM** menu button.
10. The **Explode BOM** form opens.

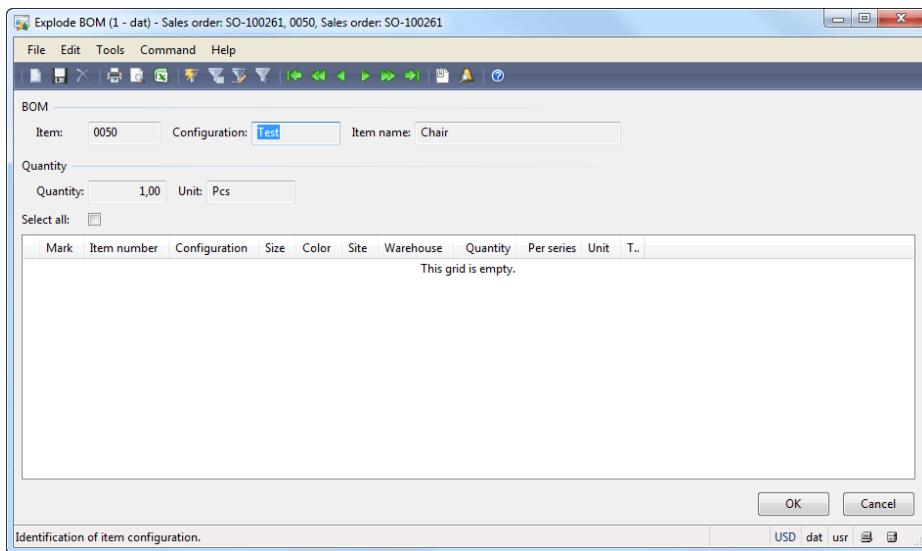


Figure 2.10 Chair components. Explode BOM form.

We can see that the Chair item doesn't have any components. This is because Microsoft Dynamics AX doesn't know that the Chair BOM item uses the BOM for Chair BOM. Let's set up a reference between the BOM item and the BOM. For this purpose, the BOM versions is used.

1. Go to the **Inventory Management > Common Forms > Bills of materials**. The **BOM** form opens.
2. Find the BOM item for Chair BOM.
3. In the **Versions** area, create a new line (set the cursor to the empty grid and click CTRL + N).
4. Select 0050 (Chair) in the **Item number** field.
5. Save the line.
6. Approve the version. Click the **Approve** button in the **Versions** area.
7. The **Approve version** form opens. The employee id assigned to your Axapta User will be filled in automatically (is taken from **Administration > Users > select current user > User relations button > General tab > Employee field**). Click **OK**.

Bills of Material

8. Activate the version. Click the **Activate** button.

That is all, now the Microsoft Dynamics AX knows that the Chair BOM item uses the BOM for the Chair BOM.

Let's check what the **Explode BOM** form will contain now:

1. Go to the **Accounts Receivable > Common Forms > Sales Order Details**. The **Sales order** form opens.
2. Find the created sales order.
3. To check what components the standard black chair consists of, click the **Functions > Explode BOM** menu button in the line area.
4. The **Explode BOM** form opens.

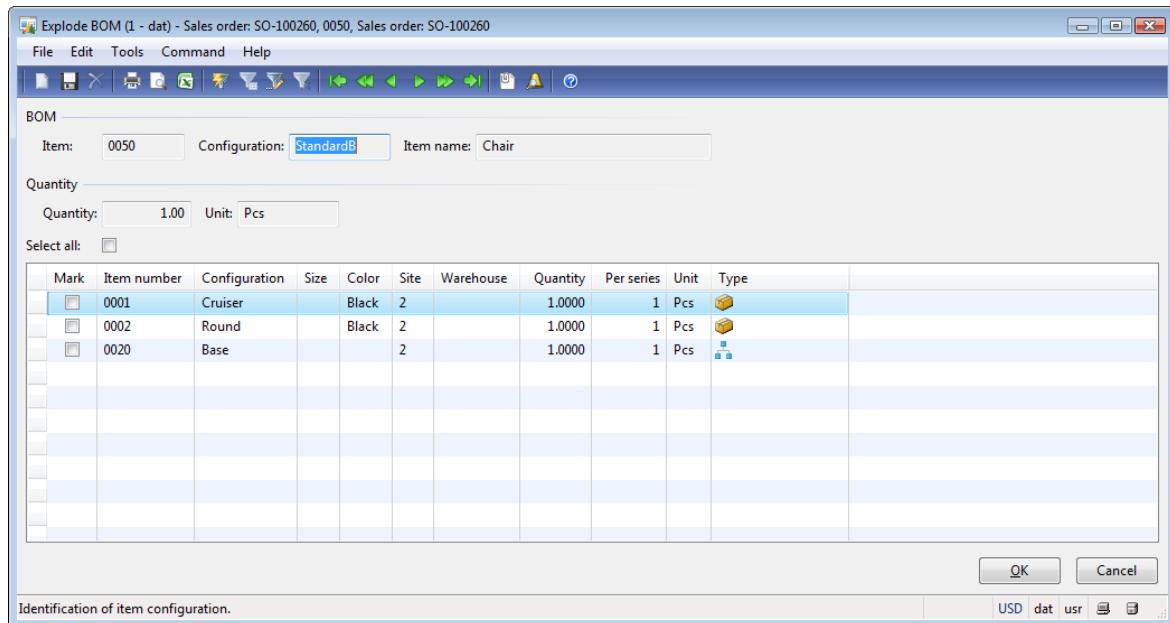


Figure 2.11 Black standard chair components. Explode BOM form.

We can see that the black standard chair consists of:

- Back (0001) – Cruiser Black
- Seat (0002) – Round seat Black
- Substructure (0020) – Base
- Without chair arms

This is what we expected.

If you select the *StandardS* (Standard + Silver) chair configuration and have set up this configuration, the **Explode BOM** form will have the following view. If you haven't set up this configuration, the **Explode BOM** form will be empty.

Bills of Material

The screenshot shows the 'Explode BOM' dialog box. At the top, it says 'Explode BOM (1 - Itc) - Sales order: SO-100178, 0050, Sales order: SO-100178'. The menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area is titled 'BOM' and has fields for 'Item: 0050', 'Configuration: StandardS', and 'Item name: Chair'. Under 'Quantity', there is a field 'Quantity: 1,00' and 'Unit: Pcs'. A 'Select all:' checkbox is checked. The main grid displays three components:

Mark	Item number	Configuration	Size	Color	Site	Warehouse	Quantity	Per series	Unit	T..
<input type="checkbox"/>	0001	Cruiser		Silver	2		1,0000	1	Pcs	
<input type="checkbox"/>	0002	Round		Silver	2		1,0000	1	Pcs	
<input type="checkbox"/>	0020	Base			2		1,0000	1	Pcs	

At the bottom right are 'OK' and 'Cancel' buttons. Below the grid, a note says 'Unit the item is sold in.' and there are buttons for USD, Itc, usr, and a print icon.

Figure 2.12 Silver standard chair components. Explode BOM form.

Sometimes it is required that the Sales Manager has the possibility to select component dimensions himself. For example, if the Customer orders the chair with Black Back and Silver seat. The Microsoft Dynamics AX can handle this case.

1. Go to the **Inventory Management > Common Forms > Item details**. The **Item** form opens.
2. Find the *0050* (Chair) item.
3. Go to the **General** tab.
4. Select the **Configurable** check box in the **Product configuration** group.
5. Save the line.

Let's check what has changed for the Sales Manager.

1. Go to the **Accounts Receivable > Common Forms > Sales Order Details**.
2. Find the created sales order.
3. Select the new configuration for the sales order line
4. The **Configure item** form opens. The Infolog with a warning shows. This is because the *0010* (Chair arm) and *0020* (Substructure) BOM items aren't associated with BOMs.
5. On the Chair arms record, select the *ExtendedB* (Extended + Black) configuration.
6. On the Black chair record, select the *0001* (Back) item in the **Item number** field and *Bigboy* in the **Configuration** field.
7. On the Silver chair record, select the *0002* (Seat) item in the **Item number** field and *Grubby* in the **Configuration** field.
8. On the Substructure record, select the *Business* configuration.

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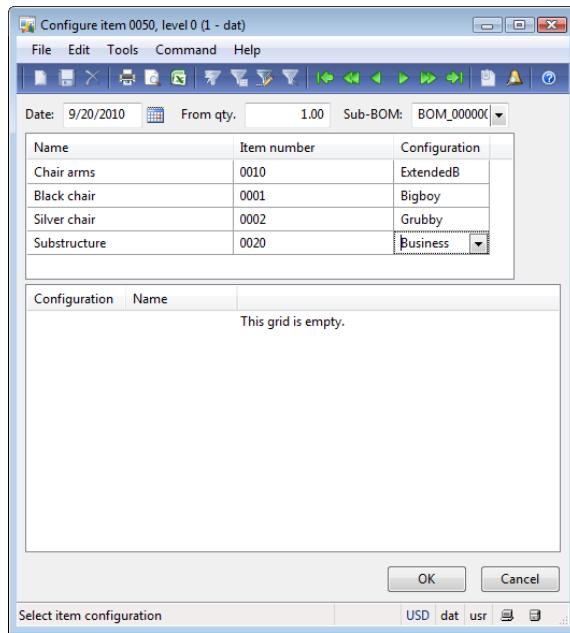


Figure 2.13 Configure the chair. Configure item form.

9. If the *Chair* configuration with the same settings exists, this configuration will be shown in the bottom grid. Otherwise, the grid is empty. Click **OK**.
10. Since the chair configuration with the required components configuration doesn't exist, the **Configuration creation** form opens.

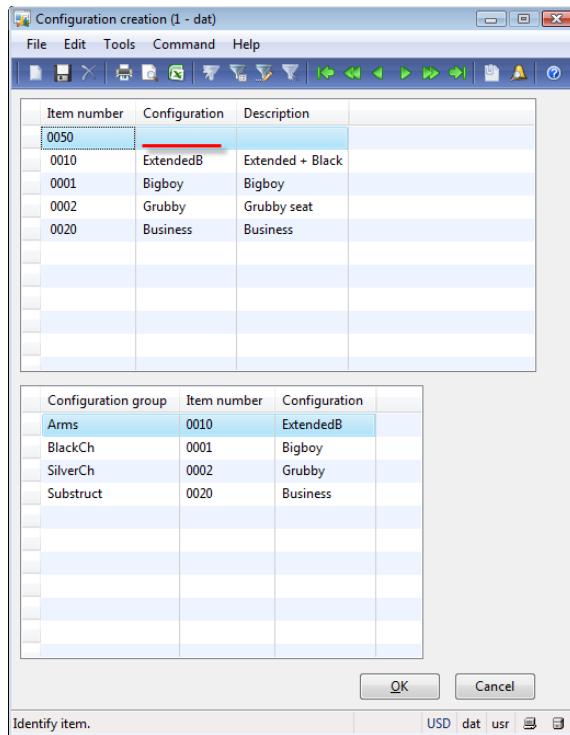


Figure 2.14 Create new chair configuration. Configuration creation form.

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11. Fill in the name for the new configuration in the **Configuration** field. For example, **Test**. Click **OK**.
12. The new chair configuration is created and this configuration is used in the sales line.

The screenshot shows the Sales order form for Sales order SO-100261. The top part displays a grid of sales orders with columns for Sales order, Customer account, Invoice account, Order type, Status, Current..., Project, Blanket order, Customer requisition, and Quality order sta... The bottom part shows the Lines tab of the Sales order form. In the Configuration column, the item number 0050 has 'Test' selected. Other columns include Size, Color, Site, Warehouse (set to 'Warehouse'), Batch number, Serial number, Quantity (1.00), Unit (Pcs), Unit price, Discount, Disc...., and Net amount. Below the table, there are fields for Requested receipt date (9/20/2010), Confirmed receipt date, Delivery date control (Sales lead time), Requested ship date (9/20/2010), Confirmed ship date, Mode of delivery (10), and Shipping location time zone (GMT-05:00) Eastern Time (US & Canada). A sidebar on the right lists various setup options like Simple, Posting, Pro forma, Setup, Functions (b), Inquiries, Trade agrmt., and Intercompany. At the bottom, there are buttons for USD, dat, usr, and a file icon.

Figure 2.15 Sales order form. New chair configuration.

You can check that the new configuration is created. Go to the **Inventory Management > Common Forms > Item details > find the Chair item > Setup > Configurations**.

The screenshot shows the Configuration selection form for item number 0050, BusinessB. The main grid displays configurations with columns for Configuration and Name. The 'Test' configuration is highlighted with a red underline. Other configurations listed include BusinessB, BusinessS, PresidentB, PresidentS, StandardB, StandardS, and Business + Black, Business + Silver, President + Black, President + Silver, Standard + Black, Standard + Silver. To the right of the grid are buttons for On-hand, Combinations, and Functions. A sidebar on the right lists functions like Setup (j), Functions (k), Inquiries (g), Calculation (l), Inventory (2), Intercompany (3), Configure line (4), and Product model (5). At the bottom, there are buttons for USD, dat, usr, and a file icon.

Figure 2.16 Chair configurations. Configuration form.

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As you can see, in the **Configure item** form, we can't configure more than one item from the configuration group. If you want to select the black bottom and black seat it can't be done.

Let's check what components there are in the Customer order:

1. In the line area of the **Sales order** form, click the **Functions > Explode BOM** menu button.
2. The **Explode BOM** form opens.

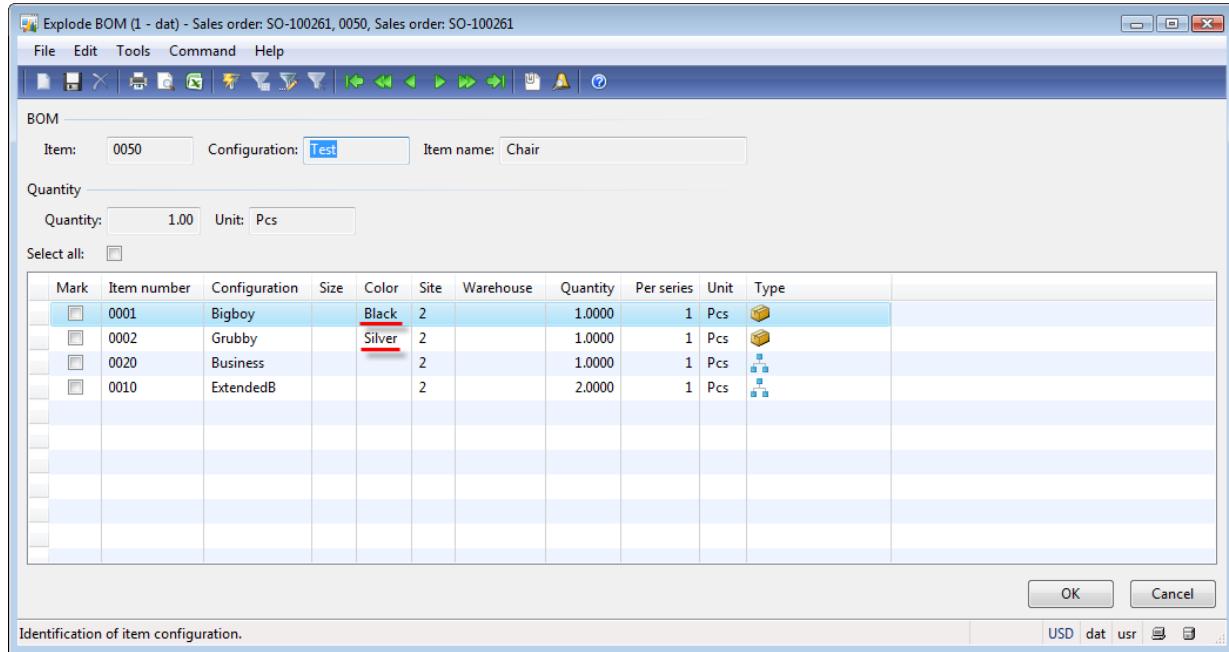


Figure 2.17 Chair components. Explode BOM form.

We can ensure that ordered Chair consist of black back and silver seat.

Creating BOMs for the Chair Arm and Substructure BOM Items

Now, we will create BOMs for the Chair arm and Substructure items. We will do this in the same manner as creating the BOM for the Chair BOM.

The chair arm contains the Arm pads and Arm brackets elements.

The substructure contains the Chair base, Castors, and Task Chair control.

Let's create the Chair arm and Substructure BOMs:

1. In the **BOM** form, create a new line (press CTRL + N).
2. The **BOM** field will be filled in automatically.
3. Fill in the *BOM for Chair arm* value in the **Name** field.
4. Select site 2 in the **Site** field.

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5. Save the line (press CTRL + S).
6. Repeat the same steps for the Substructure BOM.

In Microsoft Dynamics AX, we can configure the BOM in two ways:

- In the **BOM line** form (**Inventory Management > Common Forms > Bills of materials > Lines** button).
- With the help of the BOM designer (**Inventory Management > Common Forms > Bills of materials > Designer** button).

Let's create the list of components with the help of the **BOM line** form for the BOM for Chair arm:

1. In the **BOM** form, set the cursor on the BOM for Chair arm.
2. Click the **Lines** button. The **BOM Line** form opens.
3. Create the first line for the Arm pad component.
4. In the **Item number** field, select the *0004* item (Arm pad).
5. In the **Color** field, select the *Black* color
6. Select 22 in the **Warehouse** field.
7. Fill in 1 in the **Quantity** field.
8. In the **Configuration group** field fill in the *ArmPadB* value. Press the Tab keyboard button.
9. The **Create configuration group** form opens.
10. Fill in the BOM configuration description: *Arm pad black*. Click **OK**. The new *ArmPadB* BOM configuration is created.
11. Go to the **General** tab and make sure that the **Line type** field contains the *Item* value.
12. Save the line.
13. Create the second line for the silver arm pad.
14. In the **Item number** field, select the *0004* item (Arm pad).
15. In the **Color** field, select the *Silver* color
16. Select 22 in the **Warehouse** field.
17. In the **Configuration group** field fill in the *ArmPadS* value. Create new Arm pad silver BOM configuration group.
18. Fill in 1 in the **Quantity** field.
19. Go to the **General** tab and make sure that the **Line type** field contains the *Item* value.
20. Save the line.
21. Repeat the same steps for the Arm bracket component (BOM configuration groups are *ArmBrackB* and *ArmBrackS*)

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The BOM line form will have the following view:

The screenshot shows the 'BOM line (1 - pro) - Item number: 0010, Chair arm' window. The top menu bar includes File, Edit, Tools, Command, and Help. A toolbar with various icons is located above the main area. On the left, there's a 'Versions' section with a table showing a single row for 'BOM_00000015'. To the right of the table are buttons for Create BOM, Approve (b), and Activation. Below the table is a navigation bar with tabs: Overview, General, Setup, and Dimension. The main content area is a grid table with columns: Item number, Configuration, Size, Color, Warehouse, Work center consumption, Quantity, Per series, Unit, Configuration group, and Item name. The first row in the grid shows item 0005 (Black, 22) with a quantity of 1.0000. The second row shows item 0005 (Silver, 22) with a quantity of 1.0000. The third row shows item 0006 (Black, 22) with a quantity of 1.0000. The fourth row shows item 0006 (Silver, 22) with a quantity of 1.0000. To the right of the grid is a sidebar with buttons for Lines, Where-used, Configuration, Functions, Inventory, and Send electronically. At the bottom, there are buttons for USD, pro, usr, and a language selection dropdown.

Figure 2.18 Chair arm components. BOM line form.

In the same way, create the list of components with the help of the **BOM line** form for the Substructure BOM. BOM configuration groups are Chair base, Castor, TaskChair. Note that the BOM for Substructure must contain 4 Castors.

The **BOM line** form will have the following view:

The screenshot shows the 'BOM line (1 - dat) - BOM: BOM_00000018, BOM for Substructure' window. The top menu bar includes File, Edit, Tools, Command, and Help. A toolbar with various icons is located above the main area. On the left, there's a 'Versions' section with a table showing a single row for 'BOM_00000018'. To the right of the table is a sidebar with buttons for Lines, Where-used, Configuration, Functions, Inventory, and Send electronically. Below the table is a navigation bar with tabs: Overview, General, Setup, and Dimension. The main content area is a grid table with columns: Item number, Configuration, Size, Color, Warehouse, Work center consumption, Quantity, Per series, Unit, Configuration group, and Item name. The first row in the grid shows item 0003 (22) with a quantity of 1,0000. The second row shows item 0004 (22) with a quantity of 4,0000. The third row shows item 0007 (22) with a quantity of 1,0000. To the right of the grid is a sidebar with buttons for Lines, Where-used, Configuration, Functions, Inventory, and Send electronically. At the bottom, there are buttons for Turnover qty., number of units of raw material used in the finished item, and a language selection dropdown.

Figure 2.19 Substructure components. BOM line form.

Bills of Material

Now, we will assign the BOM items to the BOMs with the help of BOM versions.

For the Chair arm BOM item:

1. Go to the **Inventory Management > Common Forms > Bills of materials**. The **BOM** form opens.
2. Find the BOM for Chair arm record.
3. In the **Versions** area, create a new line (set the cursor to the empty grid and press **CTRL + N**).
4. Select **0010** (Chair arms) in the **Item number** field.
5. Save the line.
6. Approve the version. Click the **Approve** button in the **Versions** area.
7. The **Approve version** form opens. Employee id assigned to your Axapta User will be filled in automatically (Employee id is taken from Administration > Users > select current user > User relations button > General tab > Employee field). Click **OK**.
8. Activate the version. Click the **Activate** button.

Repeat the same steps for the Substructure BOM item.

That is all, now Microsoft Dynamics AX knows that the Chair arms item uses the BOM for Chair arms BOM and Substructure item uses the BOM for Substructure BOM.

You can download [the demo file with the resulting data](#).

Configuring the Chair Arm and Substructure BOM Items

The last thing is setup relations between item configurations and BOM configurations for the Sub-BOM items. We already configure the Chair item.

We have created the following configurations for the Chair Arm and Substructure items:

1. Chair arms: standard and extended in black and silver colors
2. Substructure: Base, Business, and Lux.

But we don't specify components configurations for BOM item configurations.

Let's assume the following:

- The Standard Chair arms item must contain the following elements:
 1. Arm pad – AP1 (Flat polyurethane arm pad)
 2. Arm bracket – AAB1 (Adjustable arm bracket)
- The Extended Chair arms item must contain the following elements:
 1. Arm pad – AP2 ("Z" polyurethane arm pad)
 2. Arm bracket – AAB3 (Adjustable trigger arm bracket).
- The Base Substructure item must contain the following elements:
 1. Chair base – Highrise alloy
 2. Castor – Standard
 3. Without Task chair control

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- The Business Substructure item must contain the following elements:
 1. Chair base – Highrise alloy
 2. Castor – Standard
 3. Task chair control – STENO04 (steno lever lock)
- The Lux Substructure item must contain the following elements:
 1. Chair base – Alloy base
 2. Castor – Chrome hooded
 3. Task chair control – STENO22 (steno reflex control)

Perform BOM item configuration yourself.

Summary

You can download [the demo file with the resulting data](#).

In this training lesson, we have studied the following:

1. How to create a BOM item. What the difference is between an ordinary item and a BOM item.
2. How to create a BOM.
3. How a BOM can be configured. What an Item configuration and a BOM configuration are.
4. How to set up relations between a BOM item and a BOM. What a BOM version is used for.
5. How to create a sales order for the BOM item with specific configuration.
6. Configure a BOM item in a sales order manually.

In the next training lesson, we will study Routes.

3. Work Centers (Resources)

In this training lesson, we will learn what a work center is and what its parameters are.

Machines, tools, people, and vendors that a company may use within a manufacturing process are defined as Work Centers which are created from within the **Basic** module.

The four types of a work center are:

- **Machine.** The most common type of work center, where one or more machines may be defined.
- **Tool.** Tools that are used within a manufacturing process should be defined as this type.
- **Vendor.** Define subcontractors to be of the type Vendor.
- **Human Resource.** Any work carried out by people or teams must be defined for later attachment to a route operation.

Work Centers of a similar type or capability can be grouped together in order to form a pool of resource capacity. The system can use them when planning production. Each work center is related to a calendar which defines the availability of the resource throughout the working year. A work center which belongs to a group can inherit the properties of that group, thus saving time and effort in the setup and maintenance of the data.

Setting Up a Work Center

For setting up a work center, we will use this [demo data](#) (the same as for the Trade and Logistics training). To review work centers, go to **Basic > Common Forms > Work center groups**. The **Work center groups** form opens. Remember that in Microsoft Dynamics AX a work center can be created only inside a work center group.

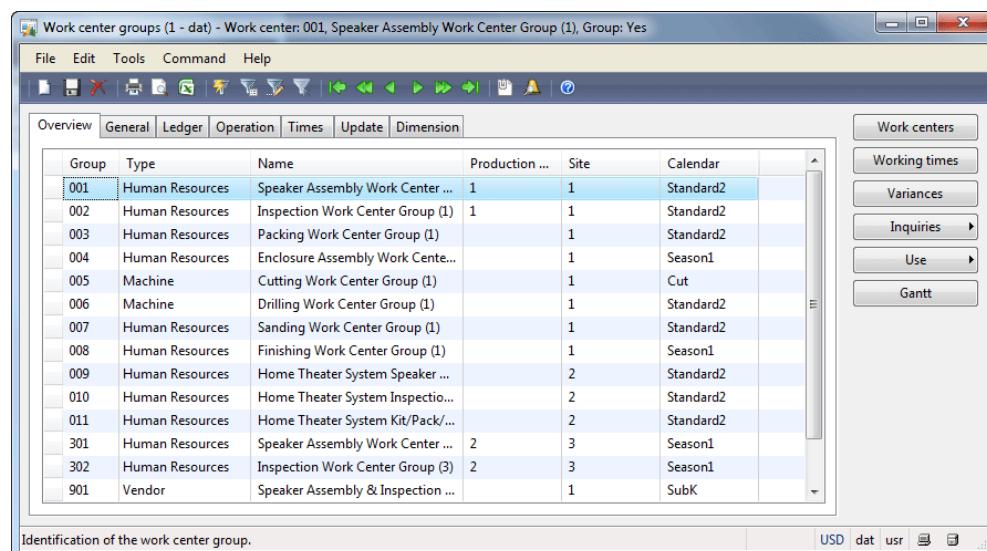


Figure 3.1 Work center groups form

Work Centers (Resources)

A work center group can contain one or several work centers. Usually work centers that perform similar functions and are generally used interchangeably are combined in one work center group.

A work center group contains default parameters for a work center. If you click the **Work centers** button, you can make sure that the work center contains almost the same parameters and tabs.

The screenshot shows the Microsoft Dynamics AX Work centers form. The title bar reads "Work centers (1 - dat) - Work center: 00101, Speaker Assembly Team 1, Group: No, Group: 001". The menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with icons for New, Open, Save, Print, and others. The main area has tabs: Overview (selected), General, Ledger, Operation, Times, Update, and Dimension. The Overview tab displays a grid of work centers:

Work center	Name	Production unit	Site	Vendor	Employee	Calendar
00101	Speaker Assembly Team 1	1	1			Standard2
00102	Speaker Assembly Team 2	1	1			Standard2
00103	Speaker Assembly Team 3	1	1			Standard2

To the right of the grid are several buttons: Dispatching, Working times, Variances, Inquiries (with a dropdown arrow), Use (with a dropdown arrow), and Gantt. At the bottom left is the note "Identify the work center." and at the bottom right are buttons for USD, dat, usr, and a file icon.

Figure 3.2 Work centers form

Why does Microsoft Dynamics AX have work center groups? In the [next training lesson](#), we will set up routes. A route determines the sequence of operations required for building a finished product. Each operation can be associated with a work center group. In this case, when a route is scheduled, an available work center (from the work center group) will perform the operation.

We will use the 011 work center group. This work center group contains the 01101 and 01102 work centers. To verify this, click the **Work centers** button.

Now, we will analyze a work center group parameters. Since a work center group and work center parameters are similar, we will only analyze the work center group parameters.

Working Time

A work center is the company resource. All resources have limitations. Working time limit is defined with the help of a calendar. The default calendar used for the 011 work centers is Standard2. Let's investigate the working time limit for the Standard2 calendar:

1. Click **Basic > Calendar**. The **Calendar** form opens. Find the Standard2 calendar.

Work Centers (Resources)

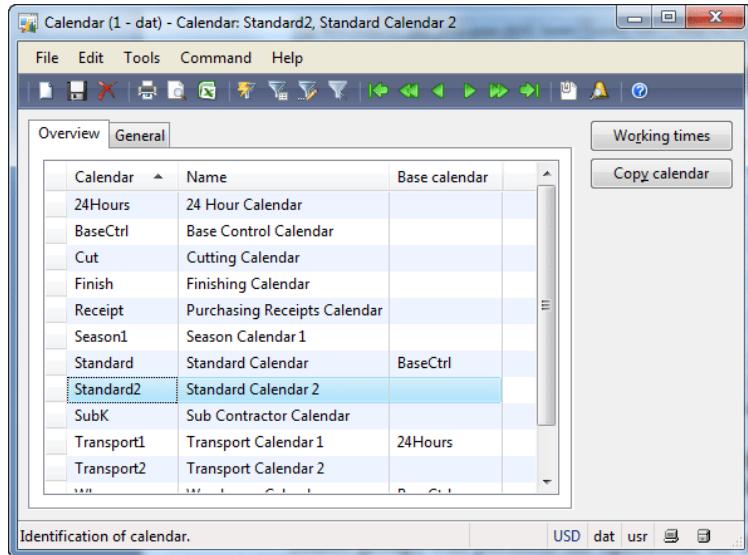


Figure 3.3 Calendar form

2. Click the **Working times** button. The **Working times** form opens. This form contains the information about working days and times.

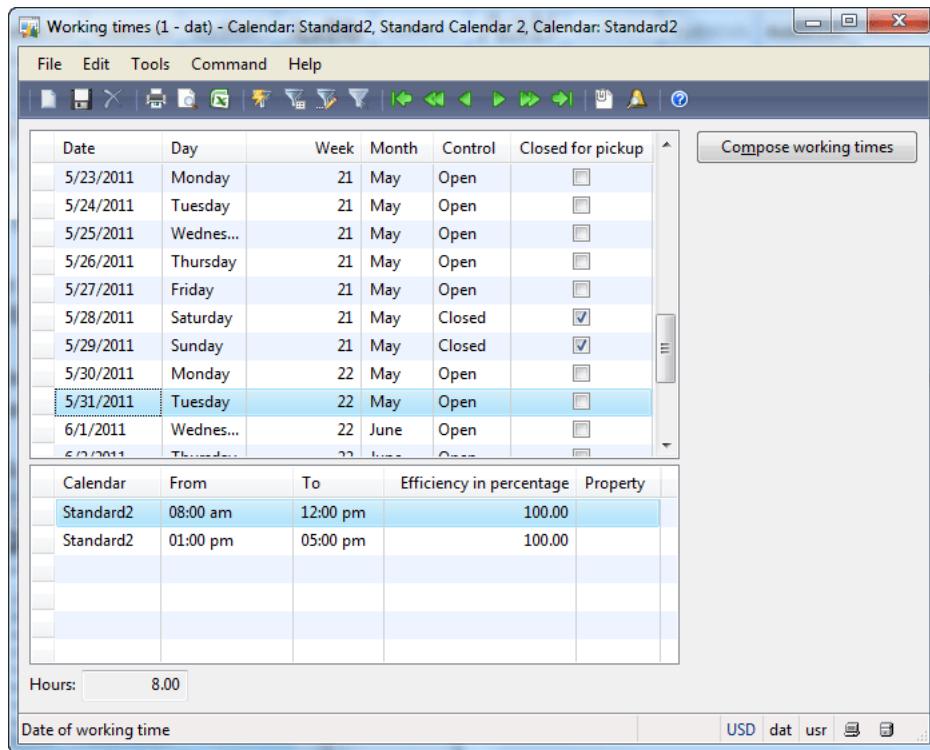


Figure 3.4 Working times form

We can see that on May, 28 – 29 the calendar is closed (this is Saturday and Sunday), so work centers from the 011 work center group are not available on Saturday and Sunday. Also, we can see that

Work Centers (Resources)

during a day, work centers are available from 8 till 12 and from 13 till 17 (the lunch time is between 12 and 13). (The **Closed for pickup** check box is used for a warehouse (warehouse working time is also set up with the help of a calendar) and it means the item can't be picked up from the warehouse on this day.)

For example, if the operation is running for 3 hours and is started at 4.00 p.m. on Friday, it will be finished at 10 a.m. on Monday. The start and end dates for operations are calculated during the production scheduling process.

How is working time set up for the calendar? Of course, working time can be set up manually but for all days within a year it is very tedious. For this purposes the working time template exists. When a new calendar is created, the **Working times** form is empty. To create working times for the calendar, the user clicks the **Compose working times** button. In the **Compose working times** form, the user specifies the start and end dates and the working time template.

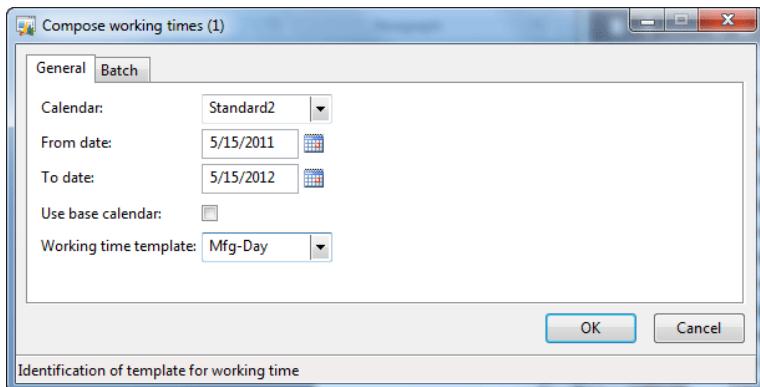


Figure 3.5 Compose working times form

The working time templates are set up under **Basic > Setup > Calendar > Workingtime templates**.

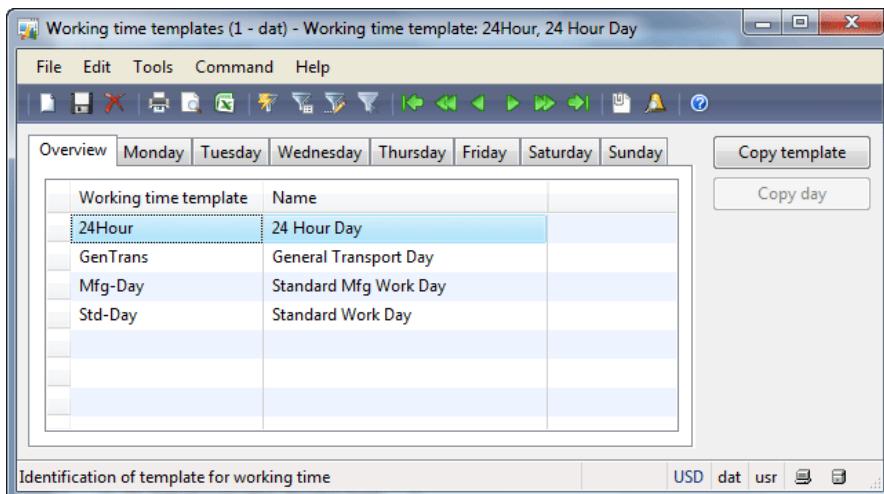


Figure 3.6 Working time templates form

Work Centers (Resources)

In the **Working time template** form, the user can specify working time per day.

The 011 work center group has the following working time: from Monday to Friday, from 8 till 12 and from 13 till 17.

Input Location

One of the major work center parameters is the input location (especially if the Warehouse management is used). An input location defines the place in a warehouse where a work center is situated. This information is used when Microsoft Dynamics AX defines the place where BOM components are to be delivered. We will study the delivery process in the [Production life cycle](#) training lesson.

Let's set up an input location for the 011 work center group:

1. In the **Work center group** form, select the 011 work center group. Go to the **General** tab.
2. Select 2 in the **Site** field, and the value 23 in the **Warehouse** field. Now, we want to specify the location. If we look up the **Location** field nothing is shown. That is because a work center can be assigned only for a production input location. But, the 23 warehouse doesn't contain any production input location.
3. To create a production input location in the warehouse 23, go to **Inventory management > Setup > Inventory breakdown > Locations**. The **Locations** form opens.
4. Create a new record with the following values:
 - o Location type = *Production input location*
 - o Warehouse = 23
 - o Aisle = 01
 - o Max.pallets = 100
 - o Height = 360
5. Now, we can set up a location for the Work center group.

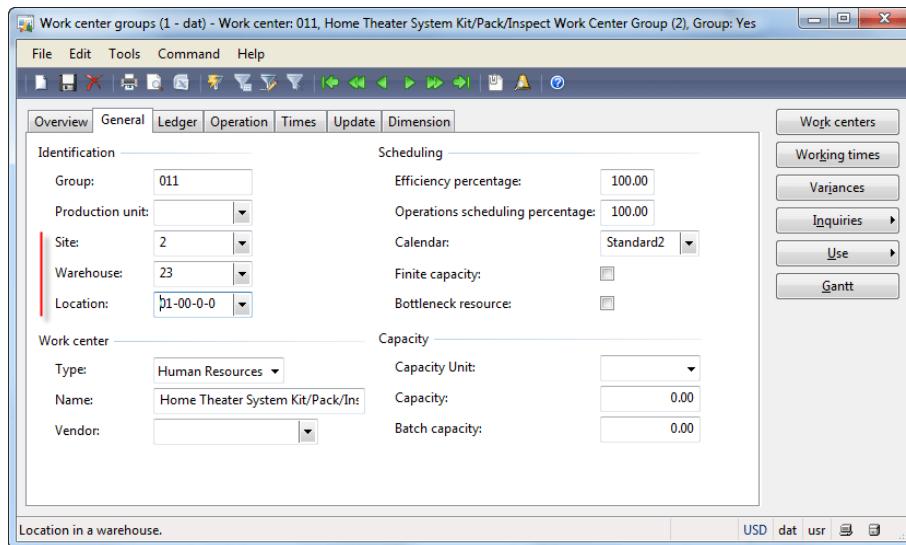


Figure 3.7 Work center groups form, Input location

Work Centers (Resources)

Ledger Posting

As you may already know, all company activities should be recorded to ledger accounts in a monetary equivalent. A work center is no exception. When a BOM item is processed, all expenses and the cost of work must be recorded to the general ledger. The Financial Manager sets up general ledger accounts that must be used for this purpose on **Ledger** tab of the **Work center groups** form.

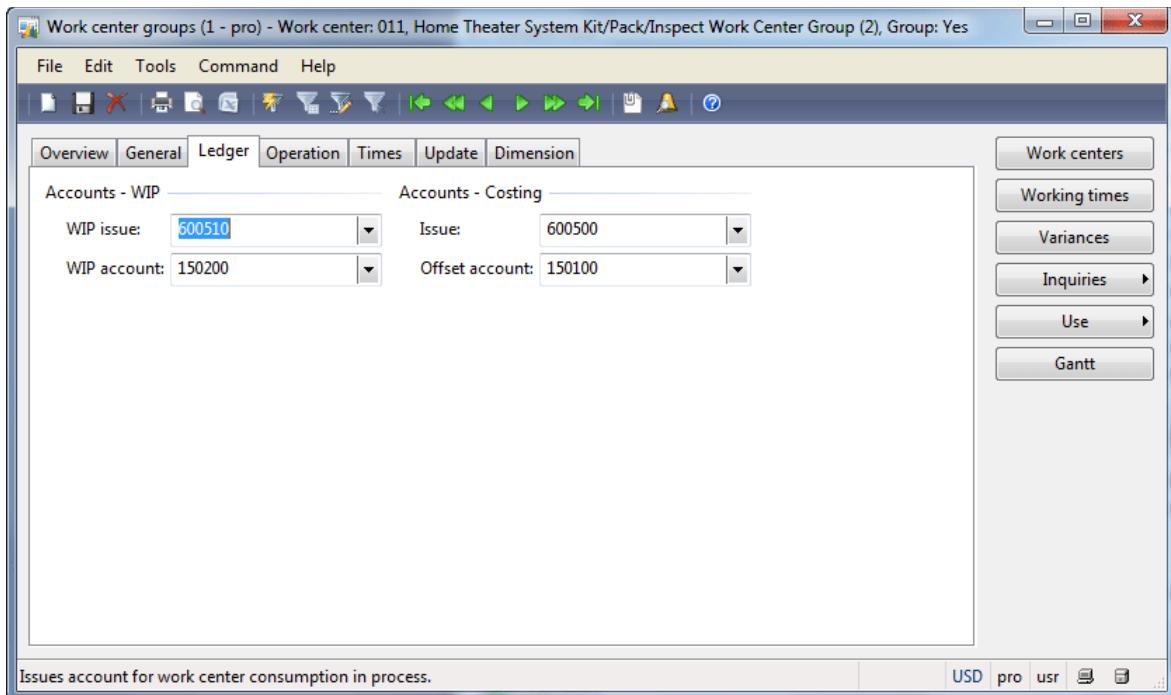


Figure 3.8 Work center groups form, Ledger tab

When a BOM item is processed, all expenses are recorded to the WIP issue account and the same amount of money (the cost of work for the processed BOM) is recorded to the WIP account (work in process). When the BOM production is finished, the previous accounts are reversed, the expense is recorded to the Issue account and the same amount of money (the cost of work for the produced BOM) to the Offset account. But the expenses and the cost of work can be recorded to the general ledger accounts from a costing group (the **Work center groups** form, **Operation** tab, **Cost categories** field group). It depends on the **production order posting** type. This type is set up when a production order is created – in the **Create production** order form, **Setup** field group, **Ledger** field. To use the ledger account from the work center, the *Item+Work center* value must be selected.

Financials is a very interesting part of the company routine. I started learning financials [from this site](#). After the production module, I am planning to start the Financial module.

Work Centers (Resources)

Default Parameters for Operation

Each work center is used to perform some operations for the BOM item. So, the work center group contains default parameters for the operation. In the [next training lesson](#), we will study routes and operation in more detail.

Shortly, each operation consumes time from a work center it is assigned to. Capacity term relates to the operation. It shows the number of processed BOM items during specific time (usually per hour) for the operation in a specific work center. When a production order is scheduled, the time required for the operations is calculated and reserved.

To set up default capacity parameters for the operation, go to the **Times** tab and fill in the **Run time** and **Process quantity** fields. For example, if during 1.5 hours only 4 chairs can be painted (painting is an operation), the **Run time** field must be filled with the 1.5 value and the **Process quantity** field with the 4 value. These values will be default for the “paint” operation in the current work center. Note that for all operations in the current work center, these values will be default.

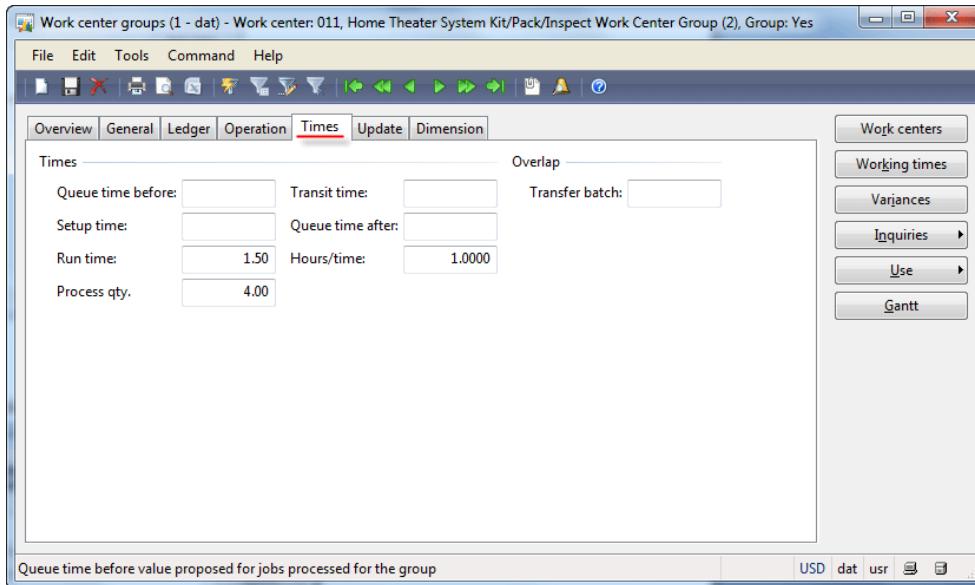


Figure 3.9 Work center groups form, Times tab

This is the easiest way to set up default time required by an operation. In Microsoft Dynamics AX, the required time can be calculated in four different ways:

- Standard (as described above)
- Capacity
- Batch
- Work center batch

The calculation formula is set up at the operation level (we will see this in the training lesson). By default, the Standard method is used.

Work Centers (Resources)

Other default fields for operation that are used during the calculation of the required time are:

- Capacity unit
- Capacity
- Batch capacity

They are placed on the **General** tab, in the **Capacity** field group:

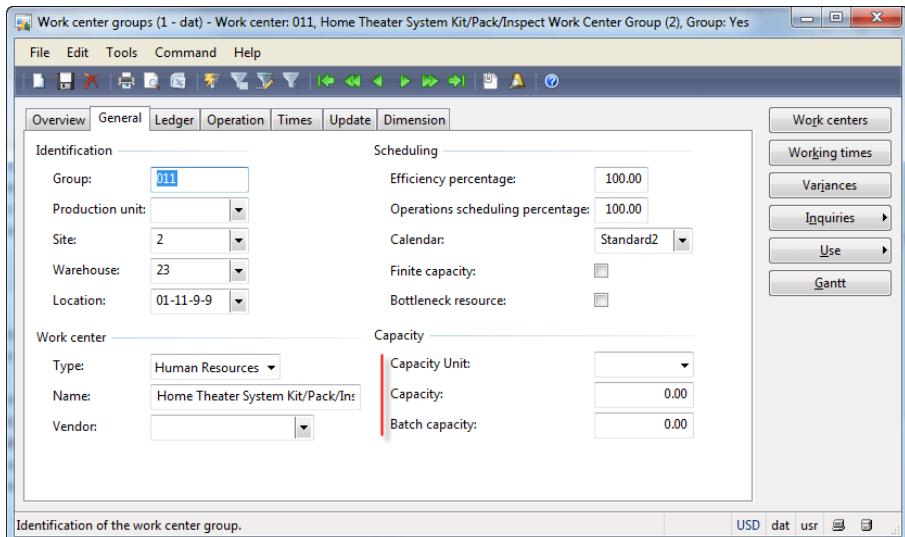


Figure 3.10 Work center groups form, Capacity

Other default fields for the operation are placed on the **Operation** tabs.

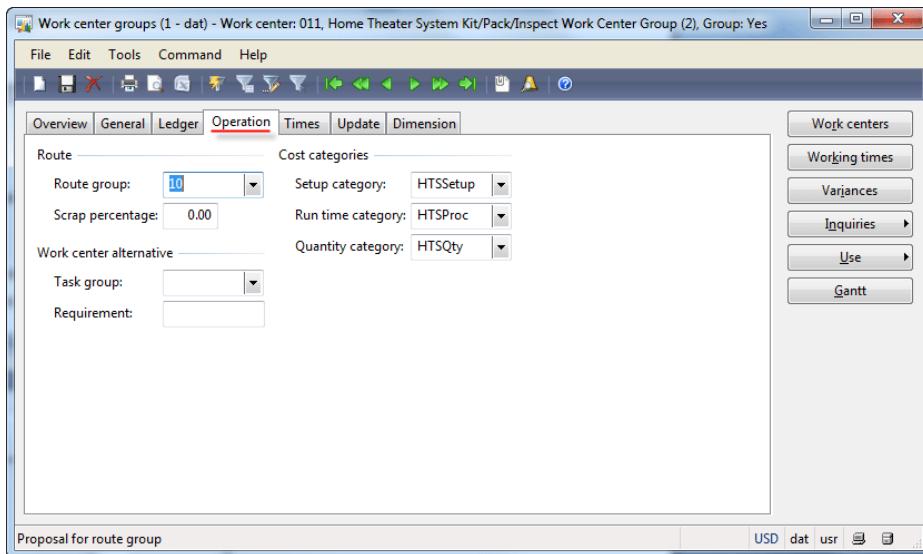


Figure 3.11 Work center groups form, Operation tab

We will discuss these fields in the [Routes and Operations](#) training lesson.

Summary

In this training lesson, we have studied the Work centers. As you may have noticed, the parameters that relate to work center set up are not so numerous. A lot of work center parameters are the default parameters for operations.

The major work center parameters are a work center type, an input location, a calendar, and ledger accounts. Other work center parameters are: production unit, efficiency percentage, operation scheduling percentage, finite capacity, bottleneck resource, and vendor name. All other parameters are default parameters for operations.

4. Routes and Operations

In this training lesson, we will learn how to set up route and operations and what they are used for.

A route or a production route in Microsoft Dynamics AX brings together a sequence of steps or operations which defines a manufacturing process. Like a production [BOM](#), a route must be approved before it is used in a live production order and must also be marked as active.

An operation within a route is attached to a specific work center, which defines a person, machine, tool, or vendor who is to carry out the work.

A route can be defined and attached to more than one item in the same way that an operation can be defined and attached to more than one route. In this way a company can build up a library of operations which may be reused on many routes.

The following examples demonstrate the principle:

Route : 0010 – Fairy Cake

Operation Number	Description	Work Center	Run Time
10	Mix	Food processor	120 seconds
20	Bake	Oven	45 minutes

Route : 0020 – Fruit Cake

Operation Number	Description	Work Center	Run Time
10	Soak Fruit	Sink	12 hours
20	Mix	Food processor	600 seconds
30	Bake	Oven	60 minutes

Notice that both previously mentioned production routes contain the same operations attached to the same work centers and only the run time differs.

Route

Let's create a new route for the Chair item:

1. Go to **Production > CommonForms > RouteDetails**. The **Route** form opens.

Routes and Operations

The screenshot shows the 'Route (1 - pro)' window. The main grid displays five routes:

Route number	Name	Item group	Approved by	Approved
1001	High end speaker route ver 1 (1)	Speakers	3300	<input checked="" type="checkbox"/>
1002	Standard speaker route ver 1 (1)	Speakers	3300	<input checked="" type="checkbox"/>
1003	Standard speaker route ver 1 (3)	Speakers	3300	<input checked="" type="checkbox"/>
1101	2.1 Home Theater System route ver 1 (2)	HTS	3300	<input checked="" type="checkbox"/>
1102	5.1 Home Theater System route ver 1 (2)	HTS	3300	<input checked="" type="checkbox"/>

Below the main grid is a 'Versions' section containing a table of items:

Item number	Configuration	Size	Color	Site	From date	To date	From qty.	Active	Approved by	Approved
1101				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1102				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1103				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1104				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1105				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1106				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1107				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>
1108				1			0.00	<input checked="" type="checkbox"/>	3300	<input checked="" type="checkbox"/>

Buttons on the right include 'Route', 'Approve (b)', 'Approve', and 'Activation'. At the bottom are tabs for 'Route identification' and currency conversion buttons ('USD', 'pro', 'usr').

Figure 4.1 Route form

- In the header area, create a new line and set the **Name** field to *Wooden chair*. The **Item group** field is used for convenience – when the user will assign a BOM to the route, BOMs from the item group will be shown first.
- In the **Versions** area, create a new line with the following values: Item number = 0050, Site =2. We make sure that the route can be assigned to different items. For example, if different types of chair are produced in one way but have different number of components, they can be assigned to one route.
- In the **Versions** area, click the **Approve** button. In the **Approve version** form, select the employee and select the **Approve route** check box, and then click **OK**.
- In the **Versions** area, click the **Activation** button.
- The **Route** form will have the following view:

The screenshot shows the 'Route (1 - pro)' window with a single route entry:

Route number	Name	Item group	Approved by	Approved
RTE_00000003	Wood chair		7210	<input checked="" type="checkbox"/>

Below the main grid is a 'Versions' section containing a table of items:

Item number	Configuration	Size	Color	Site	From date	To date	From qty.	Active	Approved by	Approved
0050				2			0.00	<input checked="" type="checkbox"/>	7210	<input checked="" type="checkbox"/>

Text at the bottom says 'Date from which the route version applies.' Buttons on the right include 'Route', 'Approve (b)', 'Approve', and 'Activation'. At the bottom are tabs for 'Route identification' and currency conversion buttons ('USD', 'pro', 'usr').

Figure 4.2 Route form, Wooden chair

Routes and Operations

Note: A route only contains operations and does not depend on BOM components. But, operation parameters can be set up per BOM. In other words, if a chair and a fishing rod use the same route, then the operations to process these BOMs are the same but can consume different time.

Operations

An operation is a task or a process connected with the production of an item. To set up operations, go to **Production > Setup > Routes > Operations**. The **Operations** form opens.

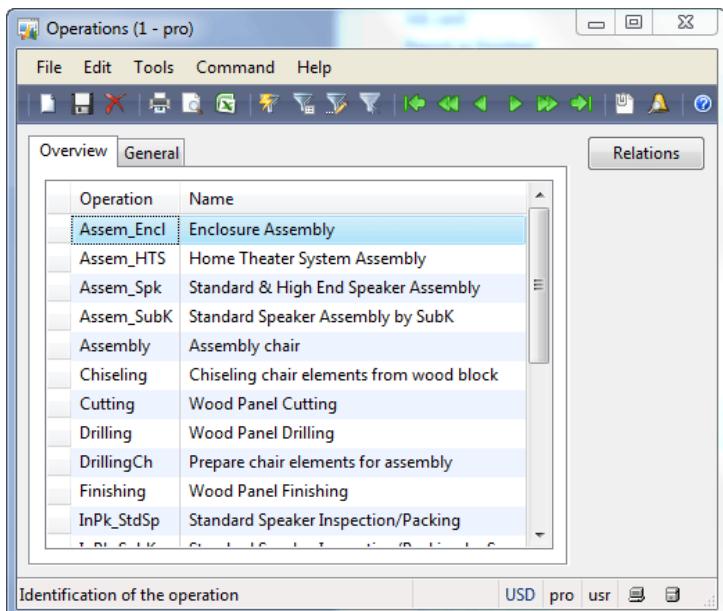


Figure 4.3 Operations form

As you can make sure, the **Operations** form contains only two parameters: **Operation** (operation identification) and **Name** (short description).

That is because an operation can be assigned to different work centers. So, an operation can consume different time in different work centers. For example it takes one hour to paint 4 chairs in one work center, while in the other work center the same operation consumes 2 hours (because the number of workers differs). So the **Operations** form can't have multiple parameters because they vary from one work center to another.

When an operation is assigned to a route, the route operation (or an operation with parameters) is created. All route operation parameters are filled in by default from the work center. In the [previous training lesson](#), we have discussed what work center parameters are the default ones for an operation.

Let's imagine the following chair production process: chiseling chair elements from wooden block (chiseling), varnishing all wooden elements (varnishing), preparing chair elements for assembly

Routes and Operations

(drilling), sewing seat and back for a chair (sewing), assembling a chair (assembly), and packing a chair (pack)

Let's set up these operations in Microsoft Dynamics AX:

1. In the **Operations** form, create the first line with the following parameters: Operation = *Chiseling*, Name = "Chiseling chair elements from wooden block". Save the line.
2. Create the second line with the following parameters: Operation = *Varnishing*, Name = "Varnishing wooden elements". Save the line.
3. Create the third line with the following parameters: Operation = *DrillingCh*, Name = "Preparing chair elements for assembly". Save the line.
4. Create the forth line with the following parameters: Operation = *Sewing*, Name = "Sewing seat and back for a chair". Save the line.
5. Create the fifth line with the following parameters: Operation = *Assembly*, Name = "Assembling chair". Save the line.
6. Create the sixth line with the following parameters: Operation = *Pack*, Name = "Packing a chair". Save the line. The **Operations** form will have the following view:

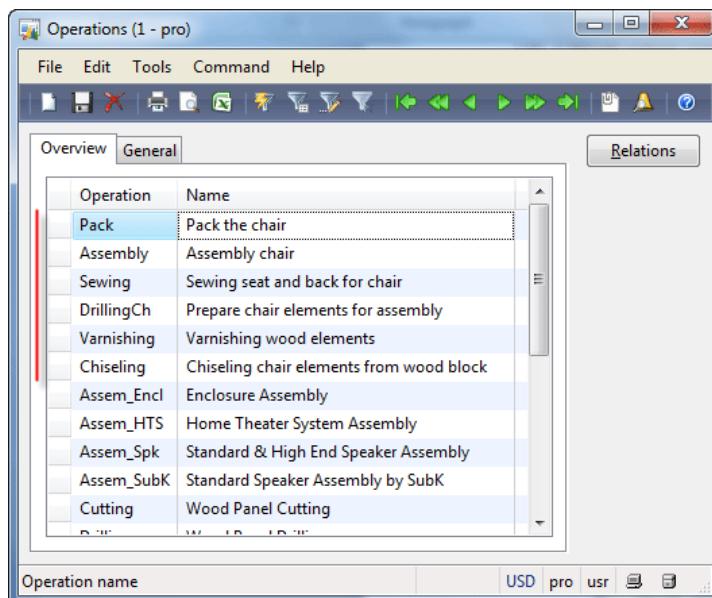


Figure 4.4 Operations form, new operations

Now, we can create the route operations:

1. Open the **Route** form. Go to **Production > CommonForms > RouteDetails**.
2. Find the route for the 0050 chair item and click the **Route** button. The **Route** form opens. This form is used for creating route operations.
3. Create a new route operation line. In the upper area, create a new line with the following parameters: Oper.No. = 10, Operation = *Chiseling*. Save the line.
4. Create route operation parameters. In the bottom area, create a new line with the following parameters: Item code = *Table*, Item relation = 0050, Site = 2, Work center = 011. When the work center is selected, all operation parameters are filled in from the selected work center.

Routes and Operations

The screenshot shows the 'Route (1) - Route number: RTE_00000003, Wood chair' window. The main grid displays one operation: Oper. No. 10, Priority Primary, Operation Chiseling, Scrap percentage 0.00, Accumulated 0.00, Next 0, Link type All, and Hourly rate / Piecework rate blank. Below the grid is a tabbed panel with 'Overview' selected, followed by 'General', 'Setup', 'Times', and 'Description'. The 'General' tab contains a table with columns: Item code, Item relation, Configuration, Route code, Route relation, Site, Work center, Production unit, Picking warehouse, and Route group. The table shows a single row for 'Table' with item relation '0050', route code 'Route', route relation 'RTE_00000003', site '2', work center '011', route group '10', and other fields blank. At the bottom, there is a message 'Identify the Production unit' and standard Windows-style buttons.

Figure 4.5 Route form, Chiseling operation

Make sure that the **Setup** and **Times** tabs contain the same values as the **Setup** and **Times** tabs in the work center. The route operation parameters can be changed. **Note:** Operation parameters can be set up per BOM item.

5. Create all other operations and assign them to the 011 work center (repeat the same step as for the first operation). The **Route** form will have the following view:

The screenshot shows the 'Route (1) - Route number: RTE_00000003, Wood chair' window. The main grid now displays six operations: Oper. No. 10, Priority Primary, Operation Chiseling, Scrap percentage 0.00, Accumulated 0.00, Next 0, Link type All, and Hourly rate / Piecework rate blank. The other five operations (20, 30, 40, 50, 60) have similar details. Below the grid is a tabbed panel with 'Overview' selected, followed by 'General', 'Setup', 'Times', and 'Description'. The 'General' tab contains a table with columns: Item code, Item relation, Configuration, Route code, Route relation, Site, Work center, Production unit, Picking warehouse, and Route group. The table shows a single row for 'Table' with item relation '0050', route code 'Route', route relation 'RTE_00000003', site '2', work center '011' (highlighted with a red box), route group '10', and other fields blank. A message at the bottom says 'Work center or work center group to be assigned.' At the bottom, there is a message 'Identify the Production unit' and standard Windows-style buttons.

Figure 4.6 Route form, All operation

Routes and Operations

Note: When several route operations are assigned to the same work center, all operation parameters are the same. So, time required for assembling one chair and time required for sewing one chair is the same.

Route Networks

If you close the **Route** form, the “There is more than one closing operation” error message will be shown. Operations in a route must be attached to each other in a logical way to reflect the production process. The operation in a route is identified by an operation number (the **Oper. No** field) and is linked with the help of the **Next** field.

Let's create the simplest production flow in the **Route** form:

1. Find the Chiseling operation and fill in 20 in the **Next** field.
2. Find the Varnishing operation and fill in 30 in the **Next** field.
3. Find the DrillingCh operation and fill in 40 in the **Next** field.
4. Find the Sewing operation and fill in 50 in the **Next** field.
5. Find the Assembly operation and fill in 60 in the **Next** field.

It is the easiest route network, because each operation goes step by step. The real production process can have a complex network. The Microsoft Dynamics AX allows creating the following operation constructions:

- *Independent* operations. In this case, operations are started independently. The following picture from the Microsoft Production training illustrates this structure:

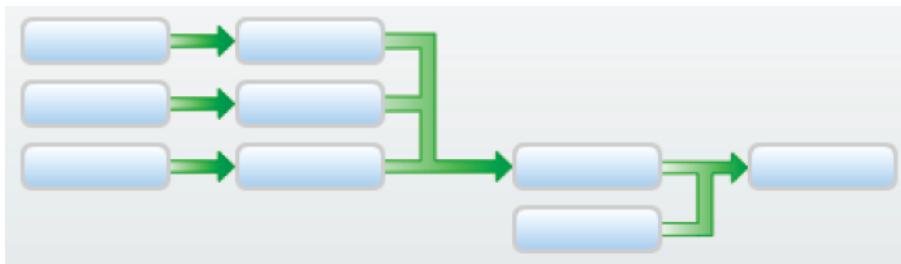


Figure 4.7 Independent operations

- *Simultaneous* operations.

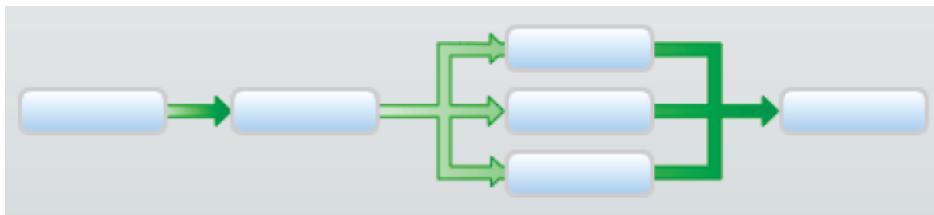


Figure 4.8 Simultaneous operations

Routes and Operations

But, these operation structures can be created only when the **Route network** check box is selected in the **Parameters** form (**Production > Setup > Parameters > Routes** field group > **Route network** check box).

Note: When the **Route** form closes, the route is updated. Actually the user can set up a complex structure (with an independent operation and simultaneous operations) with the **Route network** check box cleared, but when the user closes the **Route** form, the structure will be updated to a simple "step by step" network.

Let's create an independent operation structure for the Sewing operations, so that workers can start sewing backs or seats for chairs independently from wooden components: Find the DrillingCh operation in the **Route** form and fill in 50 in the **Next** field.

The screenshot shows the 'Route (1)' window with the route number 'RTE_00000003' for a 'Wood chair'. The main grid displays six operations:

Oper. No.	Priority	Operation	Scrap percentage	Accumulated	Next	Link type	Hourly rate / Piecework rate
10	Primary	Chiseling	0.00	1.00	20	All	
20	Primary	Varnishing	0.00	1.00	30	All	
30	Primary	DrillingCh	0.00	1.00	50	All	
40	Primary	Sewing	0.00	1.00	50	All	
50	Primary	Assembly	0.00	1.00	60	All	
60	Primary	Pack	0.00	1.00	0	All	

The 'Setup' tab is selected in the bottom navigation bar, showing the following details:

Item code	Item relation	Configuration	Route code	Route relation	Site	Work center	Production unit	Picking warehouse	Route group
Table	0050		Route	RTE_00000003	2	011			10

At the bottom left, it says 'Number for determining sequence in routes'.

Figure 4.9 Route form, Independent operations

Several words about simultaneous operations: they can be used in both simple and complex route networks. A simultaneous operation is a process where several work centers are used at the same time. Simultaneous operations use the capacity of several work centers at the same time, for example, they can use a machine, its operator, and possibly a specific tool. To set up simultaneous operations, you must use the same operation number and the **Priority** field.

Routes and Operations

Let's assume that the Chiseling operation uses the human and the machine work:

1. Since we have set up the Chair route for the site 2, we should create a machine work center in this site. Go to **Basic > CommonForms > Workcentergroups**. The **Workcentergroups** form opens. We will change the site for the available machine work center group. Find the 005 Cutting Work Center Group (1) and change the **Site** field value from 1 to 2. The warning message "The change of Production unit and/or Site takes effect on orders only after a rescheduling is run." will be shown.

Group	Type	Name	Production unit	Site	Calendar
001	Human Resources	Speaker Assembly Work Center Group (1)	1	1	Standard2
002	Human Resources	Inspection Work Center Group (1)	1	1	Standard2
003	Human Resources	Packing Work Center Group (1)		1	Standard2
004	Human Resources	Enclosure Assembly Work Center Group (1)		1	Season1
005	Machine	Cutting Work Center Group (1)	2	Cut	Standard2
006	Machine	Drilling Work Center Group (1)	1	1	Standard2
007	Human Resources	Sanding Work Center Group (1)		1	Standard2
008	Human Resources	Finishing Work Center Group (1)		1	Season1
009	Human Resources	Home Theater System Speaker Assembly W...		2	Standard2
010	Human Resources	Home Theater System Inspection Work Ce...		2	Standard2
011	Human Resources	Home Theater System Kit/Pack/Inspect Wo...		2	Standard2
301	Human Resources	Speaker Assembly Work Center Group (3)	2	3	Season1
302	Human Resources	Inspection Work Center Group (3)	2	3	Season1
901	Vendor	Speaker Assembly & Inspection Work Cent...		1	SubK

Figure 4.10 Work center groups form, Machine work center group

2. Go back to the **Route** form and create a new line for the simultaneous operation with the following input: Oper.No = 10, Priority = Secondary1, Operation = *Cutting*. Note that the simultaneous operation must have a different name (*Chiseling – human work* and *Cutting – machine work*), which to my mind is not convenient. Save the line.
3. Assign a machine work center. On the **Overview** tab, create a new line with the following values: Item code = *Table*, Item relation = 0050, Site = 2, Work center = 005. Save the line.

Routes and Operations

The screenshot shows a software interface for route configuration. The title bar reads "Route (1) - Route number: RTE_00000003, Wood chair". The menu bar includes File, Edit, Tools, Command, Help, and a toolbar with various icons. A main table lists operations with columns for Op..., Priority, Operation, Scrap percentage, Accumulated, Next, Link type, and Hourly rate / Piecework rate. The first two rows are selected, showing "Primary" and "Secondary 1" operations. Below the table is a navigation bar with tabs: Overview, General, Setup, Times, and Description. A detailed table under the General tab shows route parameters like Item code (0050), Route (RTE_00000003), Site (2), Work center (005), Production unit, Picking warehouse, and Route group (10). The bottom status bar says "Statement should apply for?" and "usr".

Figure 4.11 Route form, Simultaneous operations

When a production order is scheduled, the operation parameters from the primary simultaneous operations are taken into account. All other simultaneous operations are secondary, therefore their capacity is not taken into consideration. We will check how it works in the *Times consumed by operation* section of this training lesson.

Route Operation Parameters

Most of the operation parameters are transferred from a work center the topic that we have already discussed shortly in the [previous training lesson](#).

The main operation parameters are:

1. Time consumed for performing operations on BOM items
 2. Cost of the operation
 3. How operations is treated in Microsoft Dynamics AX

In this paragraph, we will discuss these operation parameters in more detail.

Routes and Operations

Times Consumed by Operation

In Microsoft Dynamics AX, an operation can be divided into the following parts: Queue before, Setup, Process, Overlap, Transport, Queue after. These parts are called **Jobs**. Each job is a separate logical unit. Jobs are assigned to employees for processing.

Let's assume that the Varnishing operation has the following jobs: Setup, Process, and Queue after.

Let's set up the time required for these operation jobs:

1. Open the **Route** form. Find the created Wood chair route. Click the **Route** button. The **Route** form opens. In the **Route** form, find the Varnishing operation.
2. Go to the **Times** tab and fill in the following values: Setup time = 0.5, Run time = 3, Queue time after = 2. The **Time** tab will have the following view:

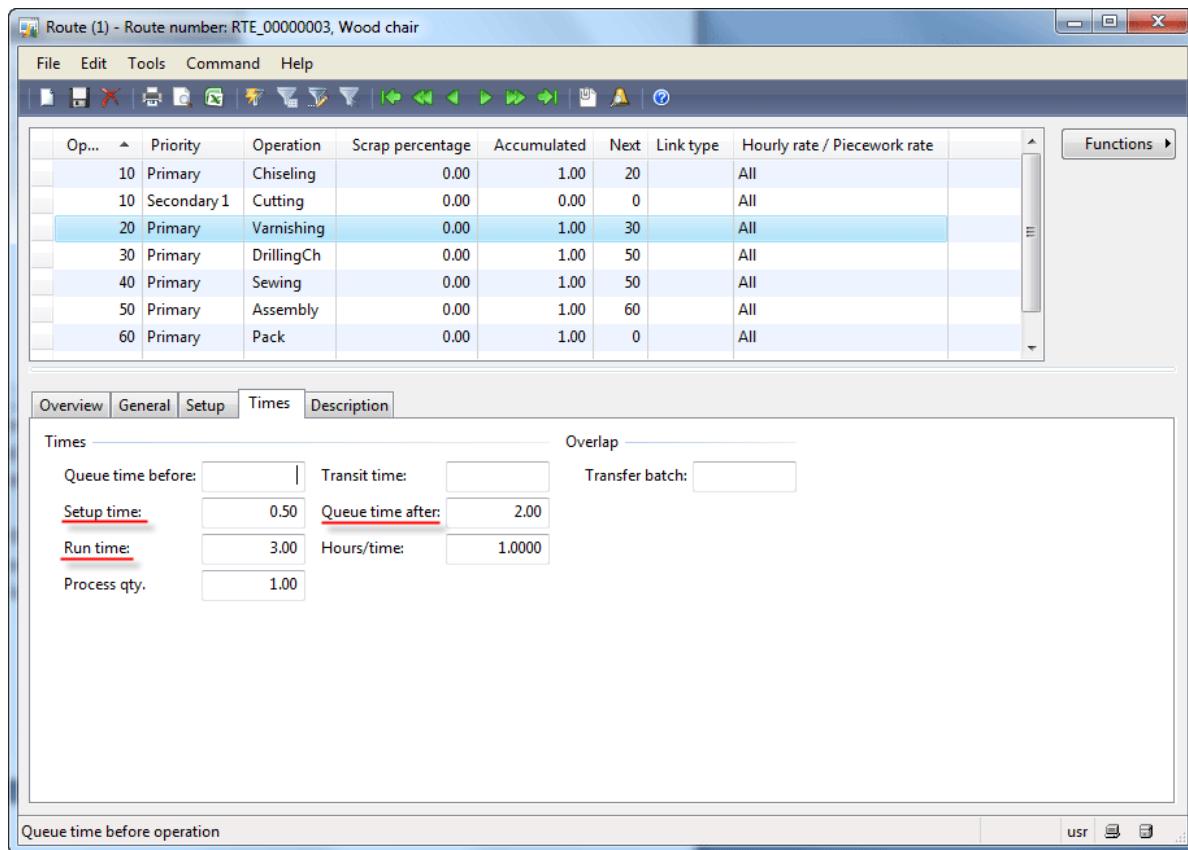


Figure 4.12 Route form, Times tab, Varnishing operation

This means that the 011 work center requires 0.5 hr (for preparing a working place) + 3 hrs (for varnishing) + 2 hrs (for drying) = 5.5 hours for varnishing one BOM item. **Note** that only the run time is quantity dependent. This means that for varnishing two BOMs the 011 work center requires 0.5 hr (for preparing a working place) + 3 hrs * 2 (for varnishing) + 2 hrs (for drying) = 7.5 hours.

Routes and Operations

We have calculated the process time (the run time) on the basis of the values from the **Run time** and **Process qty** fields, but in Microsoft Dynamics AX the process time required for processing job for one BOM item can be calculated in four different ways. It depends on the operation formula parameter which located under **Route form > Setup tab > Consumption calculation field group> Formula** field.

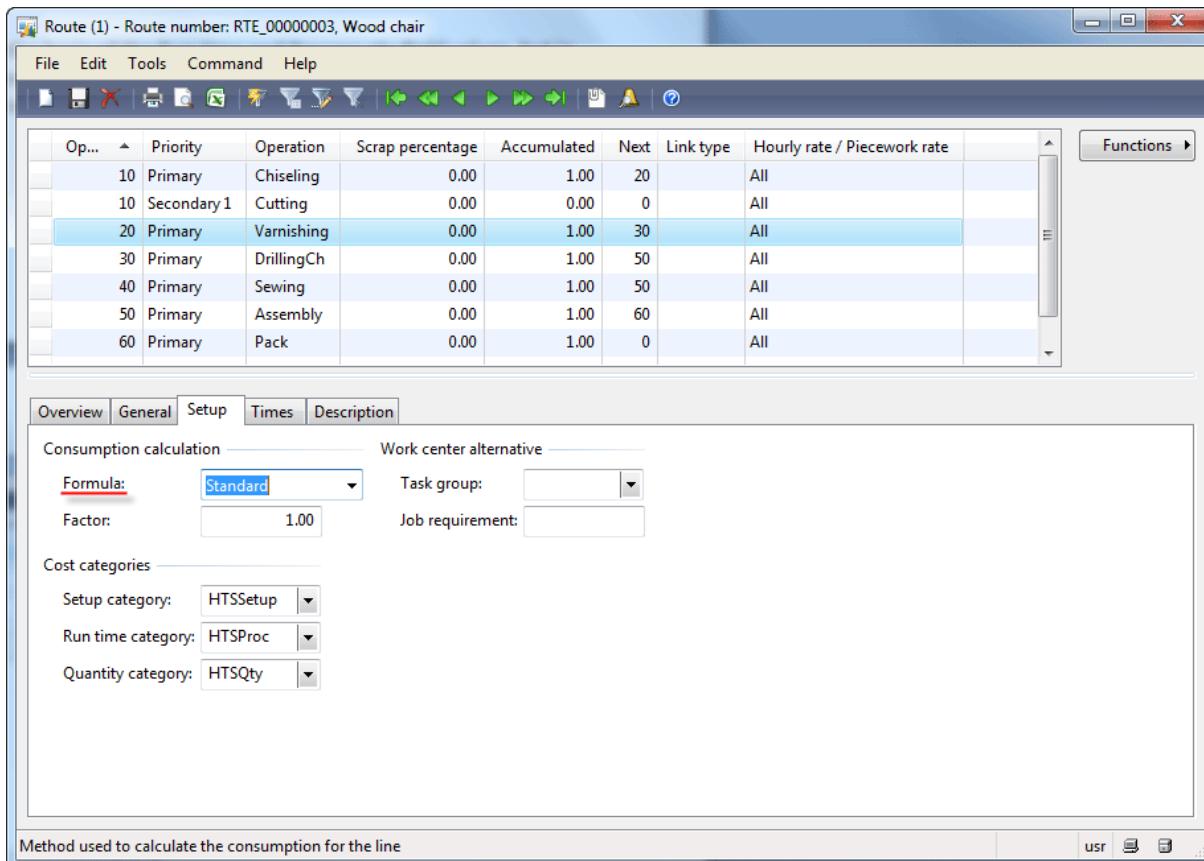


Figure 4.13 Route form, Setup tab, Consumption formula

The **Formula** field has the following values:

- *Standard*: Process time = Run time / Process quantity. For example, in our case the 011 work center requires 3(**Run time** field value) / 1 (**Process qty**. field vale) = 3 hours for process job (run job).
- *Capacity*: Process time = 1 / (Capacity / Factor). In this formula, the run time always equals to 1 hour. The capacity value is taken from a work center (**Basic > Common Forms > Work center groups > General tab > Capacity** field group > **Capacity** field). The factor value is taken from the operation factor parameter (**Route form > Setup tab > Factor** field, see the previous image).
- *Batch*: Process time = (Run time / Process quantity) * Produced quantity. As we can see, this is the standard formula multiplied by the produced quantity; produced quantity is taken from a production order. Actually, I can't imagine what this formula can be used for, because it should return the consumed run time per one BOM.
- *Work center batch*: Process time = (Run time / (Batch capacity / Factor))* Produced quantity

Routes and Operations

A route can have a complex network with independent and simultaneous operations (as described in previous topic). Let's assume that a route has the following network:

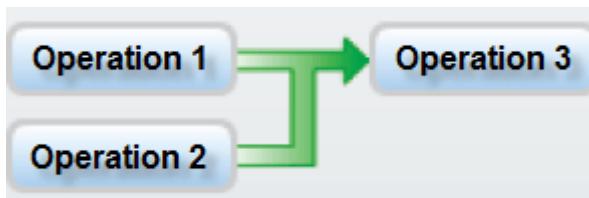


Figure 4.14 Independent operations (example)

Time consumed by Operation 1 and Operation 2 can be different. But, what if the production process requires that these two operations end or start at the same time? Unfortunately, in Microsoft Dynamics AX the user cannot set up relations between independent operations.

By default, Operation 3 will start after the longest previous operation ends, or in other word when all previous operations end. We can change the default flow. For example if Operation 1 will run 3 hours and Operation 2 will run 1 hour, we can set up Operation 3 to start when Operation 2 ends (the smallest operation). It is difficult to assume when this flow can be used. For this purposes, the **Link type** field is available in the **Route** form. If Operatin3 must start when Operation2 ends, the route should have the following link type values:

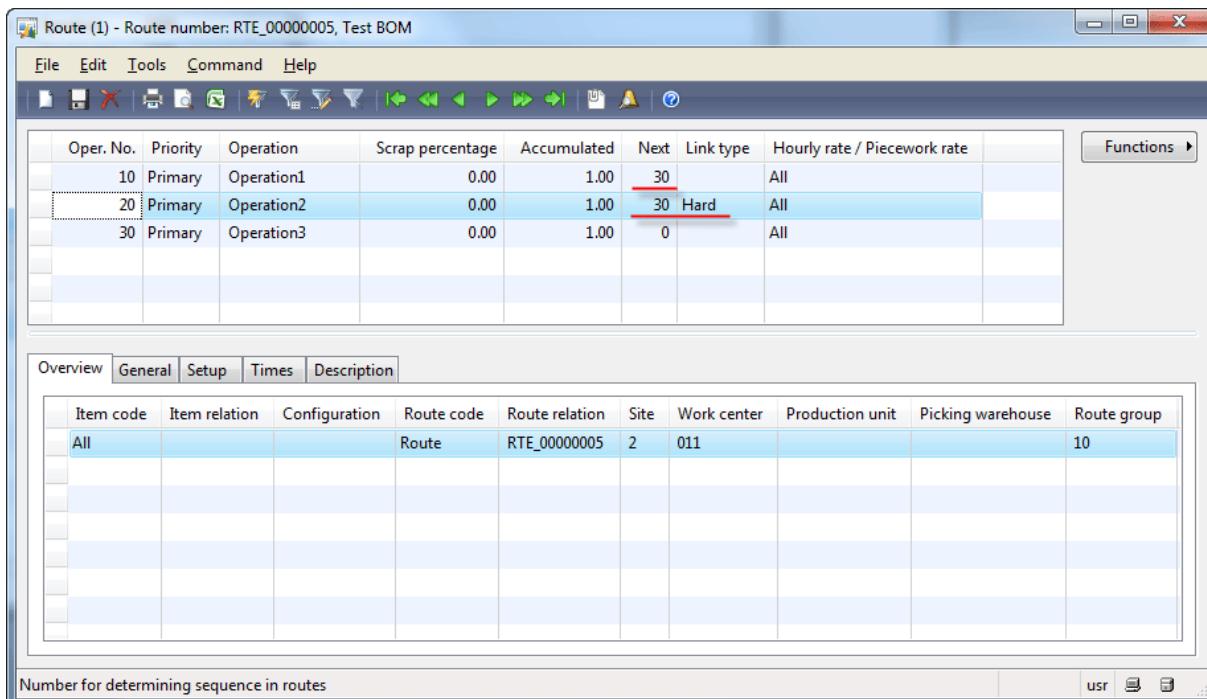


Figure 4.15 Independent Operations (Dynamics AX example)

Note: In a simple route, a network operation always starts after the previous operation ends.

Routes and Operations

In our example, we have both independent and simultaneous operations. Let's check how this works. First, we should set up the run time for all route operations:

1. In the **Route** form, select the Chiseling operation.
2. Go to the **Times** tab and fill in 1 in the **Run time** field.

The screenshot shows the 'Route (1) - Route number: RTE_00000003, Wood chair' window. The main grid displays various operations with their details like priority, operation name, scrap percentage, accumulated time, next operation, link type, and hourly rate. Below the grid, there are tabs for Overview, General, Setup, Times, and Description. The 'Times' tab is selected, showing fields for Queue time before, Transit time, Transfer batch, Setup time, Queue time after, Run time, Hours/time, and Process qty. The 'Run time' field is highlighted with a red underline and contains the value '1.00'. The status bar at the bottom shows 'Time for production of process quantity'.

Figure 4.16 Route form, Run time field

3. Repeat the same set up for all operations except the Varnishing operation, because we have already set up time for this operation.

Then, we will create a production order and run the job scheduling:

1. Go to **Production > CommonForms > ProductionOrderDetails**. The **Production orders** form opens.
2. Create a new line. The **Create production order** form opens. In the **Itemnumber** field select item number 0050 (Chair), in the **Configuration** field select the BusinessB value, in the **Site** field select the value 2 (transfer the route and the BOM from the active version). Make sure that the **Quantity** field is set to 1.

Routes and Operations

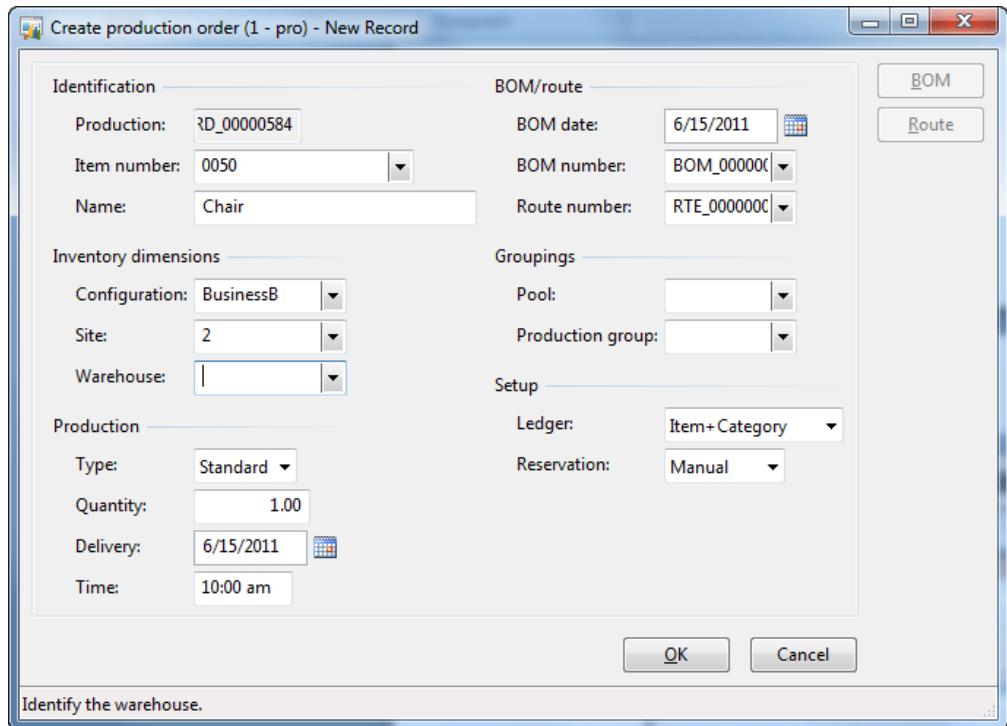


Figure 4.17 Create production order form

3. Click **OK**.
4. The new production order will be created. Click the **Update > Job scheduling** menu button.

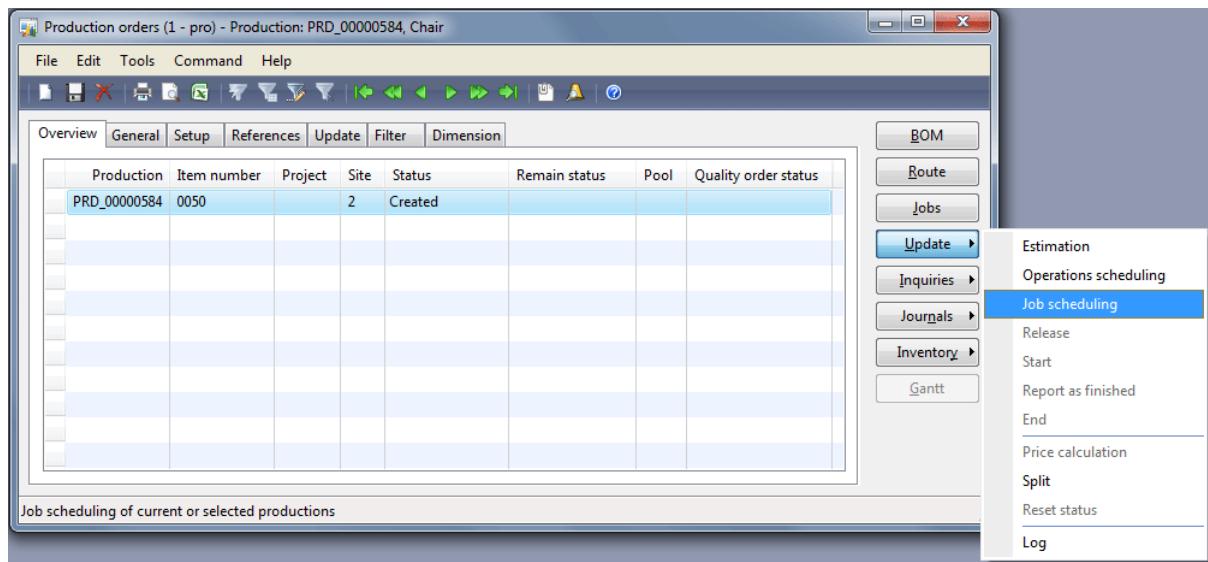


Figure 4.18 Production orders form, Job scheduling

We will learn the Production order life cycle in the next training lesson.

Routes and Operations

5. The **Job scheduling** form opens. Click **OK**. As a result, I have received the “Working time Cut has not been specified for 6/16/2011” error message:

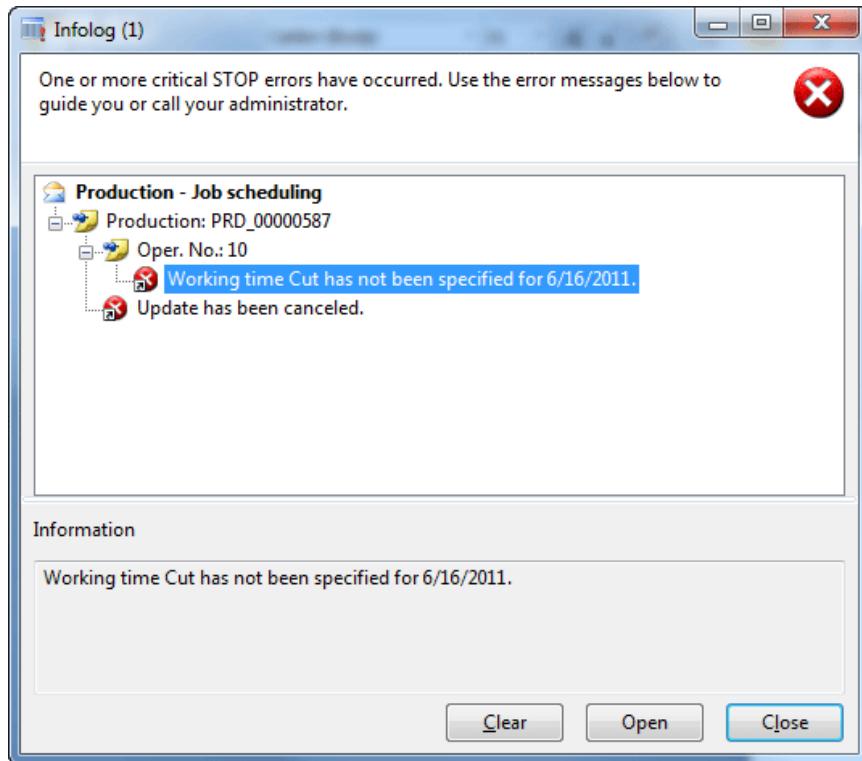


Figure 4.19 Error message: Working time Cut has not been specified

This is because the Cutting operation is performed in the 005 machine work center group. This group uses the Cut calendar. All that you need to do is to create working time for the Cut calendar by going to **Basic > CommonForms > Calendar** > finding the Cut calendar > clicking the **Workingtimes** button > clicking the **Composeworkingtimes** button > selecting the Std-Day working time template, and then clicking **OK**.

6. Run the Job scheduling process once again. In the **Productionorders** form, click the **Update > Jobscheduling** button. The **Job scheduling** form opens. Click **OK**. As a result, I have received the “Working time Standard has not been specified for 6/16/2011” error message. This is because during the job scheduling process, master planning transactions are created. Master planning uses the Standard calendar (**Master planning > Setup > Parameters > General** tab > **Update** field group > **Today'scalendardate** field) that doesn't have the working time. All that you need to do is to create working time for the Standard calendar by going to **Basic > CommonForms > Calendar** > finding the Standard calendar > clicking the **Workingtimes** button > clicking the **Composeworkingtimes** button > selecting the Std-Day working time template, and then clicking **OK**.
7. Run the job scheduling process once again. In the **Productionorders** form, click the **Update > Jobscheduling** button. The **Job scheduling** form opens. Click **OK**. The job is executed correctly.

Routes and Operations

- To check the process result in the **Productionorder** form, click the **Jobs** button. The **Jobs** form opens.

The screenshot shows the 'Jobs' form in Microsoft Dynamics AX. The main area displays a grid of operation details. The columns include Oper. No., Priority, Job type, Work center, Production unit, Job status, Start date, Start time, End date, and End time. The data shows various operations like Process, Setup, and Queue after, with specific start and end times. The 'Oper. No.' column has a tooltip 'Number for determining sequence in routes'. On the right side, there are buttons for 'Inquiries', 'Functions', and 'Materials'.

Oper. No.	Priority	Job type	Work center	Production unit	Job status	Start date	Start time	End date	End time
10	Primary	Process	01101		Coming	6/16/2011	10:00 am	6/16/2011	11:00 am
10	Secondary1	Process	00501		Coming	6/16/2011	10:00 am	6/16/2011	11:00 am
20	Primary	Setup	01101		Coming	6/16/2011	11:00 am	6/16/2011	11:30 am
20	Primary	Process	01101		Coming	6/16/2011	11:30 am	6/16/2011	03:30 pm
20	Primary	Queue after	01101		Coming	6/16/2011	03:30 pm	6/16/2011	05:30 pm
30	Primary	Process	01101		Coming	6/17/2011	08:00 am	6/17/2011	09:00 am
40	Primary	Process	01101		Coming	6/16/2011	08:00 am	6/16/2011	09:00 am
50	Primary	Process	01101		Coming	6/17/2011	09:00 am	6/17/2011	10:00 am
60	Primary	Process	01101		Coming	6/17/2011	10:00 am	6/17/2011	11:00 am

Figure 4.20 Jobs form

We can see the operations are divided into jobs. The operation 20 is divided to Setup, Process, and Queue after jobs, this is because we have set up the time for this operation parts. The operation 40 is an independent operation and we can see that the generated job starts on 8:00 A.M. 6/16/2011 (independent from other jobs). Simultaneous operations generate simultaneous jobs that start and end at the same time (Oper.No 10). The time consumed by simultaneous jobs is calculated on the basis of primary simultaneous operation parameters. For convenience, the visual view of operations and jobs is available in Microsoft Dynamics AX. In the **Production orders** form, click the **Gantt** button. The **Gantt chart** form opens. Expand work centers and you will see the following picture:

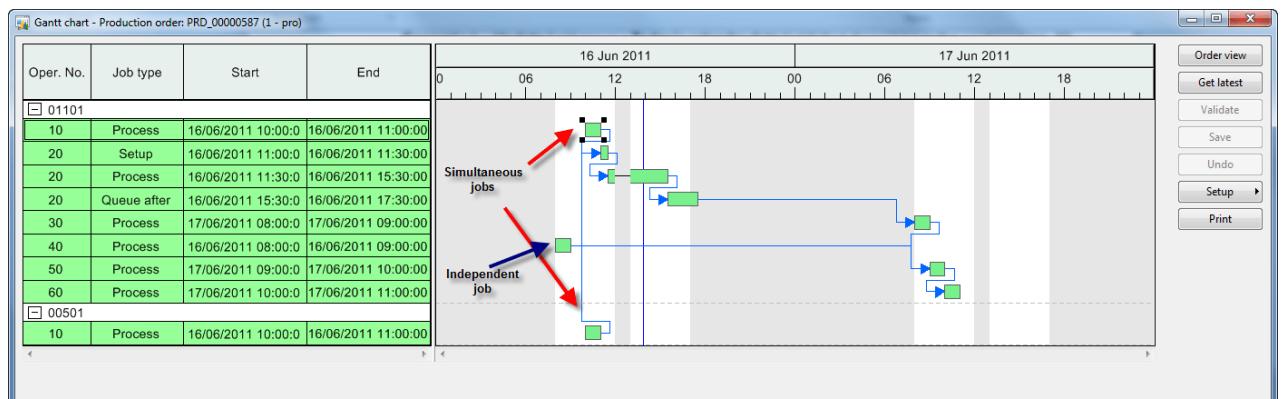


Figure 4.21 Gantt chart form

We can see that jobs consume some time from the work center. Microsoft Dynamics AX uses an available work center from a work center group specified on the operation.

Routes and Operations

One more parameter that influences the time consumed by an operation is the **Qty. of work centers** which located on the **General** tab of the **Route** form). If this field contains, for example, the value 2, two simultaneous jobs will be created in two work centers. It can be used to speed up the operation. Let's check how it works:

1. Since the production order already exists, we can change the operation parameter for this order. In the **Production orders** form, click the **Route** button. The **Production route** form opens.
2. For example, we want to speed up the Assembling operation. Find this operation in the **Productionroute** form, and change the number of work centers from 1 to 2. The dialog box opens offering the user to change the time, click **OK**.

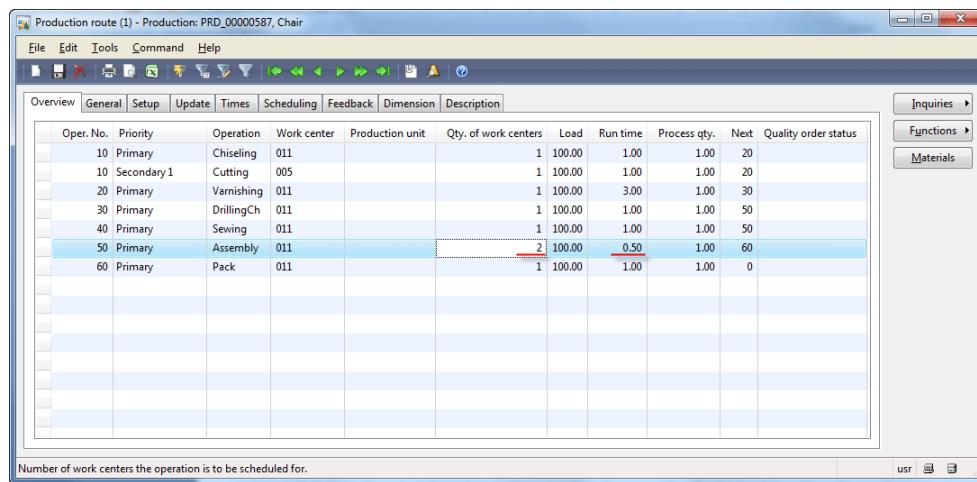


Figure 4.22 Production route form, 2 work centers

3. Close the form and run the job scheduling process. In the **Production orders** form, click the **Update > Jobscheduling** button. The **Job scheduling** form opens. Click **OK**.
4. To check the job scheduling results, click the **Jobs** button in the **Production orders** form. The **Jobs** form opens. We can see that two jobs for Operation 50 are created. As a result Operation 50 starts at 9:00 and ends at 9:30. In this way we speed up the operation execution time involving two work centers.

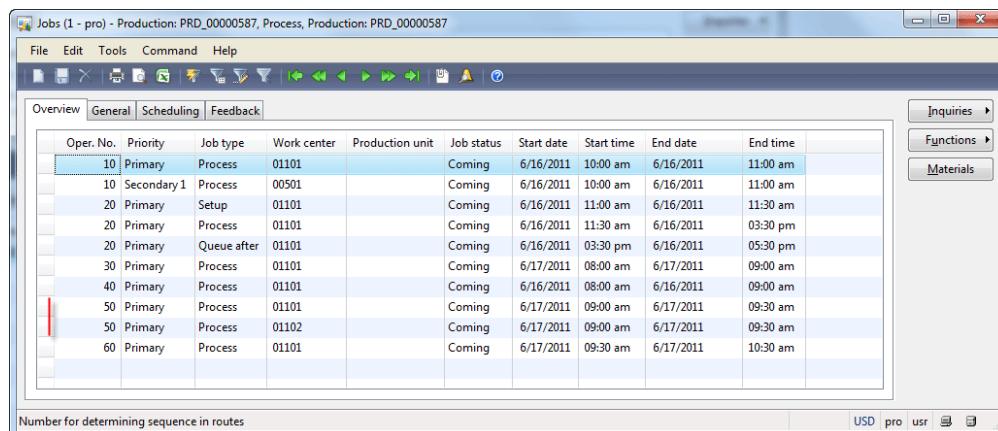


Figure 4.23 Jobs form, 2 work centers

Routes and Operations

You can view the result in the Gantt chart.

Let's recall. In this topic we have studied the following:

- Operation is divided into jobs.
- How the time consumed by an operation in a work center is set up. What the **Times** tab, **Formula** field, **Qty. of work centers** field are used for.
- How consumed time is calculated for independent and simultaneous operations.

Several notes:

- Simultaneous jobs can be created on the basis of simultaneous operations or when an operation uses more than one work center.
- Setup job always links Hard to Process job.

Cost of Operation

We have already discussed that an operation is divided into jobs. The cost of an operation is a sum of all jobs' cost. Job cost is defined with the help of cost categories.

Open the **Route** form under **Production > Common Forms > Route details** > Find the Wooden chair route > Click the **Route** button.

On the **Setup** tab, cost categories are specified:

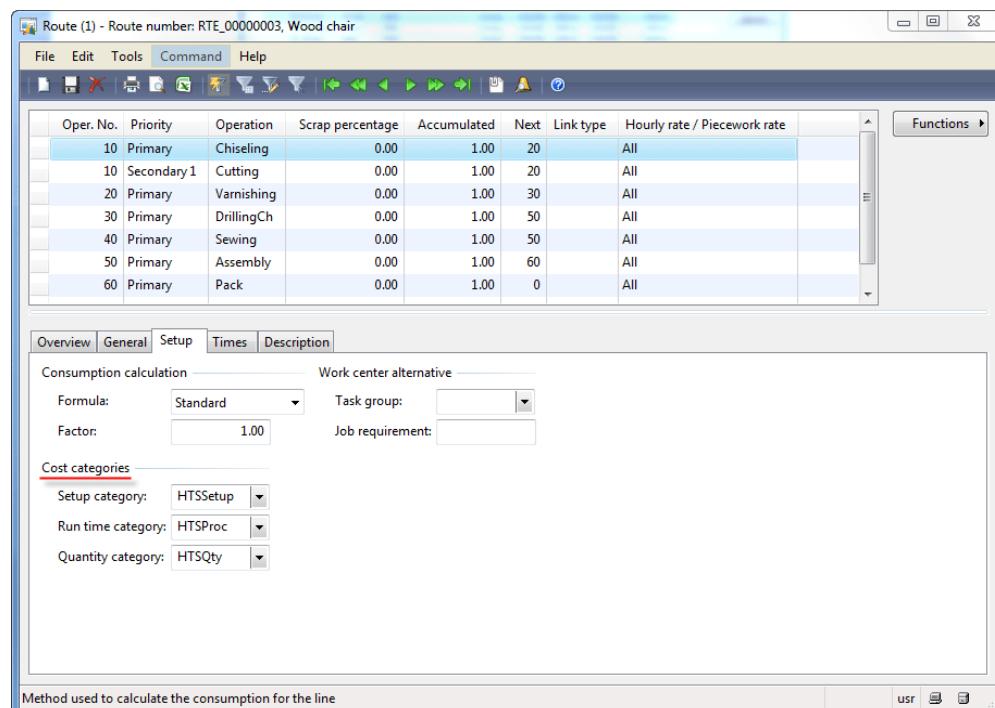


Figure 4.24 Operation cost categories

Routes and Operations

The cost category contains the rate per hour. We can see that only the Setup and the Process job costs can be specified (with the help of the **Setup category** and **Run time category** fields). This means that other job types such as Queue before, Queue after, Transit are used only for calculating the time consumed by operations not the cost (these job types can only be reported as started and ended).

In our case, all operations except Cutting have the same values in the **Setup category** and **Run time category** fields because they are handled in the same work center group (these parameters are filled in by default from the work center group).

Let's check what the cost of the setup time is. In the **Setup category** field, right-click and select Go to the Main Table Form. The **Cost categories** form opens.

The screenshot shows the 'Cost categories' form in Microsoft Dynamics AX 2009. The main grid displays various cost categories with columns for Category Id, Category Name, Use in Project, Cost price, Cost group, and Employee. The 'HTSSetup' row is selected, highlighting its cost price of 12.00. To the right of the grid is a sidebar titled 'Transactions' containing links for Setup, Function, Inquiry, Forecast (b), Project Control, and Price (d). The bottom of the screen shows the status bar with USD, pro, usr, and other icons.

Category Id	Category Name	Use in Project	Cost price	Cost group	Employee
HESprCut		<input type="checkbox"/>	500.00	Lab_HE	
HESprDril		<input type="checkbox"/>	400.00	Lab_HE	
HESProc		<input type="checkbox"/>	15.00	Lab_HE	
HESQty		<input type="checkbox"/>	2.00	Lab_HE	
HTSSetup		<input type="checkbox"/>	18.00	Lab_HE	
HTSProc		<input type="checkbox"/>	10.00	Lab_HTS	
HTSQty		<input type="checkbox"/>	1.00	Lab_HTS	
HTSSetup		<input type="checkbox"/>	12.00	Lab_HTS	
Proce		<input type="checkbox"/>	0.00	Mnfg	
Qty		<input type="checkbox"/>	0.00	Mnfg	
SDSProc		<input type="checkbox"/>	14.00	Lab_SDS	
SDSQty		<input type="checkbox"/>	0.00	Lab_SDS	

Figure 4.25 Cost categories form

We can see that the cost of Setup time is 12 per hour. On the **Ledger-Work centers** tab, the general ledger accounts that will be used for recording costs for this category are available.

The Process time uses the HTSProc cost category and the cost of the Process time is 10. One more cost category is available in the **Route** form is Quantity category. This cost category specifies the quantity-dependent cost. The Setup and Run time categories contain the time-dependent costs.

Let's check the cost of a BOM:

1. Open a scheduled production order (**Production > Common Forms > Production order details**).
2. In the **Production orders** form, click the **Inquiries > Price calculation** menu button. The **Calculation** form opens.

Routes and Operations

T..	Production	Level	Item/Work center	Consumption per unit	Unit	Total cost price...	Sales price per ...
	PRD_00000587	0	0050		Pcs	620.82	620.82
	PRD_00000587	1	0001		Pcs	0.00	0.00
	PRD_00000587	1	0002		Pcs	0.00	0.00
	PRD_00000587	1	0010		Pcs	0.00	0.00
	PRD_00000587	1	0020		Pcs	0.00	0.00
	PRD_00000587	1	011		Hours	10.00	10.00
	PRD_00000587	1	011		Pcs	1.00	1.00
	PRD_00000587	1	005		Hours	500.00	500.00
	PRD_00000587	1	005		Pcs	2.00	2.00
	PRD_00000587	1	011		Hours	6.00	6.00
	PRD_00000587	1	011		Hours	30.00	30.00
	PRD_00000587	1	011		Pcs	1.00	1.00
	PRD_00000587	1	011		Hours	10.00	10.00
	PRD_00000587	1	011		Pcs	1.00	1.00
	PRD_00000587	1	011		Hours	10.00	10.00
	PRD_00000587	1	011		Pcs	1.00	1.00
	PRD_00000587	1	011		Hours	10.00	10.00
	PRD_00000587	1	LAB_OVH			9.00	9.00
	PRD_00000587	1	PLANT_OVH			17.82	17.82

Production the line refers to.

Figure 4.26 Calculation form

We can see that the total cost price of a produced chair is 620.82. The cost price of BOM components is zero (the lines from 2 to 5). The first Chiseling operation contains only 1 hour of run time and 1 product to produce, so the cost of this operation is $1 * 10$ (from the run time cost category) + $1 * 1$ (the form quantity cost category) = 11 (lines 6-7). The rest of costs are calculated in the same way except the last two lines.

The last two lines are indirect costs. This type of cost depends on BOM or route costs. The rate for indirect costs is set up in the Costing sheet. Let's check what rates are set up for the LAB_OVH and PLANT_OVH indirect costs:

1. Go to **Inventory management > Setup > Bills of materials > Costing sheet setup**. The **Costing sheet setup** form opens.
2. In the Costing sheet tree, find and select the tree node **Root > COGM (Cost of goods manufactured) > Indirect cost > Fix_OVH (Fixed cost overheads) > PLANT_OVH (Plant overheads)**.

Routes and Operations

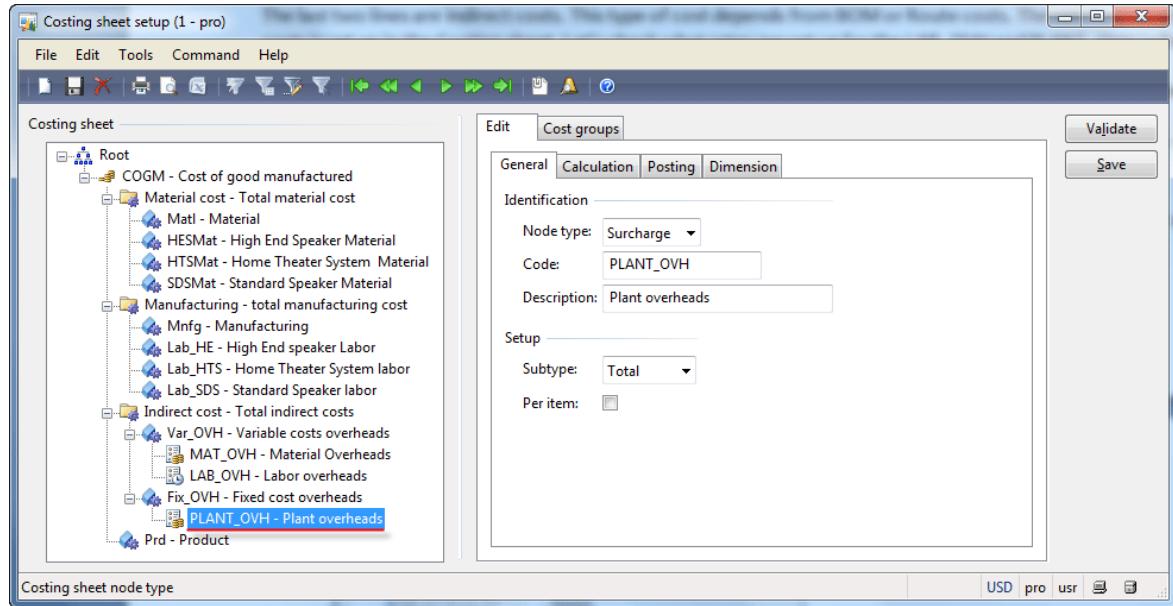


Figure 4.27 The Costing sheet setup form

- To find the rate for this indirect cost, go to the **Calculation** tab. In the **Surcharge** field group, find the rate for the site 2 with *Current active* status:

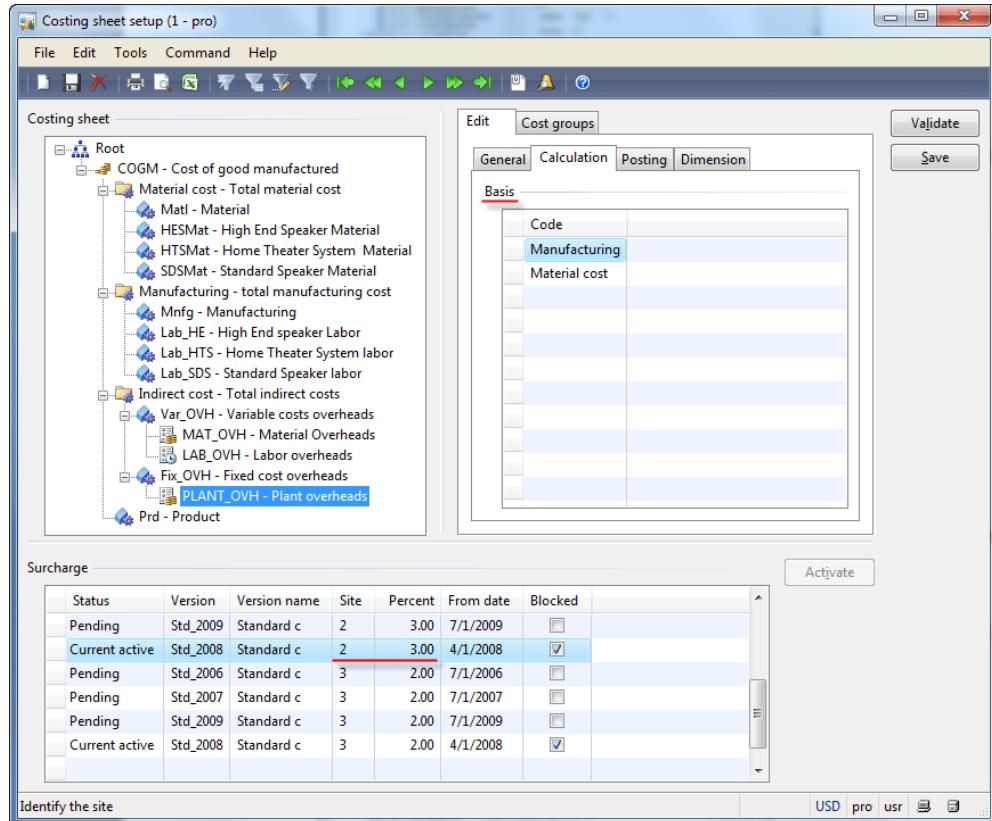


Figure 4.28 The Costing sheet setup form, Percent

Routes and Operations

We can see that the basis for calculating indirect costs is the manufacturing and material costs. The percent of plant overheads cost is 3. The cost rate of operation is set up in the cost categories (the Setup or Run time cost categories), cost categories are united in cost groups, then in the Costing sheet the cost groups are assigned either to material or manufacturing costs. Let's calculate the PLANT_OVH cost. In our example, the operation setup cost category is HTSSetup, it belongs to the LABHTS cost group, and this cost group belongs to the manufacturing cost (see the previous cost sheet image).

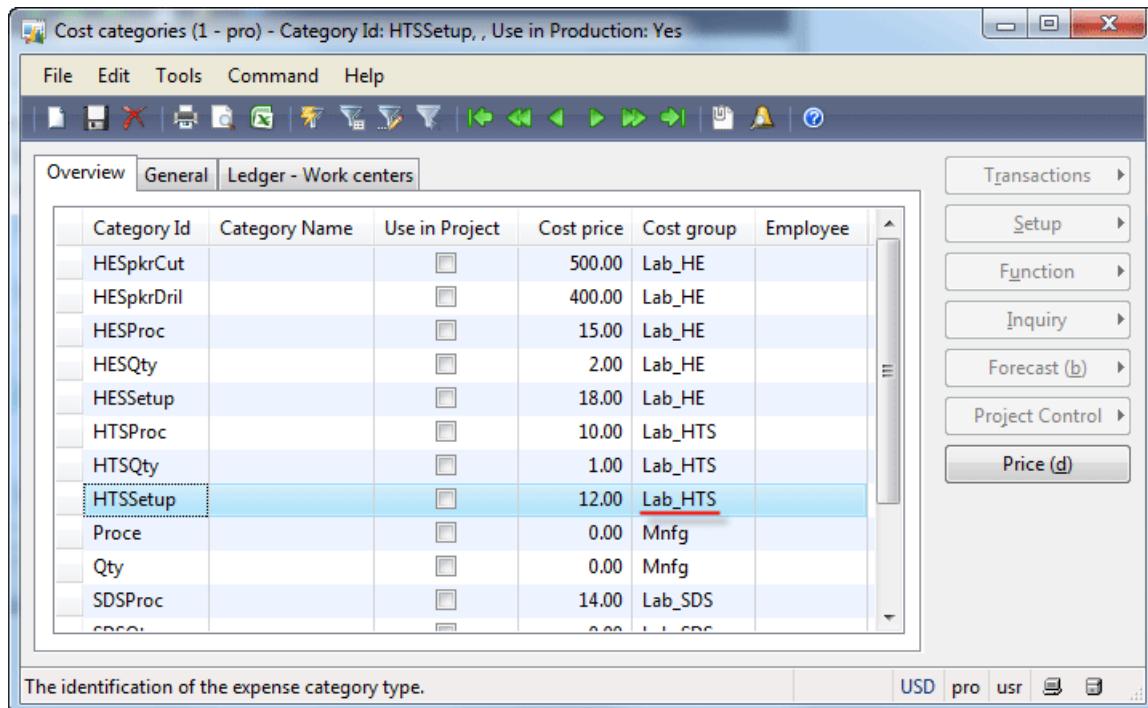


Figure 4.29 Cost group

The operation run time cost category is HTSProc, this category also belongs to the LABHTS cost group, so this cost is also for manufacturing. The quantity cost category also belongs to the Manufacturing cost. Since the operation cost category is transferred to job cost category, the manufacturing cost will be calculated in the following way: Manufacturing cost = jobs' setup cost + jobs' process cost + jobs' quantity cost. $PLANT_OVH = 0.03 * \text{Manufacturing cost}$. We can see the jobs costs in the **Calculation** form (all lines except the first 5 lines). If we sum all costs, we will receive the 594 amount, if we multiply this amount by 0.03, we will receive the 17.82 amount (exactly the same amount as in the PLANT_OVH line, **Total cost price** field in the **Calculation** form). In Microsoft Dynamics AX, it is possible to see all costs summed up in a costing sheet. In the **Calculation** form, go to the **Costing sheet** tab.

Routes and Operations

The screenshot shows the Microsoft Dynamics AX Calculation form titled "Calculation (1 - pro) - Production: PRD_00000587, Chair". The window has a menu bar with File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has tabs: Overview Estimation, Overview Costing, General, Calculation, and Costing sheet. The Calculation tab is selected. A sub-menu "Mode" is open, showing "Estimation" as the current mode. Below this are dropdowns for "Level" (Single), "Per" (Unit), and input fields for "Quantity" (1.00) and "Unit" (Pcs). The main grid displays cost data:

Code	Description	Variable cost	Fixed cost	Total
Material cost	Total material cost			
Material cost	Total material cost			
Manufacturing	total manufacturing cost			
Lab_HE	High End speaker Labor	502.00		502.00
LabHTS	Home Theater System labor	92.00		92.00
Manufacturing	total manufacturing cost	594.00	594.00	
Indirect cost	Total indirect costs			
Var_OVH	Variable costs overheads	9.00		9.00
Fix_OVH	Fixed cost overheads		17.82	17.82
Indirect cost	Total indirect costs	9.00	17.82	26.82
COGM	Cost of good manufactured	603.00	17.82	620.82

At the bottom of the grid, there is a message: "Should the costing sheet results be displayed for production estimation or production costing?". To the right of the message are buttons for USD, pro, usr, and other options.

Figure 4.30 Calculation form, Costing sheet tab

4. The base amount of LAB_OVH is Manufacturing costs and the rate is 1. Note that it is not in percent. Try to understand why the LAV_OVH cost equals 9. As for me, this is not very easy 😊

How Operations are Treated in Microsoft Dynamics AX

We already know that an operation can be divided into jobs. A job can be included or excluded from calculation of operation consumed time and cost. This is controlled with the help of a route group. Route groups are set up on operations. Open the **Route** form under **Production > Common Forms > Route details** > Find the wooden chair route > **Route** button.

In our case, all operations use the same route group:

Routes and Operations

The screenshot shows the 'Route (1) - Route number: RTE_00000003, Wood chair' window. It contains two main sections: a grid of operations and a route group summary.

Operations Grid:

Oper. No.	Priority	Operation	Scrap percentage	Accumulated	Next	Link type	Hourly rate / Piecework rate
10	Primary	Chiseling	0.00	1.00	20	All	
10	Secondary 1	Cutting	0.00	1.00	20	All	
20	Primary	Varnishing	0.00	1.00	30	All	
30	Primary	DrillingCh	0.00	1.00	50	All	
40	Primary	Sewing	0.00	1.00	50	All	
50	Primary	Assembly	0.00	1.00	60	All	
60	Primary	Pack	0.00	1.00	0	All	

Route Group Summary:

Item code	Item relation	Configuration	Route code	Route relation	Site	Work center	Production unit	Picking warehouse	Route group
Table	0050		Route	RTE_00000003	2	011			10

Scrap from this operation

Figure 4.31 Route form, route group

Let's analyze what parameters are available for the route group: Open the **Route group** form under **Production > Setup > Routes > Route groups**.

On the **General** tab, the following parameters are available:

The screenshot shows the 'Route group (1 - pro) - Route group: 10, Standard Routing Group' window, specifically the General tab.

Identification: Route group: 10

Estimation and costing:

Calculate setup time:	<input checked="" type="checkbox"/>	Automatic consumption, setup time:	<input checked="" type="checkbox"/>
Calculate run time:	<input checked="" type="checkbox"/>	Automatic consumption, run time:	<input checked="" type="checkbox"/>
Calculate quantity:	<input checked="" type="checkbox"/>	Automatically report quantity as finished:	<input checked="" type="checkbox"/>

Feedback: Report operation as finished:

Identify the route group.

Figure 4.32 Route group form, General tab

Routes and Operations

- **Estimation and costing** field group is used to control whether the setup job cost, run time job cost, or quantity cost are included in the production cost. For example, if the **Calculation setup time** and **Calculation run time** fields are empty, the **Calculation** form will have the following view (after the Estimation process):

The screenshot shows the Microsoft Dynamics AX Calculation form for Production ID PRD_00000587, specifically the 'Overview Estimation' tab. The table displays the following data:

T..	Production	Level	Item/Work center	Consumption per unit	Unit	Total cost price...	Sales price per ...
	PRD_00000587	0	0050	1.00	Pcs	8.24	8.24
	PRD_00000587	1	0001	1.00	Pcs	0.00	0.00
	PRD_00000587	1	0002	1.00	Pcs	0.00	0.00
	PRD_00000587	1	0010	2.00	Pcs	0.00	0.00
	PRD_00000587	1	0020	1.00	Pcs	0.00	0.00
	PRD_00000587	1	011	1.00	Pcs	1.00	1.00
	PRD_00000587	1	005	1.00	Pcs	2.00	2.00
	PRD_00000587	1	011	1.00	Pcs	1.00	1.00
	PRD_00000587	1	011	1.00	Pcs	1.00	1.00
	PRD_00000587	1	011	1.00	Pcs	1.00	1.00
	PRD_00000587	1	PLANT_OVH	1.00		0.24	0.24

Production the line refers to: **USD pro usr**

Figure 4.33 Calculation form (example)

Compare this image with the previous *Calculation form* image to make sure that the Setup and Run time costs are not included.

- We will understand the meaning of the **Automatic route consumption** field group in more detail in the next lesson. Shortly, these fields are used to automatically finish a job without a job registration process. This can be used when the cost of the job is calculated correctly and doesn't require the manual input.
- **Feedback** field group is used during the production finish process. If the **Report operation as finished** check box is cleared, an operation must be finished before the production is finished.

Routes and Operations

On the **Setup** tab, the following parameters are available:

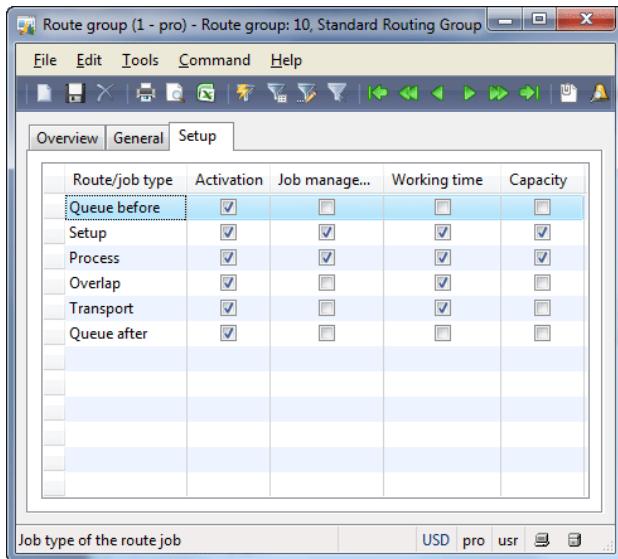


Figure 4.34 Route group, Setup tab

- The **Activation** check box is used to control which job types will be created for the operation. Note that if a job is not created, the time consumed by this job will not be included in the production time. For example, if the *Queue before* and *Setup* jobs have the **Activation** check box cleared, then after the job scheduling process, the **Jobs** form will have the following view:

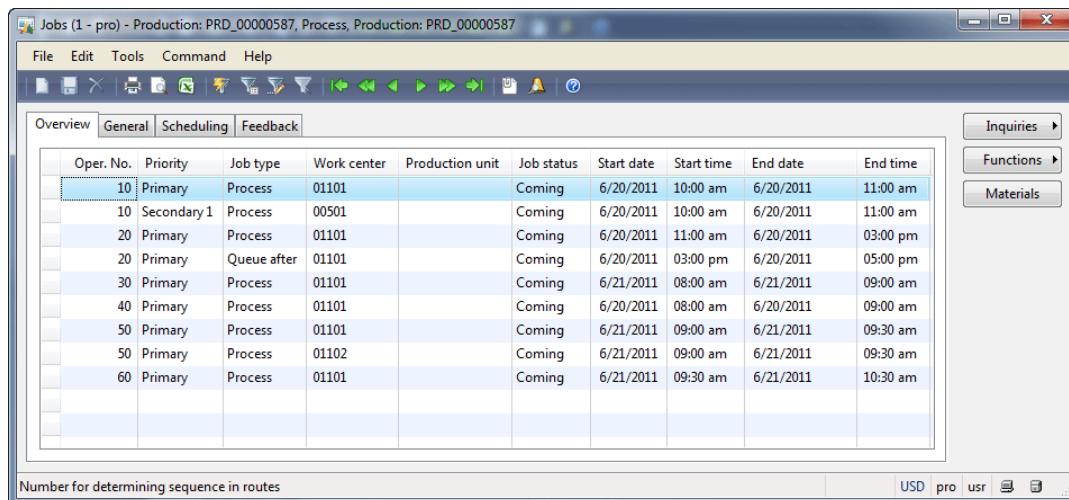


Figure 4.35 Jobs form (example)

Compare this image with the previous *Jobs form* image to make sure that the end time differs and the *Queue before* and *Setup* jobs are not created.

- The **Job management** check box is selected if the job must be registered and finished. If a job must be finished, a production order can't be reported as finished until the job is finished.

Routes and Operations

- The **Working time** check box specifies if work center working time is taken into account when job start and end time is estimated. For example, if this check box is cleared for the *Process* job the **Gantt chart** form will have the following view:

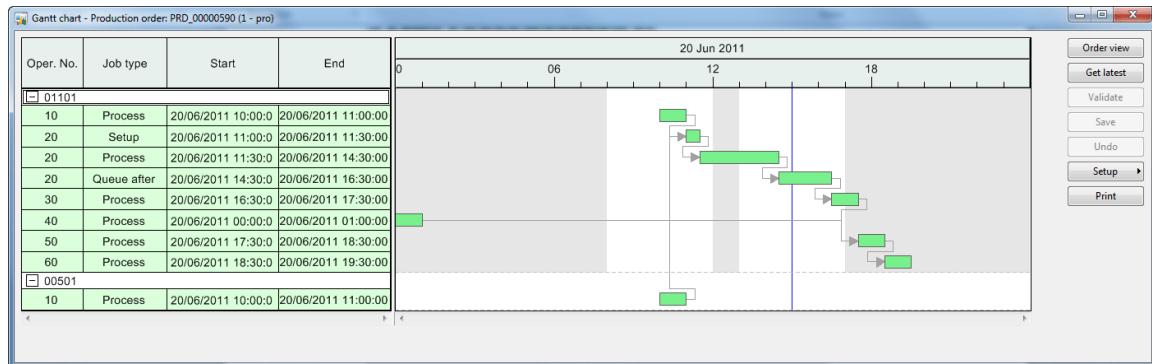


Figure 4.36 Gantt chart form (example)

Compare this image with the previous *Gantt chart form* image. We can see that only the process for the operation 40 starts from the very beginning of the day (not taking the work center calendar into account). All other processes are connected to each other, but why does the process for the operation 10 start at 10:00 A.M.? It is because the Production module is connected with the Master planning module. The default start time for the first production job is taken from **Master planning > Setup > Parameters > Planned orders tab > Planned order field group > Receipt time** field.

- The **Capacity** field is used to set up whether a work center is unavailable during processing a job. In our example, when the *Process* job is being executed, the work center can't execute another job. But, when a chair item is drying (the Queue after job), the work center can execute another job, if it is available. Let's check the reserved work center capacity under **Basic > Common Forms > Work center groups > Find 011 work center group > Inquiries > Capacity load** button.

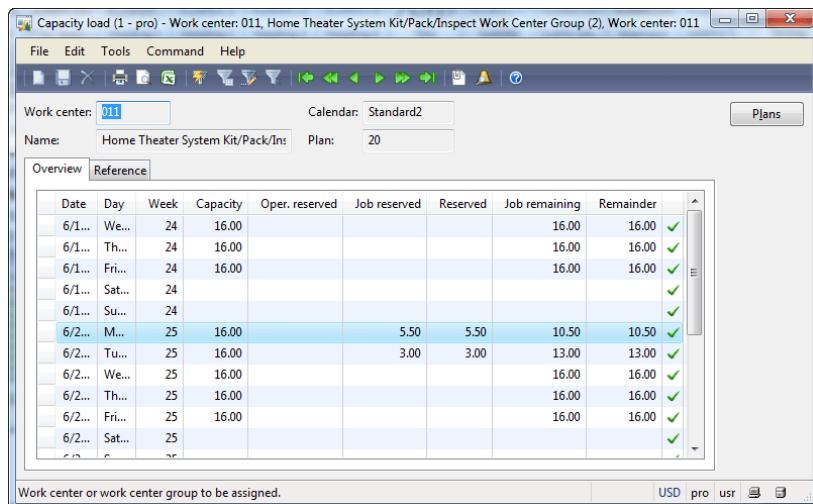


Figure 4.37 Capacity load form

Routes and Operations

We can see that 5.50 hours are registered for Monday (but the sum of jobs on Monday for the work center group 011 is 7.50 hours) and 3.00 hours are registered for Tuesday. Let's find out what jobs reserve the time in the work center 01101. In the **Work center groups** form, click the **Work centers** button. The **Work centers** form opens. Select the work center 01101 and then click the **Dispatching** button. The **Dispatching** form opens.

Select	Production	Item nu...	Job identification	Job type	Property	Job status	Start date	Start time	End date	End time
	PRD_00000585		JOB_00001173	Process		Coming	6/15/2011	08:00 am	6/16/2...	08:30 am
	PRD_00000591	0050	JOB_00001536	Process		Coming	6/20/2011	08:00 am	6/20/2...	09:00 am
	PRD_00000591	0050	JOB_00001530	Process		Coming	6/20/2011	10:00 am	6/20/2...	11:00 am
	PRD_00000591	0050	JOB_00001532	Setup		Coming	6/20/2011	11:00 am	6/20/2...	11:30 am
	PRD_00000591	0050	JOB_00001533	Process		Coming	6/20/2011	11:30 am	6/20/2...	03:30 pm
	PRD_00000591	0050	JOB_00001535	Process		Coming	6/21/2011	08:00 am	6/21/2...	09:00 am
	PRD_00000591	0050	JOB_00001537	Process		Coming	6/21/2011	09:00 am	6/21/2...	10:00 am
	PRD_00000591	0050	JOB_00001538	Process		Coming	6/21/2011	10:00 am	6/21/2...	11:00 am

Figure 4.38 Dispatching form

We can see that the *Queue after job* does not reserve any time in the work center.

Summary

Good work! 😊 In this training lesson, we have studied the following:

- Route: what it is and how it is created
- Operation: what it is and how it is created
- Route networks: simple operations, independent operations, and simultaneous operations
- Route operations: what they are and how they can be created
- Jobs: what they are and how they can be generated
- Time consumed by an operation: how the start and end time is calculated for a production order, what the consumption calculation formula, operation link type, simultaneous operations, Qty. of work center, calendars, and Gantt chart are.
- Cost of operations : how a price for the production order is calculated, what indirect costs, costing sheet, cost category, cost group are
- How an operation is treated in Microsoft Dynamics AX: what a route group and capacity load are

In the next training lesson, we will learn how the Production process is realized in Microsoft Dynamics AX.

5. Production life cycle

Hi! In this training lesson, we will learn the main production process steps and their realization in Microsoft Dynamics AX.

I have decided to create a new Universal Recorder BOM item that will consist of items from the standard demo data and with a simple route. We will learn the most complex flow of production process that will include the warehouse management (the [item arrival](#) and [shipment](#) flows) and the job management.

Prerequisite Setup

In this topic, we will create and check all data that is required to complete a production process. We will do the following:

- Create a new Universal Recorder BOM item.
- Create a new Universal Recorder BOM. BOM will consist of components 1601 and 1602. Check the warehouse management parameters.
- Create a simple Universal Recorder route. Check the job management parameters.
- Purchase BOM components (1601 and 1602) to make them on-hand in stock.

Creating a New BOM Item

We have already discussed what a BOM item is and how it can be created in [this training lesson](#). Shortly, a BOM item is a regular item whose **Item type** field contains the *BOM* value.

Let's create a new Universal Recorder BOM item:

1. Go to **Inventory management > Common Forms > Item details**. The **Item** form opens.
2. Create a new line with the following parameters:
 - Item number = 0000
 - Item name = Universal Recorder
 - Item group = Packaging
 - Item type = BOM
 - Inventory model group = FIFO
 - Dimension group = N-W

Production life cycle

The screenshot shows the Microsoft Dynamics AX Item form titled "Item (1 - pro) - Item number: 0000, Universal Recorder". The main grid displays a list of items with columns: Item number, Item name, Search name, Item group, and Item type. The item "Universal Recorder" is selected, and its details are shown in the grid. To the right, a vertical toolbar lists various functions under the "Transactions" category, such as On-hand, Setup, Trade agrmt., Functions, Inquiries, Forecasting, BOM, Route (j), Send electronically, Project Control (k), and Price (m). The bottom of the screen shows the standard Windows taskbar with icons for USD, pro, usr, and other system functions.

Item number	Item name	Search name	Item group	Item type
0000	Universal Recorder	UniversalRecorder	Packaging	BOM
0001	Back	Back	Packaging	Item
0002	Seat	Seat	Packaging	Item
0003	Chair base	Chairbase	Packaging	Item
0004	Castor	Castor	Packaging	Item
0005	Arm pad	Armpad	Packaging	Item
0006	Arm bracket	Armbracket	Packaging	Item
0007	Task chair control	Taskchaircontrol	Packaging	Item
0010	Chair arm	Chairarm	Packaging	BOM
0020	Substructure	Substructure	Packaging	BOM
0050	Chair	Chair	Packaging	BOM
1	Bottle	Bottle	Packaging	Item
1000	LCD Television HD Black 42 inches	LCDTelevisionHDBlack	Television	Item

Figure 5.1 Item form

To understand what the Item group, Inventory model group, and Dimension group parameters are used for, read the “Item setup” training lessons from the [Trade and Logistics training](#).

Creating a BOM

A BOM is a receipt of a BOM item (like a cake receipt containing a list of ingredients). In the [Bills of Material](#) training lesson, we have already discussed how a BOM is created and set up. In our example, the “receipt” of the Universal Recorder BOM item will include items 1601 and 1602. This is not logical as Universal Recorder contains a lot of different elements (a microchip, a decoder, a sound-recorder head, etc.). But to understand the production process, it does not matter whether a BOM contains all required components. We will assume that only items 1601 and 1602 are required to assemble the Universal Recorder. These items are taken from the standard demo data and already contain the Warehouse management setup.

Let's create the new Universal Recorder BOM:

1. Go to **Inventory management > Common Forms > Bills of Materials**. The **BOM** form opens.
2. In the header area, create a new line with the following values:
 - Name = Universal Recorder BOM
 - Site = 2
3. Click the **Lines** button. The **BOM line** form opens.
4. Create a new line with the following values:
 - Item number = 1601
 - Warehouse = 22
 - Quantity = 1
5. Create another line with the following values:
 - Item number = 1602
 - Warehouse = 22
 - Quantity = 1

Production life cycle

6. The **BOM line** form will have the following view:

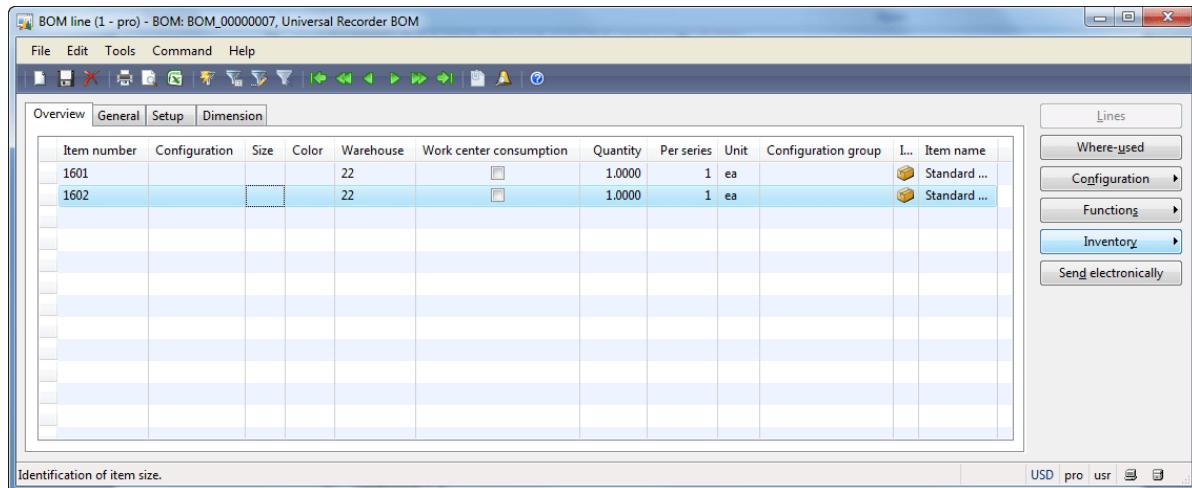


Figure 5.2 BOM line form

7. Close the **BOM line** form.
8. In the Versions area, create a new line with the following values (assign a BOM item):
 - o Item number = 0000 (Universal Recorder)
9. In the Versions area, click the **Approve** button. Select employee 7210, select the **Approve Bill of materials** check box in the **Approve version** form, and then click **OK**.
10. In the Versions area, click the **Activation** button.
11. The **BOM** form will have the following view:

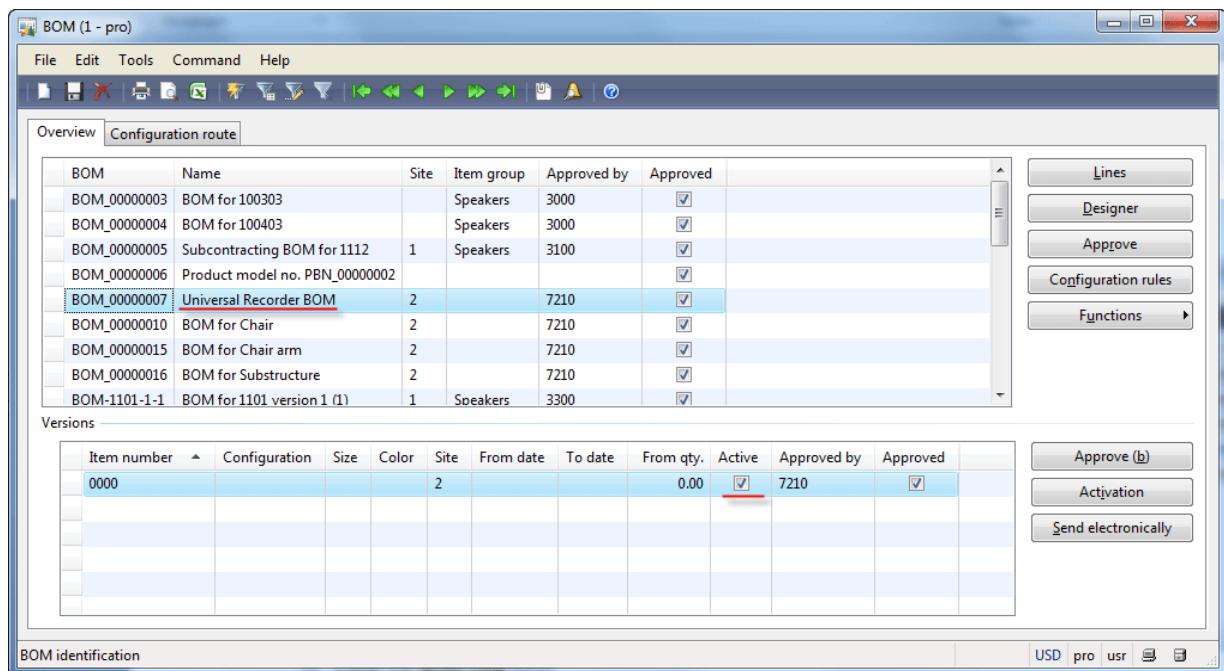


Figure 5.3 BOM form

Production life cycle

Let's analyze the BOM components: items 1601 and 1602. These items must have the setup that uses the Warehouse management features. Note that we will analyze only item 1601, because item 1602 has the same parameters.

First of all, item 1601 must have the Site, Warehouse, Location, and Pallet dimensions active:

1. Go to **Inventory management > Common Forms > Item details**. The **Item** form opens.
2. Find item 1601 and go to the **General** tab. The item uses the N-WLP dimension group.
3. Right-click the **Dimension group** field and select the **Go to the Main Table Form** option. The **Inventory dimensions** form opens. Make sure that the Site, Warehouse, Location, and Pallet Id dimensions are active.

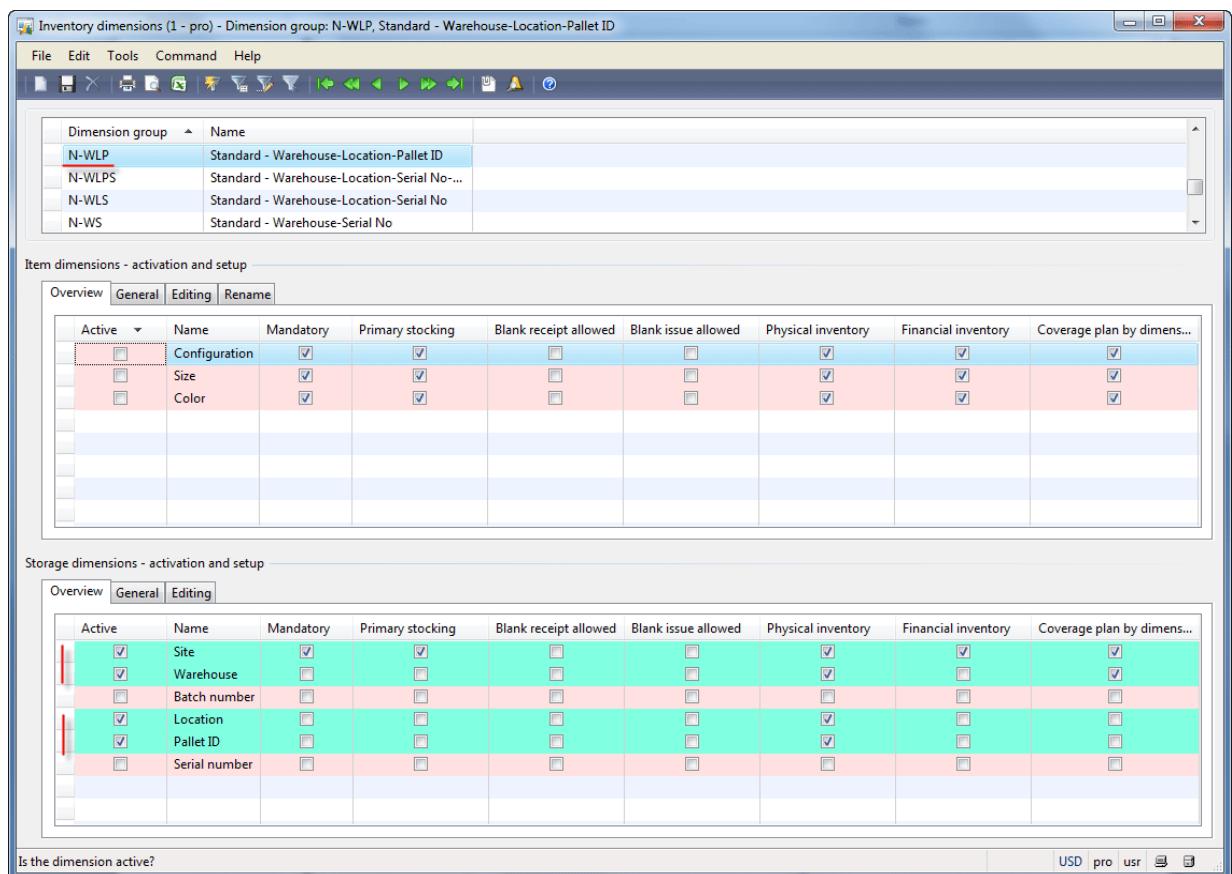


Figure 5.4 Inventory dimensions form

Item 1601 must be set up so that the registration and picking steps are mandatory. The Registration step ensures that a pallet with items is placed in a certain warehouse location. The Picking step ensures that the item is picked from the warehouse location. If, for example, the registration step is not mandatory, then the item can be received in a warehouse when an Invoice is posted without any previous steps.

1. Go to **Inventory management > Common Forms > Item details**. The **Item** form opens.
2. Find item 1601 and go to the **General** tab. The item uses the FRP_PICK inventory model group.

Production life cycle

3. Right-click the **Inventory model group** field and select the **Go to the Main Table Form** option. The **Inventory model groups** form opens. Go to the **Setup** tab and make sure that the **Registration requirements**, **Picking requirements**, and **Consolidated picking method** check boxes are selected.

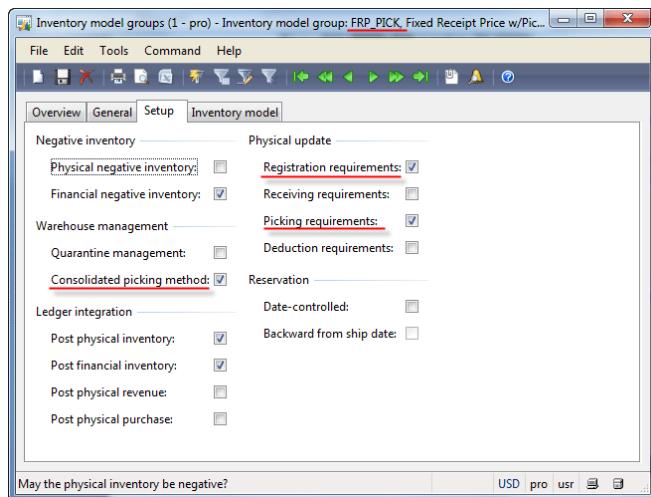


Figure 5.5 Inventory model groups form

The pallet type for item 1601 must be set up so that to receive, store, and issue items and the quantity of an item that can be loaded to the pallet must be specified:

1. Go to **Inventory management > Common Forms > Item details**. The **Item** form opens.
2. Find item 1601 and go to the **Setup** tab. Make sure that the **Pallet type** and **Pallet quantity** fields are populated.

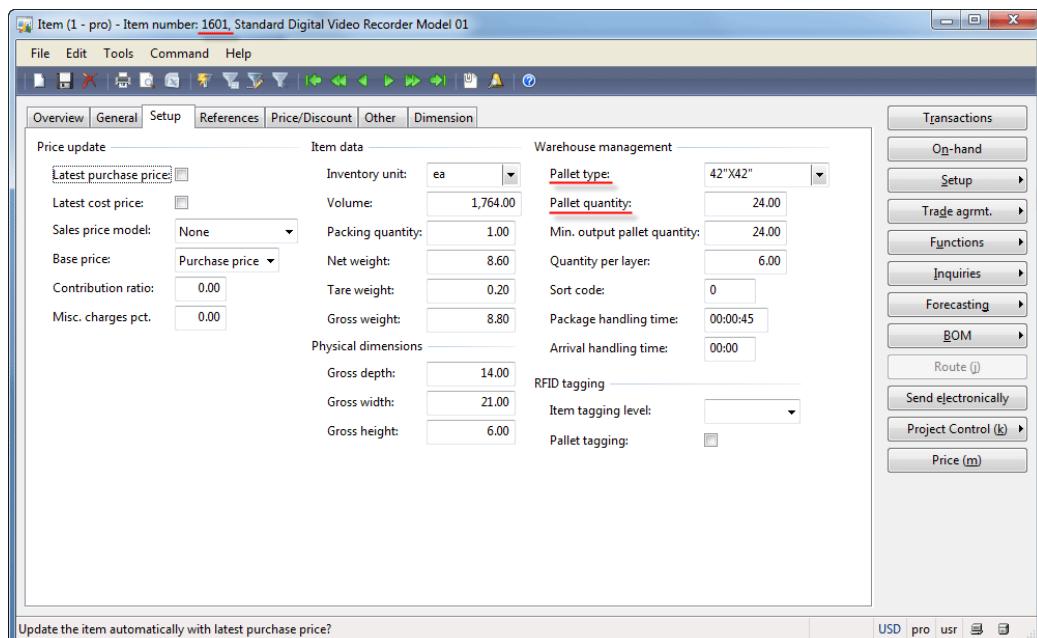


Figure 5.6 Item form, Setup tab

Production life cycle

And, the last two settings that item 1601 must have are a Store zone and a Picking location. A store zone is used to define locations for storing items during the item arrival and registration process, a picking location is used during the shipment process.

1. Go to **Inventory management > Common Forms > Item details**. The **Item** form opens.
2. Find item 1601 and then click the **Setup > Warehouse items** menu button. The **Warehouse items** form opens. We will work with warehouse 22; so select the line with warehouse 22 and then go to the **Locations** tab. Make sure that the **Store zone** and **Picking location** fields are populated.

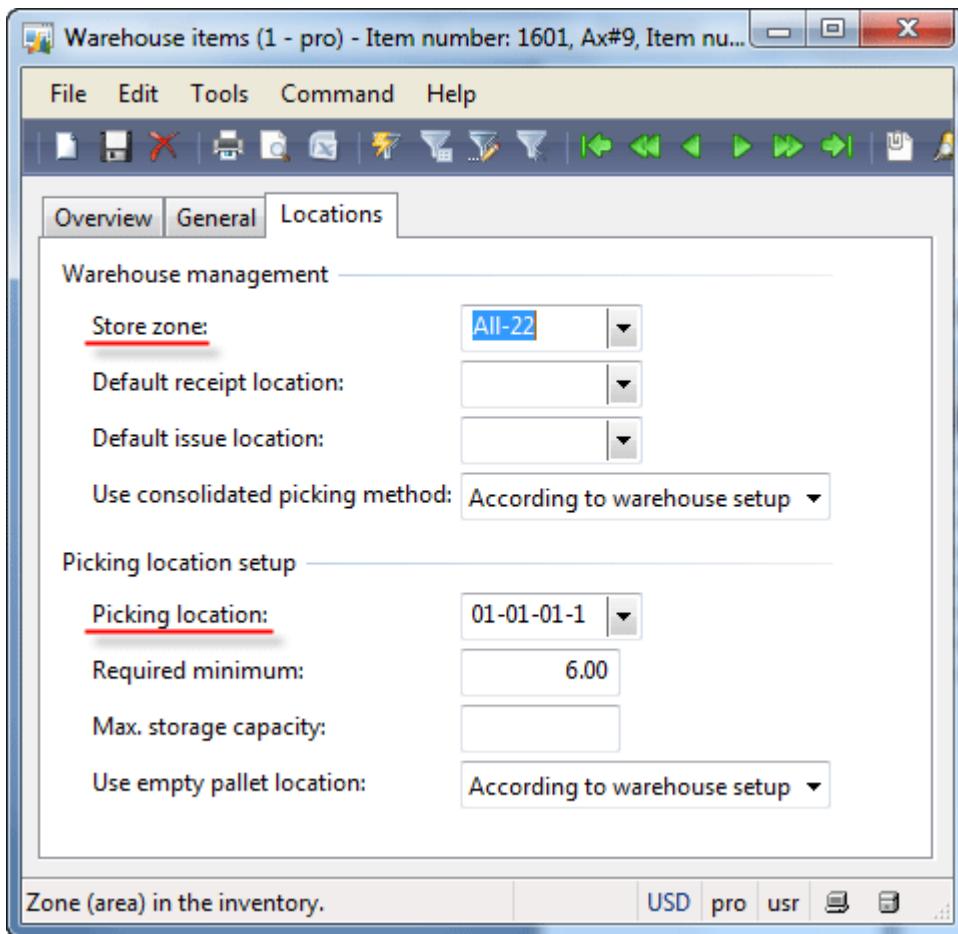


Figure 5.7 Warehouse items form

We will go through all steps of Production process later in this training. In the **Trade and Logistics training** you can study in detail the [Item arrival and registration](#) and [Shipment](#) processes (how Store zone, Picking location, Pallet type etc. parameters are used).

Creating a Route

A route contains operations that must be executed in order to produce a finished good from components. In the [previous training lesson](#), we have already discussed in detail how a route can be created and set up. In this training lesson, we will create a simple route with one operation. Let's

Production life cycle

reuse operations from the standard demo data. Assume that only the “Enclosure Assembly” operation is required to build the Universal Recorder.

Create a simple route:

1. Go to **Production > Common Forms > Route details**. The **Route** form opens.
2. In the Header area, create a new line with the following value:
 - o Name = Universal Recorder Route
3. Click the **Route** button. The **Route** form opens.
4. In the header area, create a new line with the following value (set up an operation):
 - o Operation = Assem_Encl (Enclosure Assembly)
5. In the lines area, create a new line with the following values (set up a work center):
 - o Item code = Table
 - o Item relation = 0000 (Universal Recorder)
 - o Site = 2
 - o Work center = 011
6. The **Route** form will have the following view:

Figure 5.8 Route (operations) form

7. Close the **Route** form.
8. In the Versions area, create a new line with the following values (assign a BOM item):
 - o Item number = 0000 (Universal Recorder)
 - o Site = 2
9. In the Versions area, click the **Approve** button. Select employee 7210, select the **Approve route** check box in the **Approve version** form, and then click **OK**.
10. Click the **Activation** button.
11. The **Route** form will have the following view:

Production life cycle

The screenshot shows the 'Route (1 - pro)' window. At the top, there's a menu bar with File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area contains two tables. The first table, titled 'Route number' and 'Name', lists several routes: RTE_00000005 (Universal Recorder Route), 1001 (High end speaker route ver 1 (1)), 1002 (Standard speaker route ver 1 (1)), 1003 (Standard speaker route ver 1 (3)), 1101 (2.1 Home Theater System route ver 1 (2)), 1102 (5.1 Home Theater System route ver 1 (2)), and 1902 (Standard speaker sub-K route ver 1 (1)). Columns include Item group, Approved by, and Approved status. The second table, titled 'Versions', shows a single row for item number 0000, configuration 2, site 2, from date (empty), to date (empty), from qty. 0.00, active checked, approved by 7210, and approved checked. Buttons for 'Route', 'Approve (b)', 'Approve', and 'Activation' are visible.

Figure 5.9 Route form

Let's analyze the parameters that are required for the job management. In the [Route training lesson](#), we have studied all route and operation parameters in detail.

Each operation can be divided into jobs. During job scheduling, the following jobs can be created for each operation: Queue before, Setup, Process, Transport, and Queue after. To create jobs, the corresponding job time must be specified. We will specify the time only for the Setup and Process job, so that only these jobs will be created.

1. In the **Route** form, click the **Route** button. The **Route** form opens.
2. In the lines area, click the **Times** tab. Specify the following values: Setup time = 2 hours, Run time = 3 hours. The **Route** form will have the following view:

The screenshot shows the 'Route (1) - Route number: RTE_00000005, Universal Recorder Route' window. The 'Times' tab is selected. The main table shows one operation: Oper. No. 10, Priority Primary, Operation Assem_Encl, Scrap percentage 0.00, Accumulated 1.00, Next 0, Link type All, and Hourly rate / Piecework rate. Below the table, the 'Times' section contains fields for Queue time before (empty), Transit time (empty), Transfer batch (empty), Setup time (2.00), Queue time after (empty), Run time (3.00), Hours/time (1.0000), and Process qty. (1.00). A note at the bottom says 'Queue time before operation'.

Figure 5.10 Route form, Times tab

Production life cycle

The Route group defines how the operation will be handled in Microsoft Dynamics AX. We can see that the Assem_Encl operation uses route group 10 (see the Figure “Route (operations) form”). Let’s analyze what parameters are set up for route group 10:

1. Go to the **Production > Setup > Routes > Route groups**. The **Route group** form opens.
2. Select route group 10 and then go to the **General** tab. We can see that all check boxes in the **Automatic route consumption** group box are selected. In this case, the route consumption step will be executed automatically. Since we are interested in going through all the production steps, this group is not acceptable.

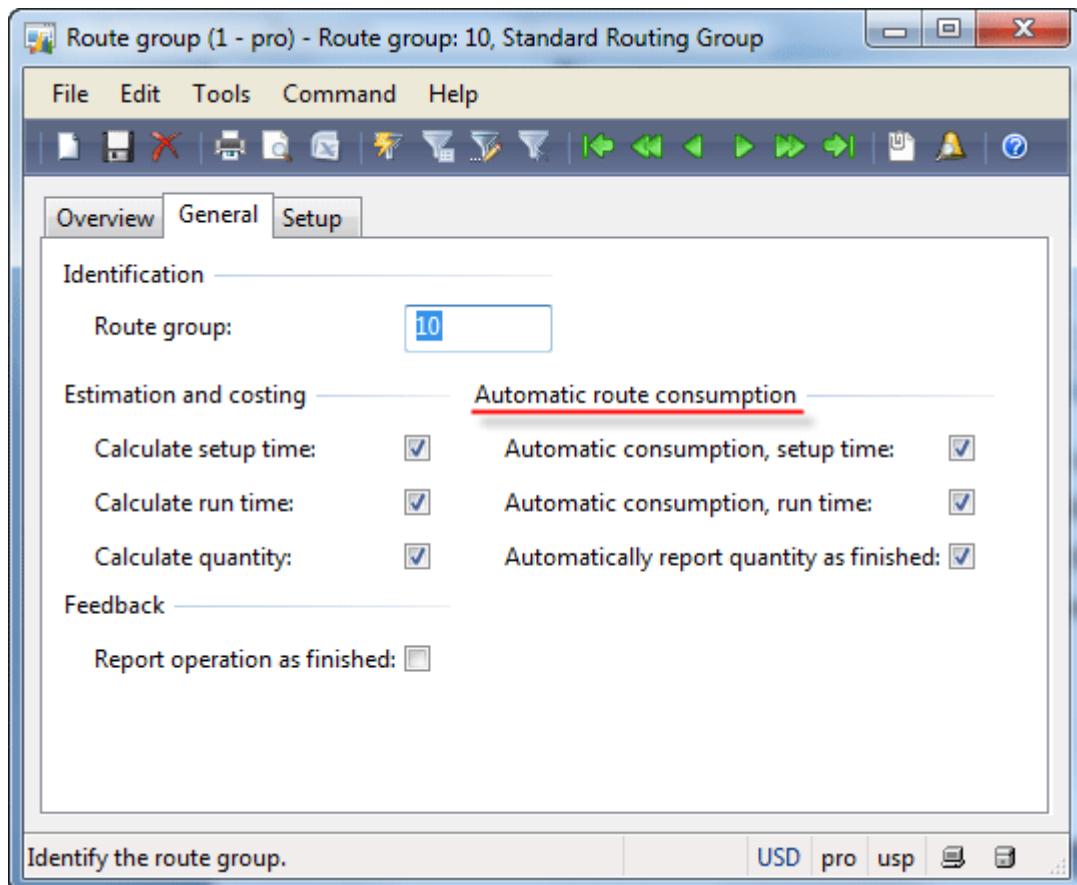


Figure 5.11 Route group form

3. Route group 20 has all mentioned check boxes cleared, so this group is acceptable (make sure yourself).

We need to change the route group from 10 to 20 in the **Route** form. Go to **Production > Common Forms > Route details** > Find the Universal Recorder Route > Click the **Route** button > Change **Route group** from 10 to 20.

Production life cycle

Figure 5.12 Route form, Route group 20

One more parameter that is required for Warehouse management is work center production location. In the [Work center training lesson](#) we have set up the 01-00-0-0 production input location for the 011 work center (see the “Input location” paragraph and set up production location if you omit this step).

Purchasing BOM Components

We have already set up all parameters that are required for the production process lifecycle with the warehouse and job management. But, before starting the production of a BOM item, we must have all BOM components in the warehouse (i.e. on-hand). In this topic, we will purchase the BOM components – items 1601 and 1602. These components are used in the warehouse management, so we will go through the item arrival and registration process. We have studied this process in detail in [this training lesson](#). In this lesson, we will quickly go through this process.

Create a purchase order:

1. Go to **Accounts payable > Common Forms > Purchase order details**. The **Purchase order** form opens.
 2. Create a line in the purchase order header with the following value:
 - o Vendor account = 1001
 3. Create a purchase order line with the following values:
 - o Item number = 1601
 - o Change Delivery date to the current date
 4. Create a purchase order line with the following values:
 - o Item number = 1602
 - o Change Delivery date to the current date

Production life cycle

5. The Purchase orderform will have the following view:

The screenshot shows the 'Purchase order' window for item 000095. The main grid displays two items: 1601 and 1602. Item 1601 has a quantity of 200.00 and a unit price of 170.00, totaling 34,000.00. Item 1602 has a quantity of 100.00 and a unit price of 192.00, totaling 19,200.00. The delivery date is set to 7/8/2011. The right-hand sidebar contains various navigation links for simple posting, price forms, setup, inquiries, and trade agreements.

Figure 5.13 Purchase order form

Item arrival and registration:

1. Go to Inventory management > Periodic > Arrival overview. The Arrival overviewform opens.

The screenshot shows the 'Arrival overview' window. It displays a receipt for purchase order 000095, dated 7/8/2011, at site 22. The receipt includes details for item 1601 (quantity 9) and item 1602 (quantity 5). The right-hand sidebar provides options for managing arrivals, such as 'Start arrival', 'Select all', and 'Clear all'.

Figure 5.14 Arrival overview form

Production life cycle

2. Find the created purchase order and select the **Select for arrival** check box.
3. Click the **Start arrival** button. As a result, an Arrival journal will be created.
4. Click the **Journals > Show arrivals from receipts** menu button. The **Location journal** form opens.
5. Click the **Lines** button. The **Journal lines** form opens.

EA...	Item number	Configuration	Size	Color	Site	Warehouse	Batch number	Location	Pallet ID	Serial number	Quantity	L..
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1601				2	22		In_01			24.00	
	1602				2	22		In_01			24.00	
	1602				2	22		In_01			24.00	
	1602				2	22		In_01			24.00	
	1602				2	22		In_01			24.00	
	1602				2	22		In_01			4.00	

Figure 5.15 Journal lines form

6. For all lines, create pallet IDs by clicking **Functions > Pallet Id** (repeat this step for all lines).
7. Click the **Post** button. As a result, pallet transports for each pallet from an inbound dock to the destination warehouse location will be created. Close the **Journal lines** and the **Location journal** forms.
8. Go to **Inventory management > Common Forms > Pallet transports**. The **Pallet transports** form opens.
9. For each selected pallet transport, click the **Start transport** button and then click the **Complete transport** button.

Production life cycle

Started	Pallet ID	From warehouse	Pickup location	To warehouse	Destination location	Item number	Quantity	Tag status	To pallet required
	00000100_114	22	In_01	22	01-02-03-1	1601	24.00	<input type="checkbox"/>	
	00000101_114	22	In_01	22	01-03-02-1	1601	24.00	<input type="checkbox"/>	
	00000102_114	22	In_01	22	01-03-03-1	1601	24.00	<input type="checkbox"/>	
	00000103_114	22	In_01	22	01-04-02-1	1601	24.00	<input type="checkbox"/>	
	00000104_114	22	In_01	22	01-04-03-1	1601	8.00	<input type="checkbox"/>	
	00000105_114	22	In_01	22	01-02-01-1	1602	24.00	<input type="checkbox"/>	
	00000106_114	22	In_01	22	01-05-02-1	1602	24.00	<input type="checkbox"/>	
	00000107_114	22	In_01	22	01-05-03-1	1602	24.00	<input type="checkbox"/>	
	00000108_114	22	In_01	22	01-06-02-1	1602	24.00	<input type="checkbox"/>	
	00000109_114	22	In_01	22	01-06-03-1	1602	4.00	<input type="checkbox"/>	

Item number	Quantity	Configuration	Size	Color	Site	Batch number	Serial number	Item tagging	Tag status
1601	24.00				2			<input type="checkbox"/>	Not applicable

Unique ID for the pallet (Serial Shipping Container Code) USD pro usp

Figure 5.16 Pallet transports form

10. As a result, a pallet with an item will be registered in the warehouse location.
11. Check that the component items are on-hand by going to **Inventory management > Common Forms > Item details >** Find item 1601 or 1602 > click the **On-hand** button. The **On-hand** form opens. To view the on-hand inventory for each location, click the **Dimensions display** button and then select the **Location** check box, also select the **Warehouse** and **Pallet** check boxes. The **On-hand** form will have the following view:

Site	Warehouse	Location	Pallet ID	Physical inventory	Physical reserved	Available physical	Ordered in total	On order	Ordered reserved	Total available
2	22	01-01-01-1	00000096_114	24.00		24.00				24.00
2	22	01-01-02-1	00000097_114	24.00		24.00				24.00
2	22	01-01-03-1	00000098_114	24.00		24.00				24.00
2	22	01-02-02-1	00000099_114	24.00		24.00				24.00
2	22	01-02-03-1	00000100_114	24.00		24.00				24.00
2	22	01-03-02-1	00000101_114	24.00		24.00				24.00
2	22	01-03-03-1	00000102_114	24.00		24.00				24.00
2	22	01-04-02-1	00000103_114	24.00		24.00				24.00
2	22	01-04-03-1	00000104_114	8.00		8.00				8.00

Set up the dimensions to be shown USD pro usp

Figure 5.17 On-hand form

We can see that item 1601 is physically available in warehouse 22.

Production life cycle

Now, the 1601 and 1602 BOM components are available in the warehouse, so we can start the production process.

Creating a Production Order

In this topic, we will create a production order for one Universal Recorder item and analyze the results.

1. Go to **Production > Common Forms > Production Order Details**. The **Production orders** form opens.
2. Create a new line. The **Create production order** form opens. In the **Item number** field, select the 0000 (Universal Recorder) value and then, in the **Site** field, select 2. The dialog box with the “Insert the active versions for bill of materials and route” message appears. Click **OK**. Make sure that the **BOM number** and the **Route number** fields are populated with correct values and the **Quantity** field contains 1.

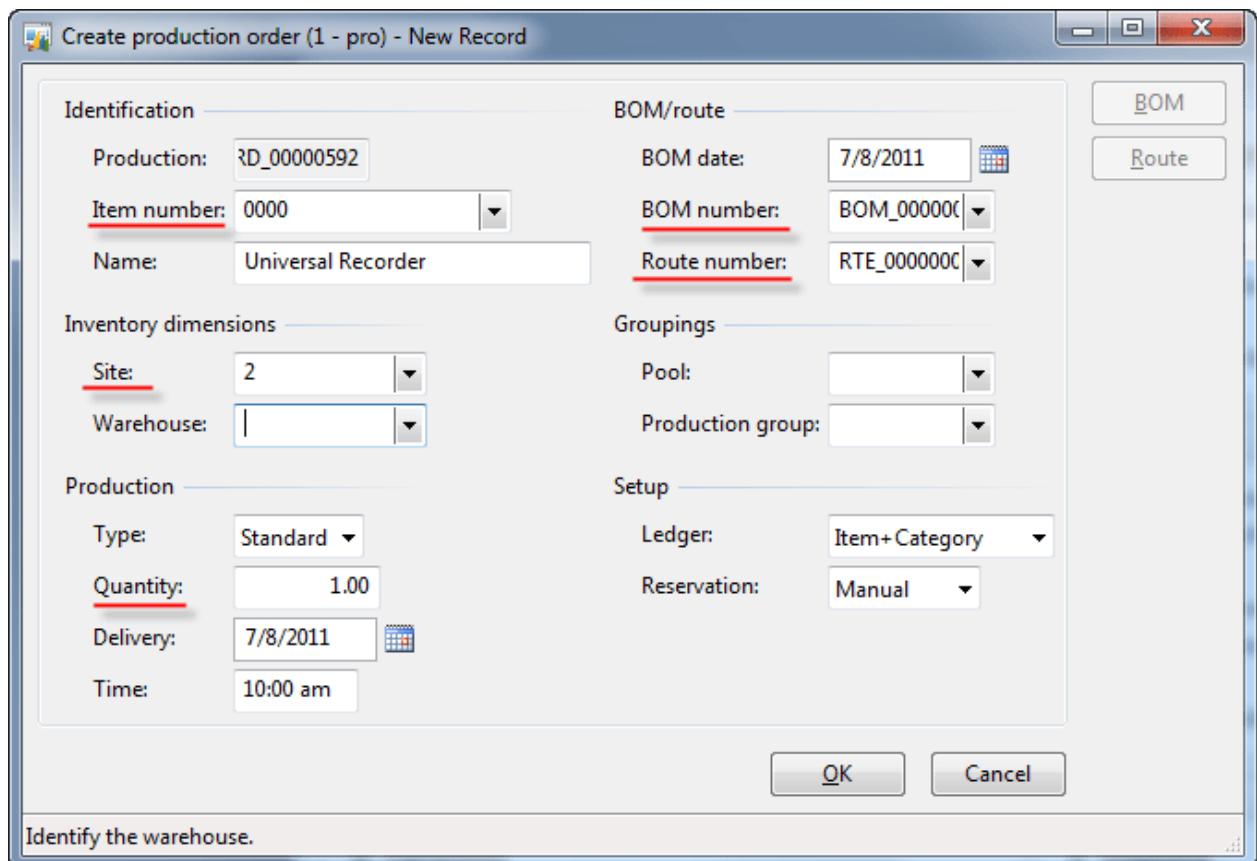


Figure 5.18 Create production order form

3. Click **OK**. As a result, the production order is created.

Production life cycle

The screenshot shows the 'Production orders' form in Microsoft Dynamics AX 2009. The window title is 'Production orders (1 - pro) - Production: PRD_00000592, Universal Recorder'. The menu bar includes File, Edit, Tools, Command, and Help. The toolbar contains various icons for operations like New, Open, Save, Print, and Filter. The main area has tabs: Overview, General, Setup, References, Update, Filter, and Dimension. The 'Overview' tab is selected, displaying a grid of production orders. One row is highlighted with a red border, showing 'PRD_00000592' in the Production column and '0000' in the Item number column. The status for this row is 'Created'. Other columns include Project, Site, Status, Remain status, Pool, and Quality order status. To the right of the grid is a vertical toolbar with buttons for BOM, Route, Jobs, Update, Inquiries, Journals, Inventory, and Gantt. At the bottom, there is a message 'Identify the production order.' and standard application buttons.

Figure 5.19 Production orders form, Created

Analyze the first results:

1. The status of the production order is *Created*.
2. The production BOM has been created. The production BOM is a copy of a BOM item. You can change any values on the production BOM. These changes are not reflected on the item BOM. To view the production BOM, click the **BOM** button. The **BOM** form opens. You can see that the production BOM is a copy of a BOM (compare with the BOM from the “Create a BOM” topic of this lesson).

The screenshot shows the 'BOM' form in Microsoft Dynamics AX 2009. The window title is 'BOM (1 - pro) - Production: PRD_00000592, Universal Recorder'. The menu bar and toolbar are identical to the production orders form. The main area has tabs: Overview, General, Setup, Update, Quantity, Reference, and Dimension. The 'General' tab is selected, displaying a grid of items. Two rows are visible:

Item number	Site	Quantity	Per series	Unit	I...	Item name
1601	2	1.0000	1	ea		Standard Digital Video Recorder Model 01
1602	2	1.0000	1	ea		Standard Digital Video Recorder Model 02

To the right of the grid is a vertical toolbar with buttons for Inventory, Copy, and Inquiries. At the bottom, there is a message 'Identify item.' and standard application buttons.

Figure 5.20 BOM form (Production BOM)

Production life cycle

3. The production route has been created. The production route is a copy of an item route. You can change any values in the production route. These changes are not reflected in the item route. To view the production route, click the **Route** button. The **Production route** form has the following view:

Figure 5.21 Production route form

4. An inventory transaction is created for the produced item. In the **Production orders** form, click the **Inventory > Transactions** menu button. The **Transactions** form has the following view:

Figure 5.22 Transactions form (BOM item Ordered)

Estimating

The first step in a production process is estimating costs. The Production Manager runs the estimate process to analyze the cost of a produced item.

Production life cycle

1. In the **Production order** form, click the **Update > Estimation** menu button. The **Estimation** form opens.

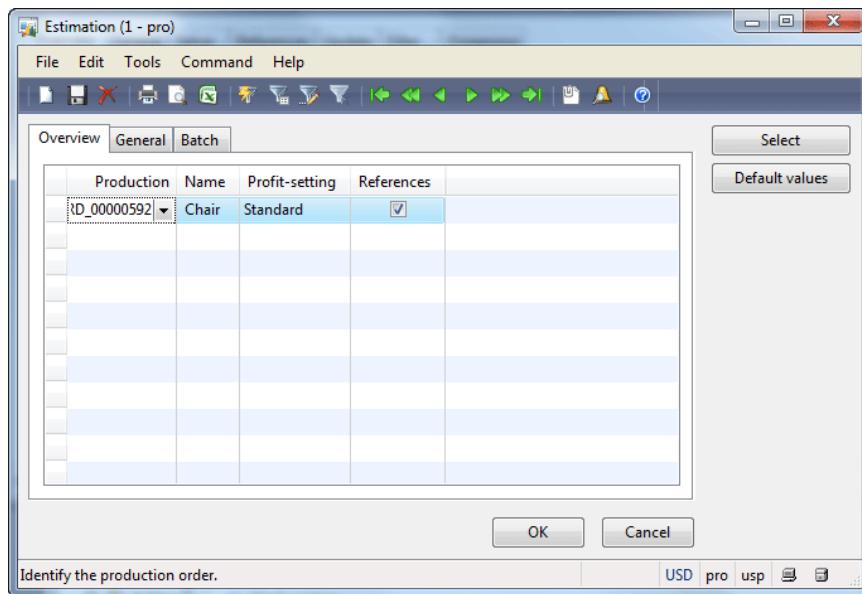


Figure 5.23 Estimation form

2. Click **OK**.

Analyze the results:

1. The production order status is changed from *Created* to *Estimated*.
2. The cost is calculated. Click the **Inquiries > Price calculation** menu button. The **Calculation** form opens.

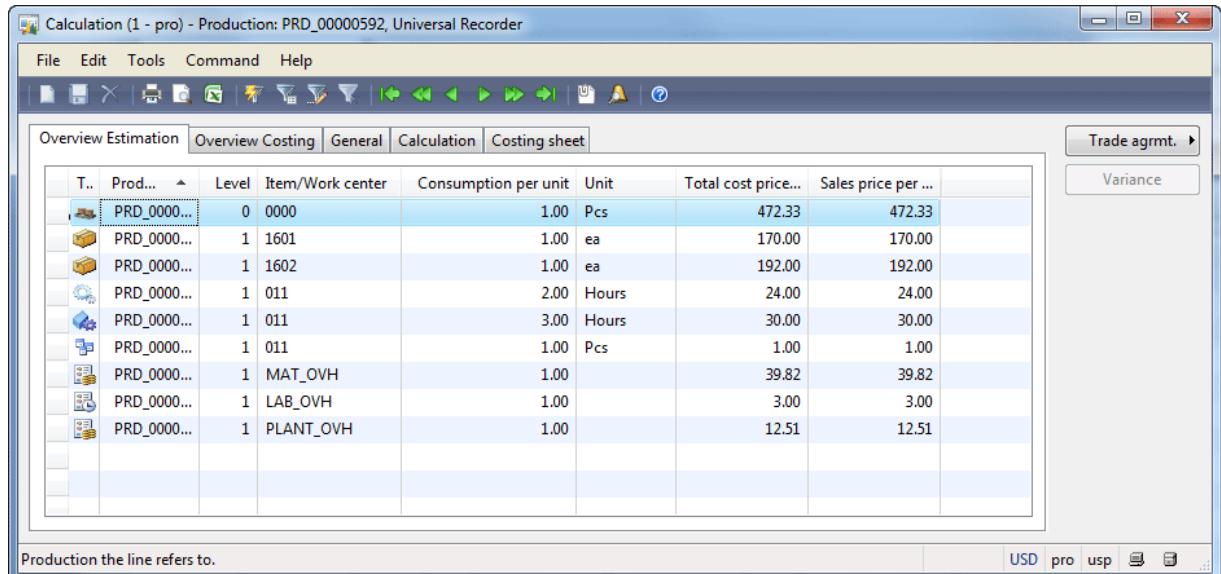


Figure 5.24 Calculation form

Production life cycle

We can see that the cost of the produced item is 472.33 \$. On the **Costing sheet** tab, the costs are divided to material, manufacturing, and indirect costs. In the [Routes and Operations training lesson](#), we have discussed how a cost of operations is calculated (see the Cost of Operation topic). The cost of a produced item is the cost of operations plus the cost of components.

3. Inventory transactions for the BOM components are created. In the **Production orders** form, click the **BOM** button. The **BOM** form opens. Click the **Inventory > Transactions** menu button. The **Transactions** form opens.

The screenshot shows the 'Transactions' form in Microsoft Dynamics AX. The title bar reads 'Transactions (1 - pro) - Reference: Production line PRD_00000592, Lot ID: 00019384_068'. The main grid displays a single row of data:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22	Out_01				Production line	PRD_00000592		On order	-1.00	

On the right side of the screen, there are several buttons: 'Inventory', 'Ledger', 'Functions', and 'Configuration details'. At the bottom, there are currency and unit of measure buttons: 'USD', 'pro', 'usp', and a print icon.

Figure 5.25 Transactions form (BOM component On order)

Scheduling

To know the dates when the production order can be started and finished, the scheduling process is used. Microsoft Dynamics AX provides the operation and job types of scheduling. *Operation scheduling* estimates the start and end date. *Job scheduling* divides each operation in jobs and calculates the start and end date and time. In the [previous training lessons](#), we have already studied that an operation can be divided into the following jobs: Queue before, Setup, Process, Transport, and Queue after. Since we want to use the job management, the job scheduling process will be run.

In the **Production orders** form, click the **Update > Job scheduling** menu button. The **Jobs scheduling** form opens. Click **OK**.

Production life cycle

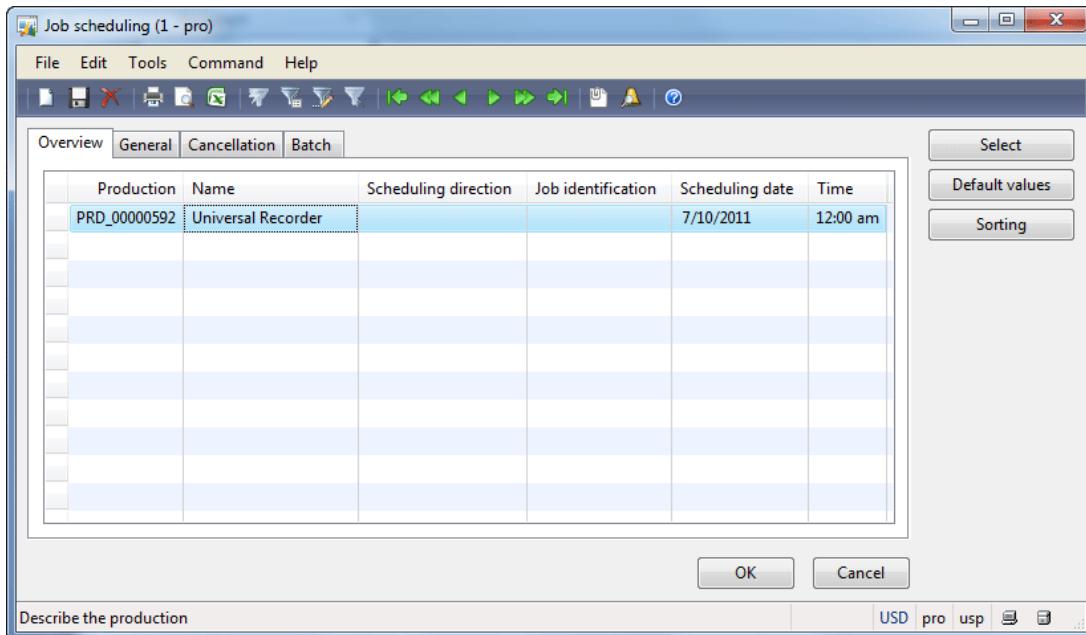


Figure 5.26 Jobs scheduling form

Analyze the results:

1. The production order status is changed from *Estimated* to *Scheduled*.
2. The end date and time is calculated. Click the **Route** button in the **Production orders** form. The **Route** form opens, go to the **Scheduling** tab.

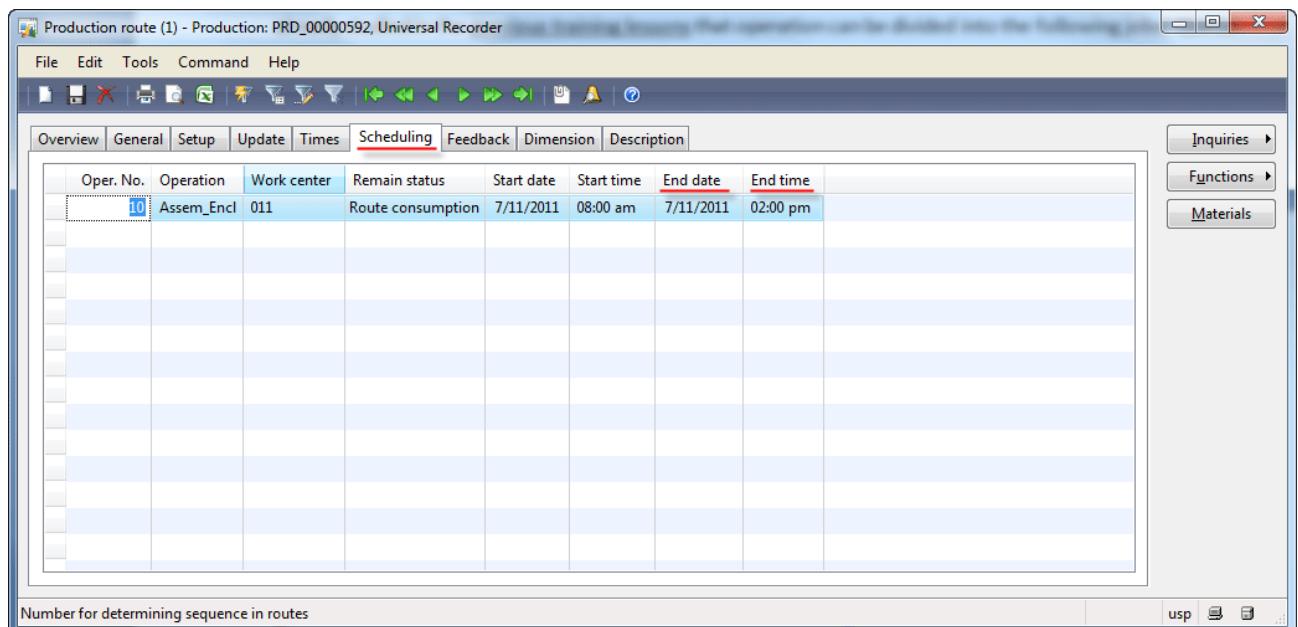


Figure 5.27 Route form, Scheduling tab

Production life cycle

I run job scheduling for the date 7.10.2011. It is Sunday and work center 011 uses the Standard2 calendar. In the Standard2 calendar, Sunday is a day off. So, the start date is shifted to Monday, 7.11.2011. According to the calendar, the start time is 8:00 am. The operation consumes 5 hours – 2 hours for the setup and 3 hours for the run. So, the operation will end at 14:00, 7.11.2011.

3. The Setup and Process jobs are created. Click the **Jobs** button in the **Production orders** form. The **Jobs** form opens.

Figure 5.28 Jobs form (Coming)

We make sure that the two jobs are created. The *Setup* job must be started at 08:00 am and ended at 10:00 (2 hours). The *Processjob* must be started at 10:00 am and ended at 02:00 pm (3 hours of the run time and 1 hour of dinner time according to the Standard2 calendar). Note that these figures show the schedule time but the jobs will be executed by real people or machines, so the real time consumed by the operations can differ. With the help of a job card, a worker performing a job will post the real time consumed by jobs and the quantity of products produced. Then, the real time and cost will be included in the finished product (we will see this later in this training lesson).

Note that a job is assigned to a certain work center rather than to a work center group. In our case, the Setup and Process jobs will be performed in work center 01101. This work center is the first available work center from work center group 011. As the time in this work center is reserved for the Setup and Process jobs, other jobs cannot be processed in this work center at this time. In the **Production orders** form, click the **Route** button. The **Production route** form opens, click **Inquiries > Capacity reservation**. The **Capacity reservation** form opens.

Production life cycle

Figure 5.29 Capacity reservation form

Releasing

The production order price and time have been estimated and scheduled. The Production Manager reviews these values and makes a decision to produce the Universal Recorder item.

First of all, the item components must be delivered to the corresponding work center. For this purpose, the Production Manager generates output orders or, in other words, **releases** a production order.

In the **Production order** form, click the **Update > Release** menu button. The **Release** form opens. Click **OK**.

Production life cycle

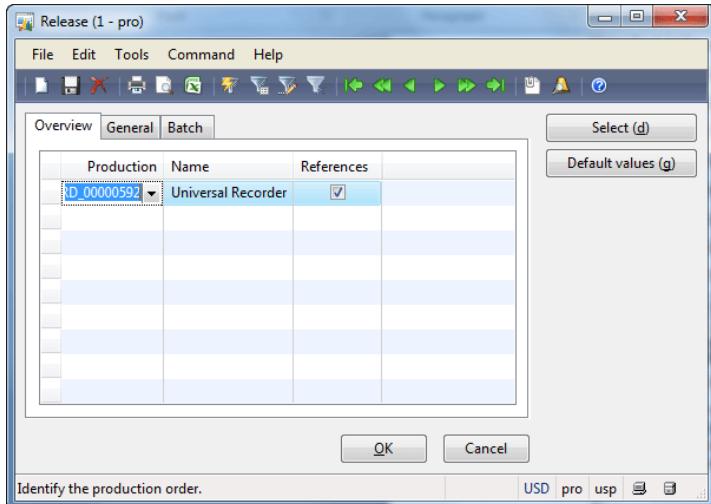


Figure 5.30 Release form

Analyze the results:

1. The production order status is changed from *Scheduled* to *Released*.
2. The two output orders for item 1601 and 1602 are created. In the **Production orders** form, click the **BOM** button. In the **BOM** form, select the first or the second line and click the **Inventory > Output orders** menu button. The **Output order** form opens (the form shows the output orders assigned to the selected production BOM line).

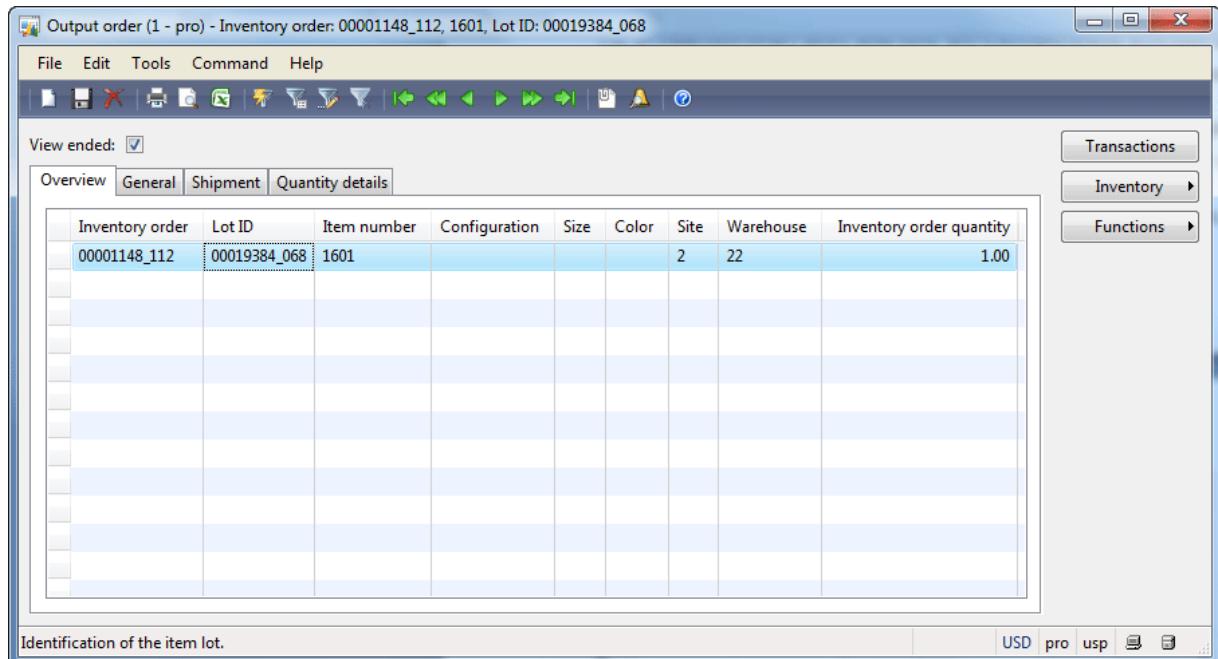


Figure 5.31 Output order form

To view all output orders, go to **Inventory management > Inquiries > Output orders**.

Shipping Components

To deliver BOM components to the work center, the shipment process is used. This process is explained in details in [this training lesson](#).

Shortly, the Shipment Manager or the Production Manager creates a shipment order that combines two output orders, and then activates picking routes. The Warehouse Worker receives information about the picking routes which define the places from where to pick items and the places where to deliver them. According to this information, the Warehouse Worker delivers the items to a work center production location.

1. Go to **Inventory management > Common Forms > Shipments**. The **Shipment form** opens.
2. Create a new line. The **Create shipment** wizard opens. Go through the wizard pages. You need to select only the **100_all** shipment template and the time by clicking the **Next** buttons. After the wizard is complete, the **Shipment** form will have the following view:

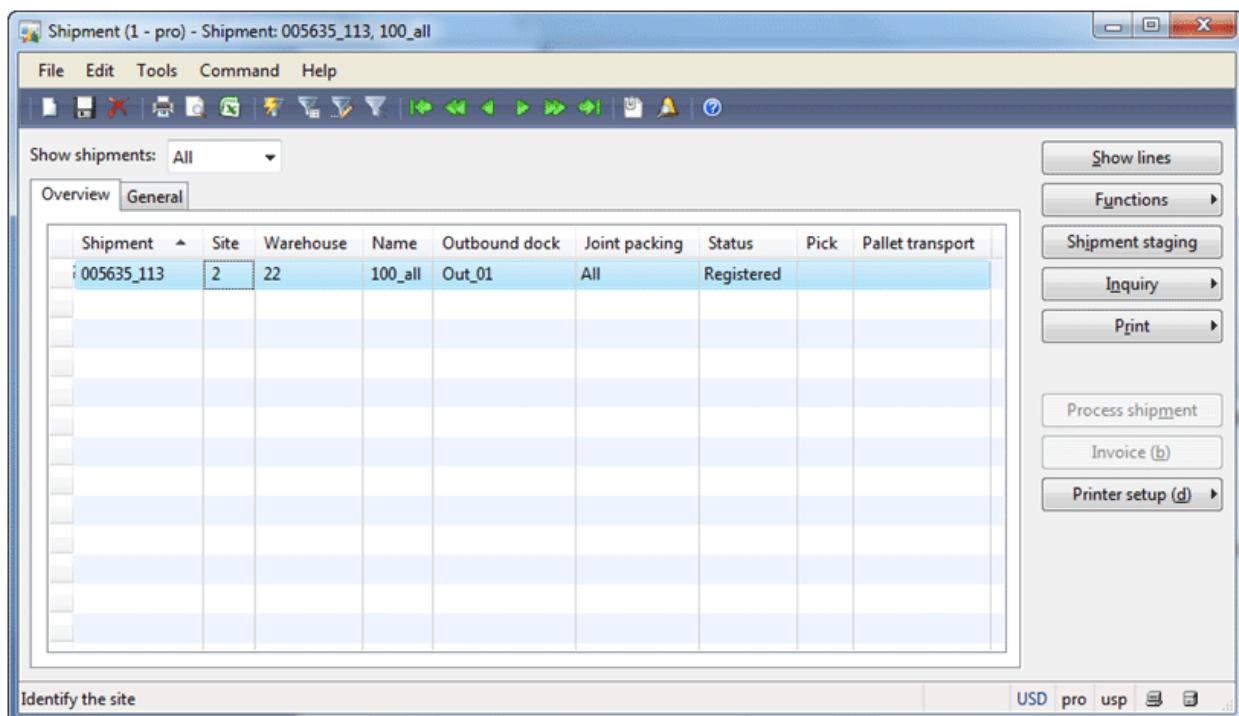


Figure 5.32 Shipment form (Registered status)

3. Activate picking routes. Click the **Functions > Activate** menu button.
4. As a result the shipment status is changed from *Registered* to *Activated* and the pick status becomes *Activated*. The picking routes are generated.
5. Go to **Inventory management > Common Forms > Picking routes**. The **Pick** form opens.
6. In the **Picking route** field, select the generated picking route.
7. Click the **Create picking pallet** button. The **Create picking pallet** dialog box appears. Click **OK**.

Production life cycle

8. The **Pick** form will have the following view:

The screenshot shows the 'Pick (I - pro) - Picking route: 005476_116, Pick-22' window. The top menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has sections for Criteria (Employee: 7210, Warehouse: 22), Picking (Picking route: 005476_116, Picking pallet: 00000110_114), and RFID (RFID tagging status: Not applicable). A central table displays picking lines for items 1601 and 1602, showing details like Site (2), Warehouse (22), Location (01-01-01-1 or 01-02-01-1), Balance after (23.00), Quantity (1.00), Reserved (checked), and RFID tagging (unchecked). To the right of the table are buttons for Approve details (b), Refill (g), Quantity adjustment, Inventory, and Read tags (k). The bottom of the window has a status bar with USD, pro, usp, and other icons.

Item number	Configuration	Size	Color	Site	Warehouse	Location	Balance after	Quantity	Reserved	RFID tagging
1601				2	22	01-01-01-1	23.00	1.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1602				2	22	01-02-01-1	23.00	1.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Figure 5.33 Pick form

9. The picking locations are automatically searched and depend on a shipment reservation combination (see the [Shipment training lesson](#)). According to the picking lines, item 1601 must be picked from location 01-01-01-1 and item 1602 must be picked from location 01-02-01-1. When the Warehouse Worker reaches the picking location, he or she approves the picking line. Click the **Approve details** button. The **Approve lineform** opens.

Production life cycle

The screenshot shows the 'Approve line (1 - pro) - Handling status: Activated, Route: 005476_116' window. At the top, there's a toolbar with various icons. Below it is a header bar with 'Item number: 1601' and 'Unit: ea'. A 'Transactions' section contains a table with columns: Site, Warehouse, Location, Pallet ID, Item tagging, Tag status, Quantity, and Reserved. One row is selected with values: Site 2, Warehouse 22, Location 01-01-01-1, Pallet ID 00000096_114, Item tagging checked, Tag status Not applicable, Quantity 1.00, and Reserved checked. To the right of the table are several buttons: 'Pick selected', 'Split', 'Cancel picking line', 'Inventory >', 'Read tag', and 'Write tag'. Below the table is a 'Parameters' section with 'Server ID:' and 'Device name:' dropdowns. At the bottom, there's a note 'Identify the site' and a toolbar with buttons for USD, pro, usp, and other options.

Figure 5.34 Approve line form

10. To pick the items from the location to a picking pallet, click the **Pick selected** button.
11. The **Approve lines** form opens for the second line. When the Warehouse Worker reaches the second picking location, she or he clicks the **Pick selected** button again.
12. Since all items are picked, the Warehouse Worker transfers these items to the destination location. The destination location is shown in the **Deliver picked items** form.

The screenshot shows the 'Deliver picked items (1 - pro) - Picking route: 005476_116, Pick-22, Picking route: 005476_116' window. It has a toolbar at the top. Below it is a table titled 'Items to deliver' with tabs 'Overview' and 'Details'. The table has columns: Route, Pallet ID, Location, Warehouse, Total quantity, and Number of lines. One row is selected with values: Route 005476_116, Pallet ID 00000110_114, Location 01-00-0-0, Warehouse 23, Total quantity 2.00, and Number of lines 2. To the right of the table is a 'Deliver items' button. Below the table is a 'Deliver to destination' section with fields: Warehouse (23), Location (01-00-0-0), and Pallet ID (00000110_114). There's also a checkbox 'Deliver pallet at destination: checked'. At the bottom, there's a note 'Picking route or pallet transport.' and a toolbar with buttons for USD, pro, usp, and other options.

Figure 5.35 Deliver picked items form

Production life cycle

Note that the component items will be delivered to the work center production location 01-00-0-0. We have specified this location for the work center group 011 in the “Create route” topic [of this training](#).

13. When the Warehouse Worker delivers the items to the destination location, he or she clicks the **Deliver items** button.

Let's analyze the results. The component items are picked from locations 01-01-01-1 and 01-02-01-1 in the warehouse 22 and are delivered to the work center production location 01-00-0-0 in the warehouse 23. Let's check the inventory transaction for the component items. Go to **Production > Common Forms > Production order details**. In the **Production orders** form, select the production order and click the **BOM** button. In the **BOM** form, select the line with the required component (either item 1601 or 1602) and click the **Inventory > Transactions** menu button.

The screenshot shows the 'Transactions' form with the title bar 'Transactions (1 - pro) - Reference: Production line, PRD_00000592, Lot ID: 00019384_068'. The menu bar includes File, Edit, Tools, Command, and Help. The toolbar has various icons for navigation and search. The main area has tabs: Overview, General, Update, Ledger, Reference, Other, and Dimension. The table displays one row of data:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22	01-01-01-1	00000096.114			Production line	PRD_00000592	Picked		-1.00	

On the right side, there are four buttons: Inventory, Ledger, Functions, and Configuration details. At the bottom, there are buttons for USD, pro, usp, and other language options.

Figure 5.36 Transactions form (BOM component Picked)

We can see that one item 1601 is picked from the location 01-01-01-1 in the warehouse 22. Note that the inventory transaction doesn't reflect the information about the place to which the items are delivered.

Starting

When all components are delivered to the work center, workers can start the production. The time and the component quantities consumed during the production, and the number of produced items is posted to the system with the help of a Job card journal (or a Route card journal, if jobs are not generated).

Production life cycle

In Microsoft Dynamics AX, there are three ways to create and post the Job card journal:

- Manually. In this case, when a production order is released, a job card is printed (the **Release** form, **General** tab, **Print job card** check box). The job card report is given to the workers. When the workers end the production, they fill in the job card report (start and end time, produced quantity, error quantity) and give it back to the office. Then, the Production Manager creates a job card journal and fills in the information from the job card report to the journal. And, finally the journal is posted.
- Shop Floor Control. The Shop Floor Control module is used for managing tasks performed by workers. All jobs created for a production order can be handled in this module. This module is designed to remove all paper work. All job information is entered to the system by employees. A worker starts a specific job, ends it, and enters the quantity of produced items, bad items, etc. The time is calculated based on the job start and end time. When the worker ends a job, a job card journal is created and posted automatically. The job card journal contains real figures (time, cost, produced quantity) of jobs.
- Automatically. In this case, the job card journal is not created, the route card journal is created instead and is posted with the estimated number of product produced quantity and scheduled time. This is used when estimation and scheduling generate valid values (time, cost, produced quantity, scrap).

Actually, the first two options are a manual registration of consumed time and quantity, the last one is an automatic registration of scheduling time and quantity.

Each operation can be set up to be posted either automatically or manually. This can be controlled with the help of a route group. In our case, we set up the route group 20 for the Assembly operation.

Let's check the route group setup:

1. Go to **Production > Setup > Routes > Route groups**. The **Route group** form opens.
2. Select the route group 20 and go to the **General** tab.

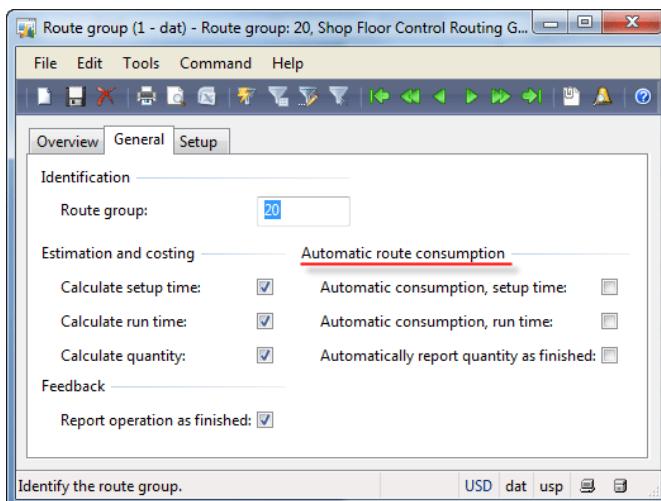


Figure 5.37 Route group form

The **Automatic route consumption** field group controls which operation jobs will be automatically posted to the system.

Production life cycle

We have set up the route group 20 in the “Create route” topic of this training lesson. The **Automatic route consumption** check boxes are cleared, so we will create and post the job card journal manually.

To produce the Universal Recorder, the Assem_Encl (Enclosure Assembly) operation must be executed (the **Production order** form, the **Route** button). This operation is divided into the following jobs: Setup and Process (the **Production order** form, the **Jobsbutton**).

Figure 5.38 Jobs form

We will post the time and the product quantity produced by the Setup job via the Shop Floor control module. For the Process job, we will create the job card journal manually.

Before that, we should run the Start process. The Start process is used to create and post the picking list and the route card journals automatically. Both journals can be created and posted manually (the **Production orders** form, the **Journals** button), so this step is not mandatory. We will run the Start process to create and post the picking list journal since all component items are already picked and delivered to the work center.

In the **Production orders** form, click the **Update > Start** button. The **Start** form opens. Go to the **General** tab and make sure that the **Post picking list now** check box is selected. Click **OK**.

Production life cycle

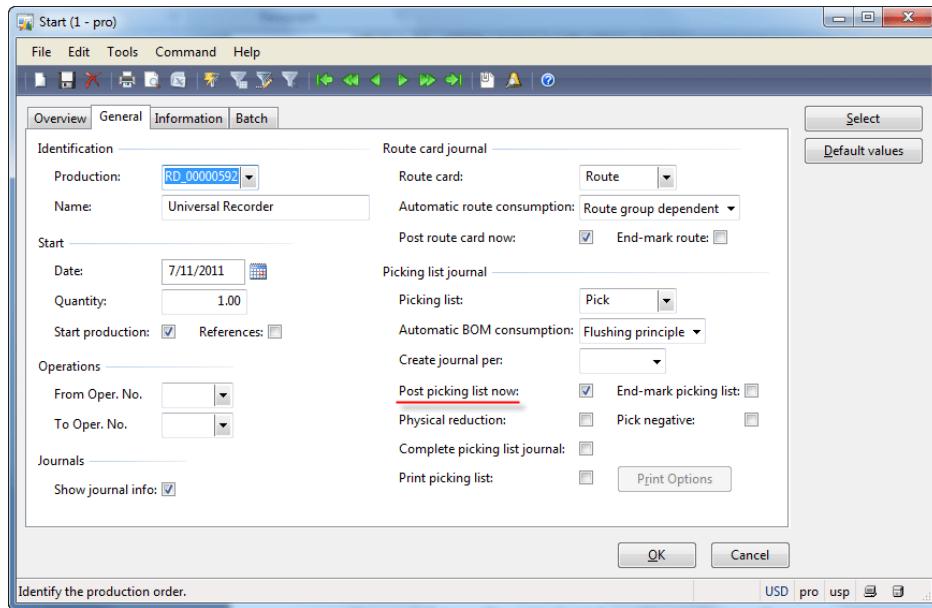


Figure 5.39 Start form

The Infolog with the information about the created picking list journal will be shown.

Analyze the results:

1. The production order status is changed from *Released* to *Started*.
2. A picking list journal is created and posted. In the **Production orders** form, click the **Journals > Picking list** menu button. The **Production journal** form opens. Click the **Lines** button. The **Production journal lines, picking list** form opens.

The screenshot shows the 'Production journal lines, picking list (1 - pro)' form. It displays two lines for a 'Standard Digital Video Recorder M' with a quantity of 1.00. The lines are:

Date	Lot ID	Item number	Site	Proposal	Consumption	Unit	End	Log
7/11/2011	00019384_068	1601	2	1.00	1.00	ea		
7/11/2011	00019385_068	1602	2	1.00	1.00	ea		

At the bottom, it shows 'Item name: Standard Digital Video Recorder M', 'Estimated: 1.0000', 'Remainder: ', 'Started: 1.00', and 'Released quantity: 1.00'. On the right, there are buttons for 'Validate', 'Post', 'Log', 'Functions', 'Inventory', and 'Print'.

Figure 5.40 Production journal lines, picking list form

Production life cycle

The picking list journal shows how many components were consumed during the production process. If for example, the component 1601 will be broken during the production, a new component must be delivered to the work center and the picking list journal must be created and posted.

- When the picking list journal is posted, the status of an inventory transaction for component items is changed from *Picked* to *Deducted*. In the **Production order** form, click the **BOM** button. In the **BOM** form, select the first or the second line and then click the **Inventory > Transactions** menu button. The **Transactions** form will have the following view:

The screenshot shows the 'Transactions' form window titled 'Transactions (1 - pro) - Reference: Production line, PRD_00000592, Lot ID: 00019384_068'. The main grid displays a single row of data:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22	01-01-01-1	00000096_114	7/11/2011		Production line	PRD_00000592		Deducted	-1.00	

On the right side of the form, there are several buttons: 'Inventory', 'Ledger', 'Functions', and 'Configuration details'. At the bottom, there is a note 'Identify the site' and a currency converter 'USD pro usp'.

Figure 5.41 Transactions form (BOM components Deducted)

- Production posting. When the picking list journal is posted, the ledger transactions are generated. The cost of items is recorded to work-in-process ledger accounts. To view a ledger voucher, click the **Inquiries > Production posting** menu button in the **Production orders** form. In the **Production posting** form, find the Material consumption record and click the **Ledger > Voucher** menu button.

The screenshot shows the 'Production posting' form window titled 'Production posting (1 - pro) - Production: PRD_00000593, 7/12/2011, Production: PRD_00000593'. The main grid displays two rows of data:

Date	Type	Good quantity	Error quantity	IIP/WIP amount	Cost accounted amount
7/12/2011	Material consumption			362.00	
7/12/2011	Indirect cost			50.68	

On the right side, there are buttons for 'Inventory', 'Ledger', 'Route', and 'Indirect cost'. At the bottom, there is a note 'Posting date' and a currency converter 'USD pro usp'.

Figure 5.42 Production posting form

Production life cycle

5. The job status is changed from *Coming* to *Waiting*. In the **Production order** form, click the **Jobs** button. The **Jobs** form will have the following view:

The screenshot shows the 'Jobs' form in Microsoft Dynamics AX 2009. The title bar reads 'Jobs (1 - pro) - Production: PRD_00000592, Setup, Production: PRD_00000592'. The menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has tabs: Overview, General, Scheduling, and Feedback. The Overview tab is selected, displaying a grid of job details. The columns are: Oper. No., Priority, Job type, Work center, Production unit, Job status, Start date, Start time, End date, and End time. Two rows are visible in the grid:

Oper. No.	Priority	Job type	Work center	Production unit	Job status	Start date	Start time	End date	End time
10	Primary	Setup	01101		Waiting	7/11/2011	08:00 am	7/11/2011	10:00 am
10	Primary	Process	01101		Waiting	7/11/2011	10:00 am	7/11/2011	02:00 pm

Below the grid, there is a note: 'Number for determining sequence in routes'. On the right side of the form, there are three buttons: Inquiries, Functions, and Materials.

Figure 5.43 Jobs form (Waiting)

Posting a Job in Shop Floor Control

In this topic, we will study how to start and finish a job in the Shop Floor Control module. If you don't have this module, you can post the job card journal manually as described in the next paragraph.

Prerequisite setup:

1. By default, the Terminal form cannot be closed. Let's set up the parameter that allows closing it. Go to **Shop Floor Control > Setup > Terminals > Configure registration** forms. The **Configure registration** form opens. Select the "Default" configuration and clear the **Disable Close** check box.

Production life cycle

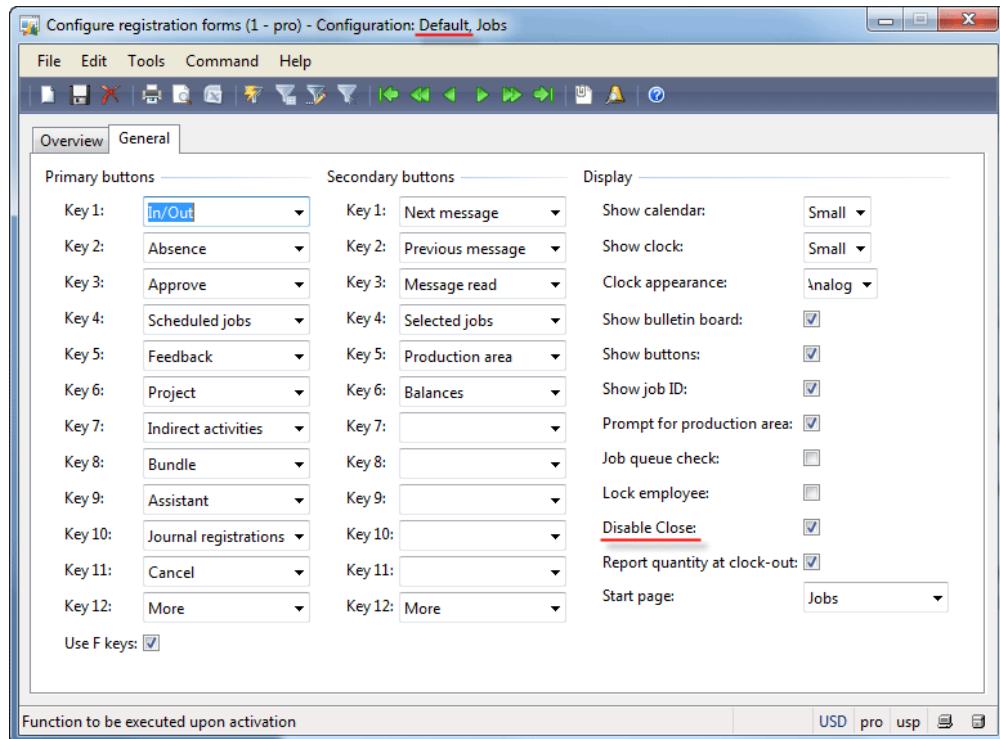


Figure 5.44 Configure registration form

2. Go to **Shop Floor Control > Setup > Production > Production parameters**. In the **Production parameters** form, go to the **Operations** tab and change the **Job level** field value from *Route* to *Job*.

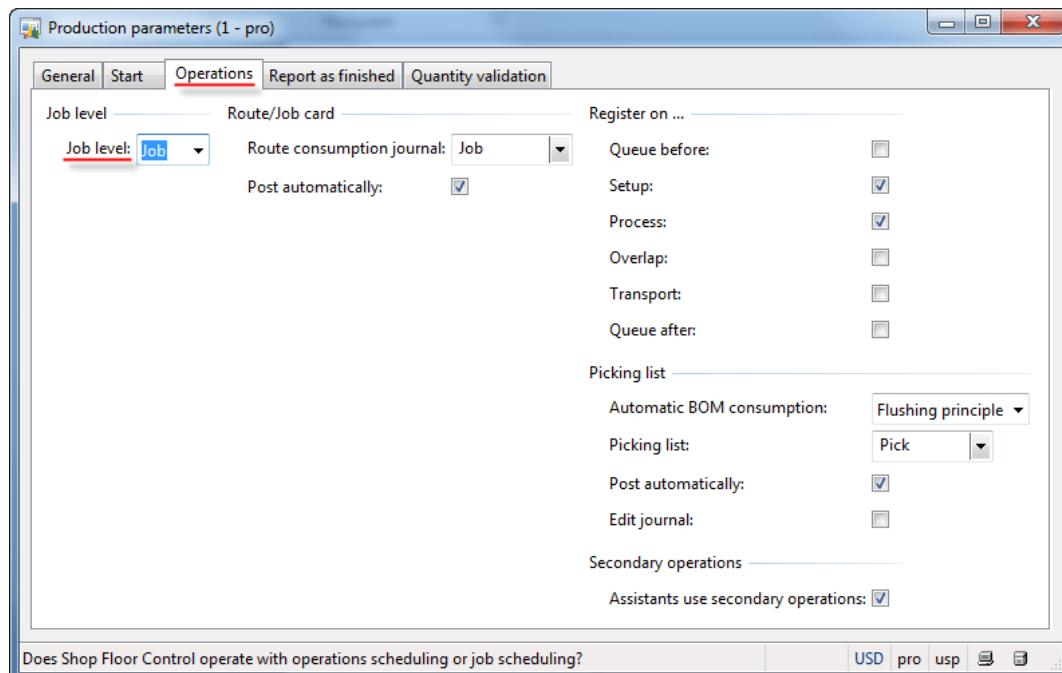


Figure 5.45 Production parameters form

Production life cycle

To start the Setup job in the Shop Floor Control module, do the following:

1. Go to **Shop Floor Control > Periodic > Registration > Job registration (Job queue)**. The **Change production area** form opens. Fill in 2 in the **Site** field and then click **OK**. The **Registration** form opens.

The screenshot shows the 'Registration - 2 (1 - pro)' window. At the top, there are fields for Employee number, Employee name, Flex balance, Job identification, Status, and Flex date. Below these are buttons for 'From time' and 'Read'. A message says 'This grid is empty.' followed by the date '7/11/2011'. The main area is titled 'Jobs in queue' and contains a table with the following data:

Reference ID	Operation/Activity	Oper. No.	Job type	Work center	Quantity	Started quantity	From date	From time	Start	Start quantity
PRD_00000592	Assem_Encl	10	Production setup	011				12:00:00 am	<input checked="" type="checkbox"/>	
PRD_00000592	Assem_Encl	10	Production process	011	1.00			12:00:00 am	<input checked="" type="checkbox"/>	

Below the table, there are fields for Job identification (JOB_00001541), Item name (Universal Recorder), Employee, Description (Enclosure Assembly), Item number (0000), Continue bundle (No), and several function keys (F1-F12) for various actions like In/Out, Absence, Feedback, etc.

Figure 5.46 Registration form

We can see that the registration form contains the Setup and Process job.

2. Select the employee 3130 (Lars Giusti) in the **Employee number** field. Note that the employee must have the **Configuration** field empty (**Shop Floor Control > Setup > Employee > General tab > Setup** field group).
3. Select the **Start** check box for the Production setup job. In my demo data, I receive the following error message "JOB_00001541 is an invalid job ID". Some issues has occurred with the job ID, I need to synchronize the job tables. If you receive the same error message, go to **Shop Floor Control > Periodic > Update > Synchronize job table**. The form opens, select the **Synchronize production** check box and click **OK**. Then, close the **Registration** form and open it again, repeat step 2.
4. Then click the **Approve** button.

Production life cycle

Figure 5.47 Registration form after Approve

5. In the header area, select the employee 3130 in the **Employee number** field again.
 6. Click the **Feedback** button. The **Quantity reports** form opens.
 7. The Warehouse Worker fills in this form. Since during the Setup job, no product quantity is produced, the worker just reports that the job is finished. Select Yes in the **Finished** field.

Figure 5.48 Quantity reports form

Click the **Approve** button. One more issue occurs “System does not support setup ‘continuous’ of number sequence Prod_89.” Close the **Quantity reports** form and go to **Basic > Setup > Number sequences >Number sequence**. In the **Number sequence** form, find the Prod_89 number sequence, on the **General** tab, clear the **Continuous** check box, and then click **ok**. The warning message opens, click **Yes**. Repeat step 7 again – everything is fine.

Production life cycle

Let's analyze the results:

1. The Job card journal is created and posted. In the **Production orders** form, click the **Journals > Job card** menu button. The **Production journal** form with one posted journal opens. Click the **Lines** button. The **Production journal lines, job card** form opens.

The screenshot shows the 'Production journal lines, job card' window. The main area displays a table with columns: Date, Job identification, Employee, Start time, End time, Hours, Good quantity, Error quantity, Processing percentage, and End. A single row is selected, showing the date 7/11/2..., job identification JOB_00001555, employee 3130, start time 12:00 am, end time 12:00 am, hours 0, good quantity 0, error quantity 0, processing percentage 0%, and end checked. To the right of the table are buttons for Validate, Post, Log, Functions, Job, and Picking list. At the bottom are buttons for Feedback date, USD, pro, usp, and a file icon.

Figure 5.49 Production journal lines, job card

2. Production posting. When the job card journal is posted, ledger transactions are generated. The cost of work is recorded to the work-in-process ledger accounts. To view the ledger voucher, click the **Inquiries > Production posting** menu button in the **Production orders** form. In the **Production posting** form, find the Route consumption record and then click the **Ledger > Voucher** menu button. Since we only post that the Setup job is finished, the cost is not calculated and no ledger transactions are generated. The cost of the Setup operation will be posted later in the topic "Ending" of this lesson.

The screenshot shows the 'Production posting' window. The main area displays a table with columns: Date, Type, Good quantity, Error quantity, IIP/WIP amount, and Cost accounted amount. Three rows are visible: 1) Date 7/12/2011, Type Material consumption, IIP/WIP amount 362.00. 2) Date 7/12/2011, Type Route consumption. 3) Date 7/12/2011, Type Indirect cost, IIP/WIP amount 50.68. To the right of the table are buttons for Inventory, Ledger, Route, and Indirect cost. At the bottom are buttons for Posting type, USD, pro, usp, and a file icon.

Figure 5.50 Production posting form

Production life cycle

3. As a result, the Setup job is completed. In the **Production orders** form, click the **Jobs** button.

Figure 5.51 Jobs form

On the **Feedback** tab, you can review how much time is consumed and the quantity of products produced.

Posting a Job Manually

Now, we will study how to start and end a job manually. Let's assume that you are the Production Manager in an office. The job card report was printed during the Release step (the **Release** form, the **General** tab, the **Print job card** check box). You send the report to a worker. The worker performs the Run job and fills in all information about consumed time, produced quantity, and error quantity in the report. The report has been delivered to the office. You should create and post the job card journal and, since the Assem_Encl (Enclosure Assembly) operation is completed, create and post the route card journal (the Assem_Encl operation is completed when the Setup and Run jobs are completed).

1. Go to the **Production orders** form. Click the **Journals > Job card** menu button. The **Production journal** form opens.
 2. Create a new line and select Job in the **Name** field. Click the **Lines** button. The **Production journal lines, job card** form opens.
 3. Create a new line with the following values:
 - Job identification = JOB_00001556 (your job identification for the Process job can differ)
 - Employee = 3131 (Lars Rathje)
 - Hours = 3
 - Good quantity = 1
 - End = Yes
 - Operation completed = Yes
 4. Click the **Post** button.

Production life cycle

Let's analyze the results:

1. The Process job is completed. In the **Production orders** form, click the **Jobs** button.

The screenshot shows the 'Jobs' form in Microsoft Dynamics AX 2009. The title bar reads 'Jobs (1 - pro) - Production: PRD_00000592, Setup, Production: PRD_00000592'. The menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has tabs: Overview, General, Scheduling, and Feedback. The Overview tab is selected, displaying a table with columns: Oper. No., Priority, Job type, Work center, Production unit, Job status, Start date, Start time, End date, and End time. Two rows are present in the table:

Oper. No.	Priority	Job type	Work center	Production unit	Job status	Start date	Start time	End date	End time
10	Primary	Setup	01101		Ended	7/11/2011	02:00 pm	7/11/2011	02:00 pm
10	Primary	Process	01101		Ended	7/11/2011	02:00 pm	7/11/2011	02:00 pm

A message at the bottom left says 'Number for determining sequence in routes'. On the right side, there are three buttons: Inquiries, Functions, and Materials. At the bottom right are currency and user buttons: USD, pro, usp, and a print icon.

Figure 5.52 Jobs form

2. Production posting. When the job card journal is posted, the ledger transactions are generated. The cost of work is recorded to the work-in-process ledger accounts. To view the ledger voucher, click the **Inquiries > Production posting** menu button in the **Production orders** form. In the **Production posting** form, find the Route consumption record, and then click the **Ledger > Voucher** menu button.

The screenshot shows the 'Production posting' form in Microsoft Dynamics AX 2009. The title bar reads 'Production posting (1 - pro) - Production: PRD_00000593, 7/12/2011, Production: PRD_00000593'. The menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has tabs: Overview and General. The General tab is selected, displaying a table with columns: Date, Type, Good quantity, Error quantity, IIP/WIP amount, and Cost accounted amount. Several rows are listed:

Date	Type	Good quantity	Error quantity	IIP/WIP amount	Cost accounted amount
7/12/2011	Material consumption			362.00	
7/12/2011	Route consumption				
7/12/2011	Route consumption			31.00	
7/12/2011	Indirect cost			3.93	
7/12/2011	Indirect cost			50.68	

A message at the bottom left says 'Posting date'. On the right side, there are four buttons: Inventory, Ledger, Route, and Indirect cost. At the bottom right are currency and user buttons: USD, pro, usp, and a print icon.

Figure 5.53 Production posting form

Production life cycle

3. The Operation is finished. In the **Production orders** form, click the **Route** button.

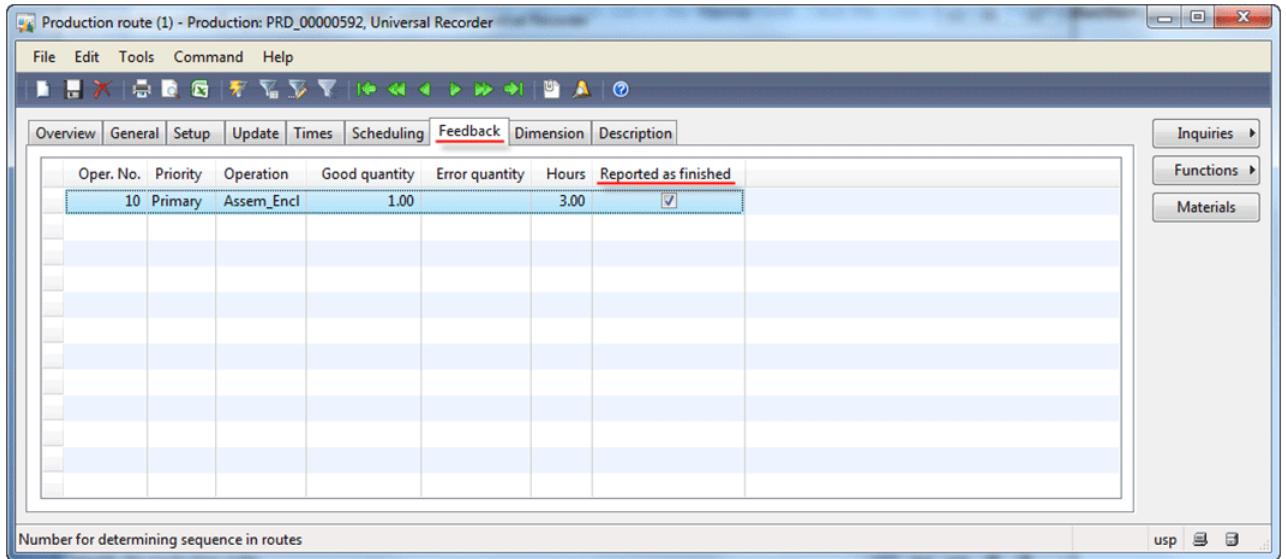


Figure 5.54 Production Route, Feedback tab

4. The real cost of produced items is updated (on the basis of job card journals). In the **Production orders** form, click the **Inquiries > Price calculation** menu button. In the **Calculation** form, go to the **Overview Costing** tab. Since we post that the Setup job consumes 0 hours, the total cost will differ.

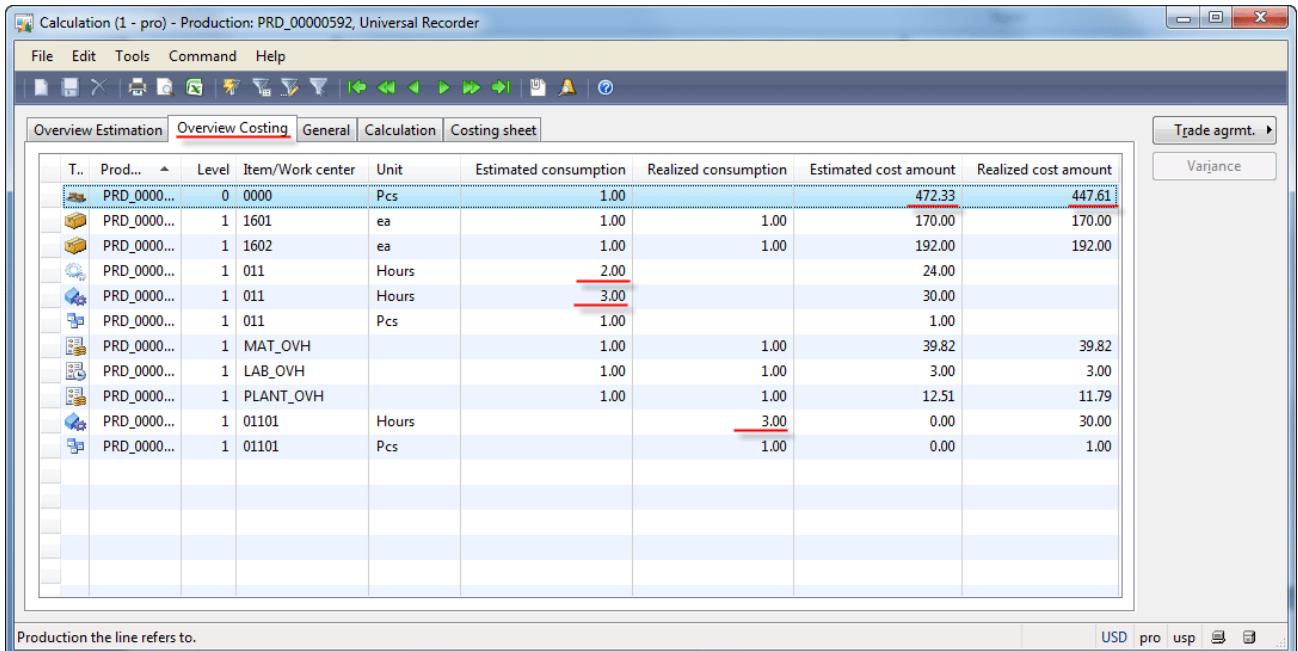


Figure 5.55 Calculation form, Overview Costing tab

Reporting as Finished

When a product is produced, the next step is delivering it to the warehouse. Microsoft Dynamics AX allows only registering the produced item in a certain place in a warehouse. If it is required to move a produced item from a work center to another location, standard inventory journals or a transfer order must be used.

1. Specify the warehouse where the produced item will be registered (since the Universal Recorder item has the Site and the Warehouse dimensions active). In the **Production order** form, go to the **Dimensions** tab and then select 22 in the **Warehouse** field.

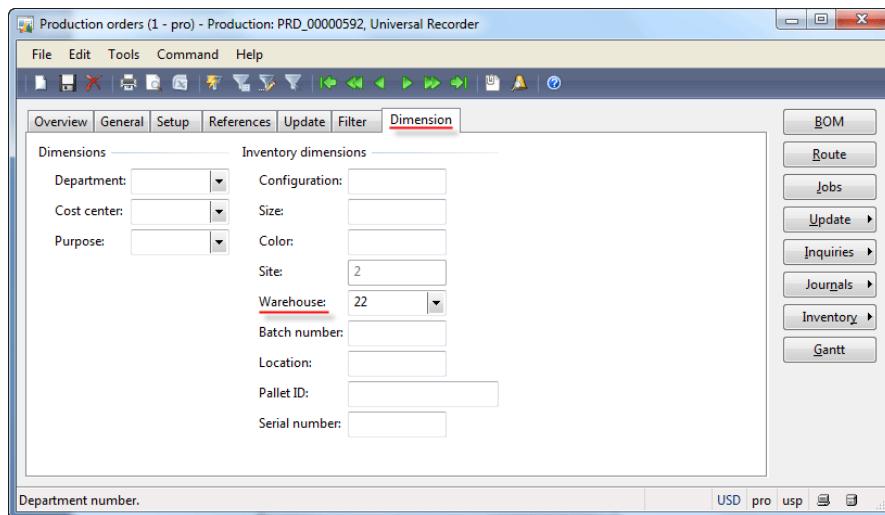


Figure 5.56 Production order form, Dimensions tab

2. In the **Production orders** form, click the **Update > Report as finished** menu button. The **Report as finished** form opens. Click **OK**.

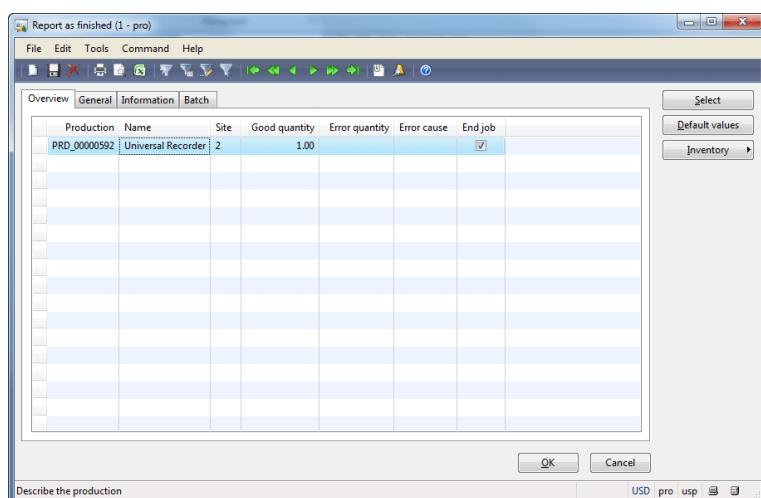


Figure 5.57 Report as finished form

Production life cycle

Analyze the results:

1. The production order status is changed from *Started* to *Reported as finished*.
2. The Report as finished journal is created and posted. In the **Production orders** form, click **Journals > Report as finished**. The **Production journal** form with one posted journal opens.
3. Production posting. When the report as finished journal is posted, the ledger transactions can be generated. To view a possible ledger voucher, click the **Inquiries > Production posting** menu button in the **Production orders** form. In the **Production posting** form, find the Report as finished record and click the **Ledger > Voucher** menu button. In our case, no additional ledger transactions are generated.

The screenshot shows the 'Production posting' window with the title bar 'Production posting (1 - pro) - Production: PRD_00000592, 7/11/2011, Production: PRD_00000592'. The menu bar includes File, Edit, Tools, Command, Help. The toolbar has standard icons like New, Open, Save, Print, etc. The main area has tabs 'Overview' and 'General'. A table lists ledger entries:

Date	Type	Good quantity	Error quantity	IIP/WIP amount	Cost accounted amount
7/11/2011	Material consumption			362.00	
7/11/2011	Route consumption				
7/11/2011	Route consumption			31.00	
7/11/2011	<u>Report as finished</u>	1.00			
7/11/2011	Indirect cost			3.93	
7/11/2011	Indirect cost			50.68	

On the right, there are buttons for 'Inventory', 'Ledger', 'Route', and 'Indirect cost'. At the bottom, there's a link 'Show related inventory transactions.' and a toolbar with USD, pro, usp, and other icons.

Figure 5.58 Production posting form

4. The Receipt status of the inventory transaction for the produced item is changed from *Ordered* to *Received*. In the **Production orders** form, click the **Inventory > Transactions** menu button. The **Transactions** form has the following view:

The screenshot shows the 'Transactions' window with the title bar 'Transactions (1 - pro) - Reference: Production, PRD_00000592, Lot ID: 00019383_068'. The menu bar includes File, Edit, Tools, Command, Help. The toolbar has standard icons. The main area has tabs 'Overview', 'General', 'Update', 'Ledger', 'Reference', 'Other', and 'Dimension'. A table lists transactions:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22			7/11/2011		Production	PRD_00000592	Received		1.00	

On the right, there are buttons for 'Inventory', 'Ledger', 'Functions', and 'Configuration details'. At the bottom, there's a link 'Show related transactions in the inventory.' and a toolbar with USD, pro, usp, and other icons.

Figure 5.59 Transactions form (BOM item Received)

Production life cycle

Ending

The last step in the production process lifecycle is the End. During this process, the financial update occurs. The cost of produced items is transferred from the work-in-process ledger account to the item receipt ledger account, and the cost of components is transferred from the work-in-process ledger account to the item issue ledger account.

1. In the **Production orders** form, click the **Update > End** menu button. The **End** form opens.

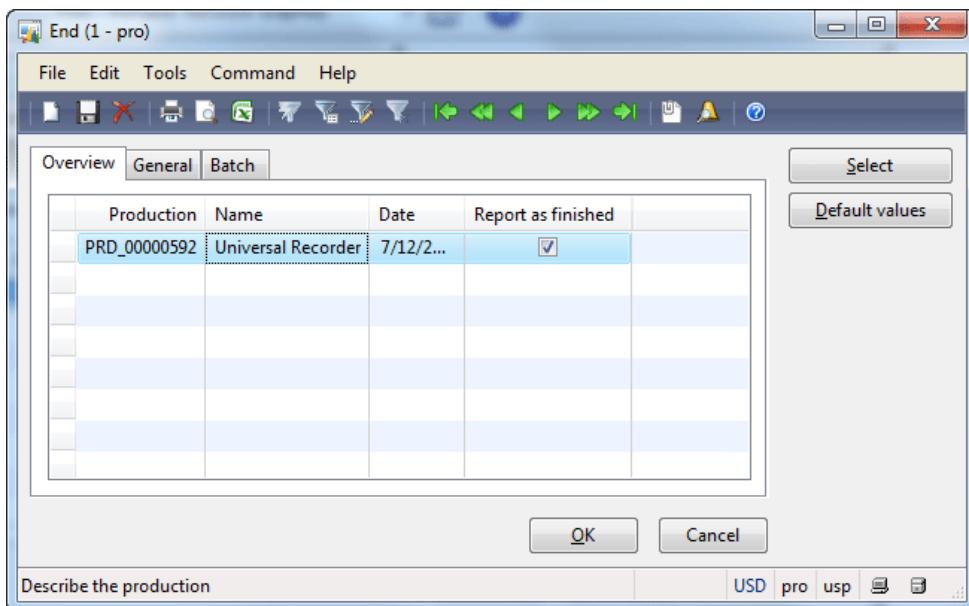


Figure 5.60 End form

2. Click **OK**. The “Active job registrations or journal registrations exist on production in Shop Floor Control” error message appears. This is because all costs must be posted before the final End step can be executed. We have started and ended the Setup job in the Shop Floor Control module, but we don’t transfer the cost of time consumed by a worker.

In the Shop Floor Control module, all information entered by a worker must be approved by a manager. Let’s approve the Setup job costs:

1. Go to **Shop Floor Control > Common Forms > Approve**. The **Approve** dialog box appears, select the date when you posted the job in the Shop Floor Control module (in my case, it is the yesterday date) and then click **OK**. The **Approve** form opens.
2. Find the employee 3130. The **Approve** form will have the following view:

Production life cycle

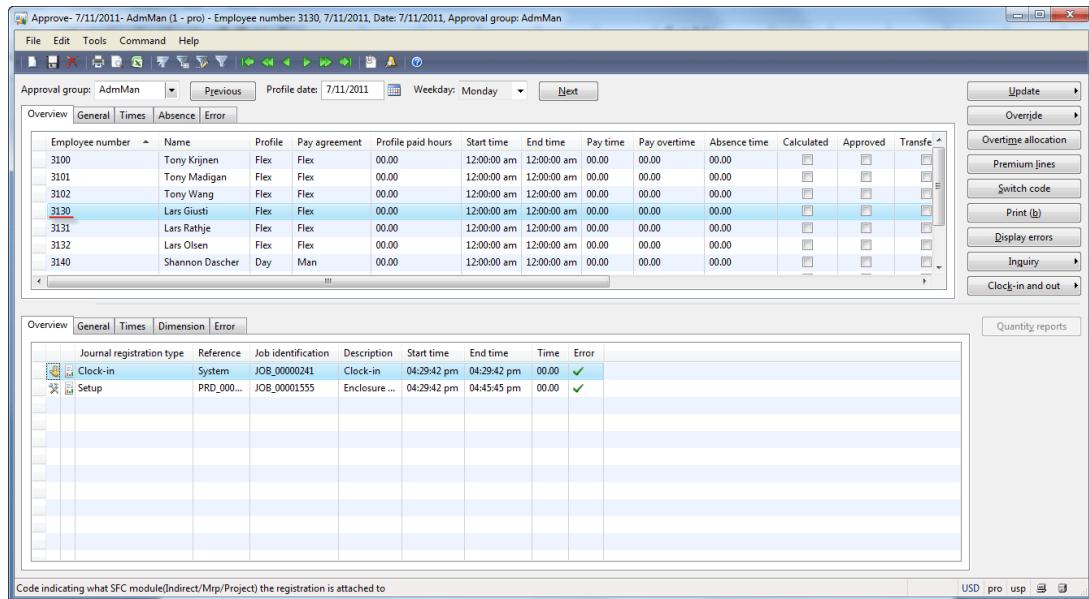


Figure 5.61 Approve form

In the line area, we can see that employee 3130 (Lars Giusti) (3130) performed the following actions: clocked in at 04:29 pm and was performing the Setup for Enclosure assembly operation from 04:29 pm till 04:45 pm (in my case).

3. Click the **Update > Approve** menu button. The **Approve jobs** form opens. Click **OK**.
4. The system determines that Lars Giusti was absent from the 07:00 till the 3:00 pm (in my case), so the absence code is required. In the header area, go to the **Absence** tab and fill in Education in the **Reference** field and JOB_00000208 (Course) in the **Absence job** field. Repeat step 3 again.
5. Now, the error for the header appears. In the header area, go to the **Error** tab.

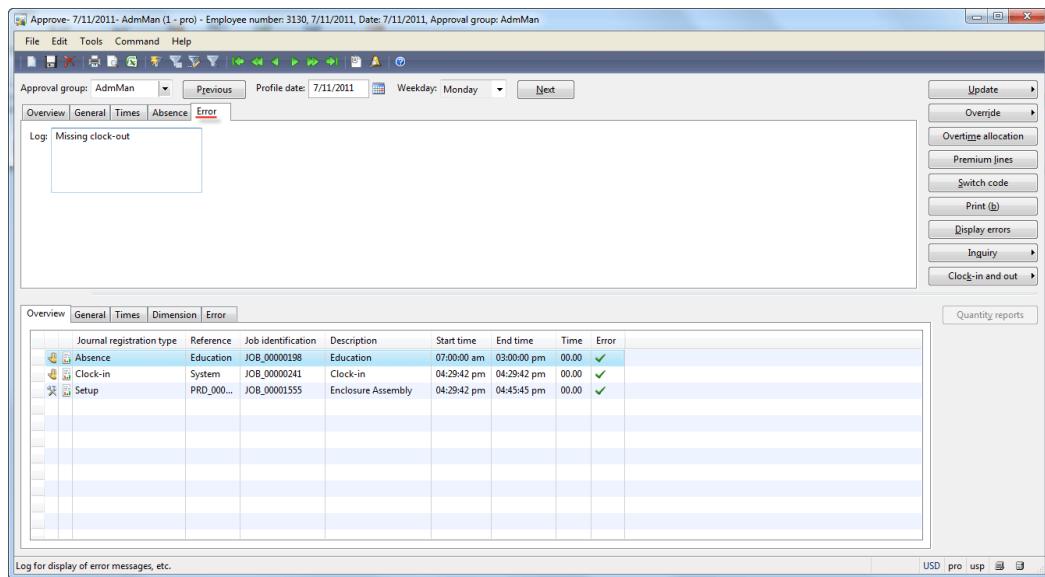


Figure 5.62 Approve form, Error tab

This is because an employee's jobs can be approved before the employee is logged out.

Production life cycle

- To log out the employee 3130, go to **Shop Floor Control > Periodic > Clock out employees**. The **Clock out employees** form opens. Click the **Select** button and in the **Employee number** field, enter the 3130 value. Click **OK**. In the **Profile date** field, select the date when the Setup job was posted (in my case it is yesterday). The **Clock out employees** form will have the following view:

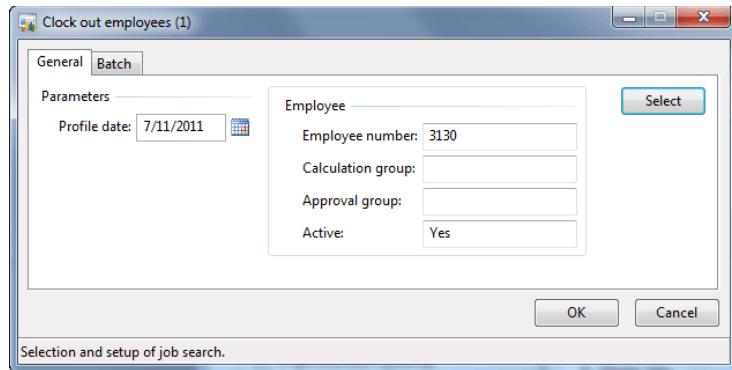


Figure 5.63 Clock out employees form

Click **OK** and return to the **Approve** form.

- In the **Approve** form, select the employee 3130. The new Clock-Out job appears. I change the start time for the Clock out job to 5:00 pm.

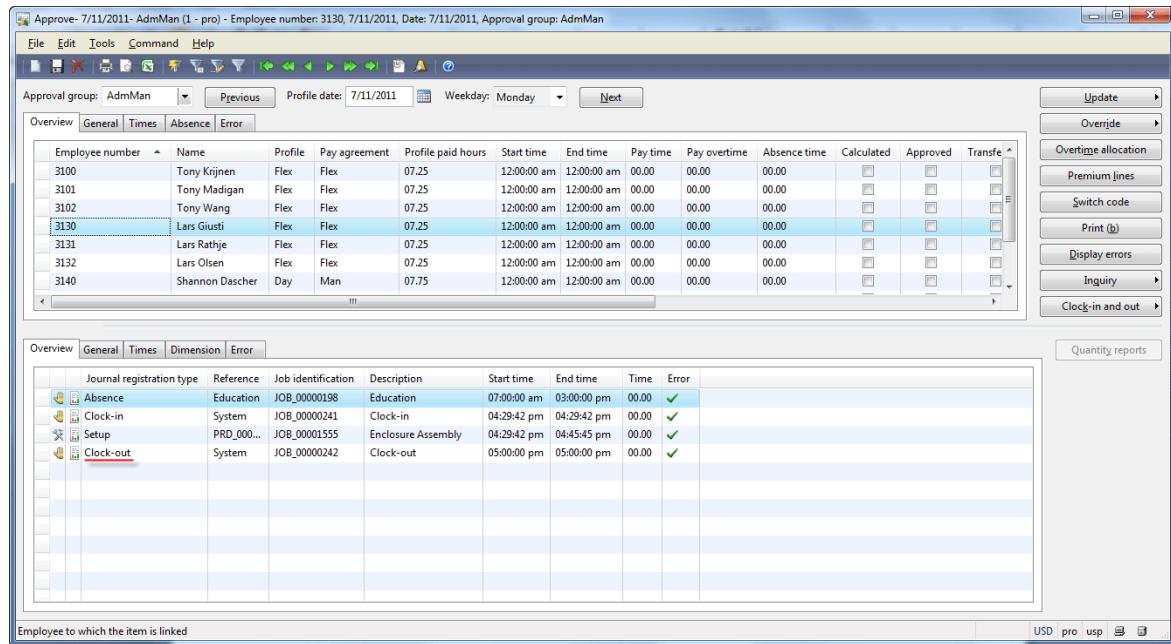


Figure 5.64 Approve form

- Click the **Update > Approve** button. The **Approve jobs** form opens. Click **OK**. The information is approved. Note that the Waiting job appears, because the employee was clicked in but doesn't have any jobs.

Production life cycle

Now, the cost of the Setup job must be transferred to the production order.

1. In the **Approve** form click the **Update > Transfer** button. The **Transfer jobs** form opens. Click **Ok**.
2. The “The payroll period PP_2 does not have a date interval containing 7/11/2011” error message appears. Go to **Shop Floor Control > Setup > Payroll > Pay periods**. The **Pay periods** form opens. Find the PP_2 pay period and create a period, for example, from the yesterday to tomorrow date.

The screenshot shows the 'Pay periods (1 - pro) - Pay period: PP_2, Month' window. The top menu bar includes File, Edit, Tools, Command, and Help. Below the menu is a toolbar with various icons. The main area has two tables. The first table lists pay periods with columns for Pay period and Description. The second table, titled 'From date' and 'To date', shows the specific dates for the selected pay period. At the bottom, there is a note about the unique key and some buttons for USD, pro, usp, and other functions.

Pay period	Description
Monthly	Monthly pay periods
PP_0	Week
PP_1	14 days start even week
PP_2	Month
PP_3	Quarter
PP_4	Half year

From date	To date	Transaction text
7/11/2011	7/13/2011	

Figure 5.65 Pay periods form

3. Repeat step 1.

As a result, a new job card journal with the cost of the Setup job is created and posted. Let's check the job card journal.

1. Return to the **Production orders** form (Go to **Production > Common Forms > Production orders** and find the production order for the 0000 (Universal Recorder) item).
2. Click the **Journals > Job card** menu button. The **Production journal** form with two journals opens. This is an old job card journal that we have posted. No new job card journal is available.
3. Click the **Journals > All** menu button. The **Production journal** form contains three job card journals. (There can be the following errors in Microsoft Dynamics AX: a job card journal is not displayed when the **Journals > Job card** menu button is clicked and the generated job card journal has the **Line** field empty.) Select the latest journal and click the **Lines** button. The **Production journal lines, job card** form will have the following view:

Production life cycle

The screenshot shows a Microsoft Dynamics AX application window titled "Production journal lines, job card (1 - pro) - Production: PRD_00000592, 7/11/2011, Route card journal: 001672_89". The window has a toolbar with various icons. Below the toolbar is a tab bar with "Overview", "General", "Setup", "Report as finished", and "Dimension". The main area is a grid table with columns: Date, Production, Job identification, Employee, Start time, End time, Hours, Good quantity, Error quantity, Processing percentage, and End. A single row is selected, showing the following data:

Date	Production	Job identification	Employee	Start time	End time	Hours	Good quantity	Error quantity	Processing percentage	End
7/11/2...	PRD_00000592	JOB_000001555	3130	04:29 pm	04:45 pm	0.27			13.50	<input checked="" type="checkbox"/>

On the right side of the window, there are several buttons: "Validate", "Post", "Log", "Functions", "Job", and "Picking list". At the bottom, there are currency conversion buttons: "USD", "pro", "usp", and a "Print" icon.

Figure 5.66 Production journal lines, job card

We can see that the Setup job takes 0.27 hour, the cost per hour is placed on the **Setup** tab.

- Let's check the total cost of a produced item. In the **Production orders** form, click the **Inquiry > Price calculation** menu button. The **Overview costing** tab of the **Calculation** form has the following view:

The screenshot shows a Microsoft Dynamics AX application window titled "Calculation (1 - pro) - Production: PRD_00000592, Universal Recorder". The window has a toolbar with various icons. Below the toolbar is a tab bar with "Overview Estimation", "Overview Costing", "General", "Calculation", and "Costing sheet". The main area is a grid table with columns: T., Prod..., Level, Item/Work center, Unit, Estimated consumption, Realized consumption, Estimated cost amount, and Realized cost amount. The table contains multiple rows of data, with the last row highlighted in red, indicating it is the current focus. The data in the last row is as follows:

T..	Prod...	Level	Item/Work center	Unit	Estimated consumption	Realized consumption	Estimated cost amount	Realized cost amount
PRD_0000...	0	0000		Pcs	1.00	1.00	472.33	450.95
PRD_0000...	1	1601		ea	1.00	1.00	170.00	170.00
PRD_0000...	1	1602		ea	1.00	1.00	192.00	192.00
PRD_0000...	1	011		Hours	2.00		24.00	
PRD_0000...	1	011		Hours	3.00		30.00	
PRD_0000...	1	011		Pcs	1.00		1.00	
PRD_0000...	1	MAT_OVH			1.00	1.00	39.82	39.82
PRD_0000...	1	LAB_OVH			1.00	1.00	3.00	3.00
PRD_0000...	1	PLANT_OVH			1.00	1.00	12.51	11.89
PRD_0000...	1	01101		Hours		3.00	0.00	30.00
PRD_0000...	1	01101		Pcs		1.00	0.00	1.00
PRD_0000...	1	01101		Hours		0.27	0.00	3.24

At the bottom, there are currency conversion buttons: "USD", "pro", "usp", and a "Print" icon.

Figure 5.67 Calculation form

We can see that the realized cost amount is changed, because the cost of the Setup job is added (3.24\$). In our case, the scheduled setup time was 2 hours, but the real setup time was 0.27 hour.

- Ledger and route transactions are generated. To view transactions, click the **Inquiries > Production posting** menu button in the **Production orders** form. In the **Production posting** form, find the Route

Production life cycle

consumption record with the WIP amount 3.24. Click the **Ledger > Voucher** menu button to view ledger transactions and then click the **Route > Route transactions** menu button to view route transactions.

The screenshot shows the 'Production posting' window with the title bar 'Production posting (1 - pro) - Production: PRD_00000592, 7/11/2011, Production: PRD_00000592'. The menu bar includes File, Edit, Tools, Command, and Help. The toolbar has various icons for file operations. The main area has tabs 'Overview' and 'General'. The 'General' tab displays a table with columns: Date, Type, Good quantity, Error quantity, IIP/WIP amount, and Cost accounted amount. The table contains the following data:

Date	Type	Good quantity	Error quantity	IIP/WIP amount	Cost accounted amount
7/11/2011	Material consumption			362.00	
7/11/2011	Route consumption				
7/11/2011	Route consumption			31.00	
7/11/2011	Route consumption			3.24	
7/11/2011	Report as finished	1.00			
7/11/2011	Indirect cost			0.10	
7/11/2011	Indirect cost			3.93	
7/11/2011	Indirect cost			50.68	

On the right side, there are four buttons: 'Inventory', 'Ledger' (which is selected), 'Route', and 'Indirect cost'. At the bottom, there is a link 'Show attached ledger transactions.' and a currency converter 'USD pro usp'.

Figure 5.68 Production posting form

Now, we can repeat the End process:

1. In the **Production orders** form, clicks the **Update > End** menu button. The **End** form opens.
2. Click **OK**.

Analyze the results:

1. The production status is changed from *Report as finished* to *End*.
2. The production order is locked for any process. Click the **Update** button, all process buttons are disabled.
3. The Receipt status of the inventory transaction for the produced item is changed from *Received* to *Purchased*. In the **Production orders** form, click the **Inventory > Transactions** menu button. The **Transactions** form has the following view:

The screenshot shows the 'Transactions' window with the title bar 'Transactions (1 - pro) - Reference: Production, PRD_00000592, Lot ID: 00019383_068'. The menu bar includes File, Edit, Tools, Command, and Help. The toolbar has various icons for file operations. The main area has tabs: Overview, General, Update, Ledger, Reference, Other, and Dimension. The 'General' tab displays a table with columns: Site, Warehouse, Location, Pallet ID, Physical date, Financial date, Reference, Number, Receipt, Issue, Quantity, and Cost amount. The table contains the following data:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22			7/11/2011	7/12/2011	Production	PRD_00000592	Purchased		1.00	450.95

On the right side, there are four buttons: 'Inventory', 'Ledger' (selected), 'Functions', and 'Configuration details'. At the bottom, there is a link 'Identify the site' and a currency converter 'USD pro usp'.

Figure 5.69 Transactions form (BOM item Purchased)

Production life cycle

4. The Issues status of the inventory transaction for the component items is changed from *Deducted* to *Sold*. In the **Production order** form, click the **BOM** button. In the **BOM** form, select the first or the second line and then click the **Inventory > Transactions** menu button. The **Transactions** form will have the following view:

The screenshot shows the 'Transactions' form with the reference 'Production line, PRD_00000592, Lot ID: 00019384_068'. The grid displays one row of data:

Site	Warehouse	Location	Pallet ID	Physical date	Financial date	Reference	Number	Receipt	Issue	Quantity	Cost amount
2	22	01-01-01-1	00000096_114	7/11/2011	7/12/2011	Production line	PRD_00000592		Sold	-1.00	-170.00

Buttons on the right side of the form include 'Inventory', 'Ledger', 'Functions', and 'Configuration details'.

Figure 5.70 Transactions form (BOM component Sold)

5. Production posting. To view the ledger voucher, click the **Inquiries > Production posting** button in the **Production orders** form. In the **Production posting** form, find the Costing record and then click the **Ledger > Voucher** menu button.

The screenshot shows the 'Production posting' form with the production reference 'PRD_00000592, 7/11/2011, Production: PRD_00000592'. The grid displays several rows of ledger transactions:

Date	Type	Good quantity	Error quantity	IIP/WIP amount	Cost accounted amount
7/11/2011	Material consumption			362.00	
7/11/2011	Route consumption				
7/11/2011	Route consumption			31.00	
7/11/2011	Route consumption			3.24	
7/11/2011	Report as finished	1.00			
7/11/2011	Indirect cost			0.10	
7/11/2011	Indirect cost			3.93	
7/11/2011	Indirect cost			50.68	
7/12/2011	Costing	1.00			450.95

Buttons on the right side of the form include 'Inventory', 'Ledger' (which is selected), 'Route', and 'Indirect cost'.

Figure 5.71 Production posting form

Summary

In this training lesson, we have gone through the Production lifecycle with the warehouse and job management.

The main steps of the production lifecycle are:

1. Creating a production order.
2. Estimation. The cost price is calculated.
3. Scheduling. The start and end date and time is scheduled.
4. Release the production order. Pick component items and deliver to a work center.
5. Start the production order. Post time and components quantity consumed during executing jobs: manually, automatically, in the Shop Floor Control module.
6. Report as finished. Produced items become available in the warehouse.
7. End the production order. Financial update. Transfer cost from Shop Floor Control.