Ostendo®

6

Assembly Orders

1. Introduction

The Assembly Order process covers manufacturing of a Product from components. Upon completion the Product is moved into Stock. Assembly Orders can be defined to run with a level of complexity required by the User. For example:

	Bill of Material	Routing	Resources
Assemble 'On the fly'	-	-	-
Use Bills of Material	Y	-	-
Use Routing Only	-	Y	-
BOM & Routing	Y	Y	-
Routing with Resources	-	Y	Y
BOM & Routing & Resources	Y	Y	Y

2. Preparation

In preparation for commencing with Assembly Orders you should refer to the following

Assembly Rules: This allows the Systems Administrator to nominate rules that will apply to Assembly Orders. Go into **Assembly>Settings>Assembly Rules** and set the rules to your requirements

Step Names: Within a BOM you can include a series of '**Steps**' that define what activities to carry out when making the Finished Item. If you go into **Assembly>Settings>Step Names** you will notice that one step is annotated as the '**Default**' step. Whenever a new BOM is created it is always given this Default. At that time you can replace this with any other Step, but a BOM must have at least one Step.

3. Bill Of Material

A Bill Of Material is a pre-defined list of Items, Descriptors and Labour Codes that are used to make the required Parent Item.

3.1. Creating a BOM

To demonstrate Bills Of Material we will begin by creating a BOM with the following Structure

```
                A
                |
        ---------------------
        |                   |
        B                   C
```
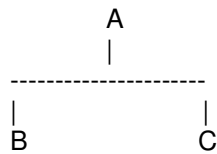
Go into **Inventory>Items** and '**Add**' 3 Items

Item Code	Description	UOM
A	Parent	Each
B	Component B	Each
C	Component C	Each

Now go into **Assembly>Bills of Material** and click the '**Add**' button. On the presented Panel enter **A** into field '**Item Code**' then click the '**Create**' button to display the Bills of Material '**Detail**' panel

Two fields of note (for now):

BOM Batch Size: This represents the quantity that will be made when the 'Lines' of the BOM are used. I.e. The quantities entered into the BOM Lines will make this quantity of the Parent Item. Enter a Quantity of **10** in this field

Quantity Use for Cost Roll-Up: A Setup activity is normally carried out once per Assembly Order. For costing purposes the cost of this Setup should be apportioned across the quantity being made to arrive at the 'Setup' Cost per finished Item. This field is available to annotate a 'nominal' quantity used for this purpose. It is prefilled with 1 but you should amend this to reflect the 'Average' Order Quantity. We will address this later but, for now, enter a quantity of **20** in this field.

Routing: Firstly let us address the Routing. Across the centre of the screen you will see a series of tabs. Click on tab '**Routing Steps***'. You will see that this BOM has a single Routing Step '**Assembly**'.   Click on the '**Add**' button and add a new Step (say) '**QA**'. Go to the '**Instructions**' field and insert some simple Instructions.. You should now have two Steps in the Routing.

Step **10**	**Assembly**
Step **20**	**QA**

Lines: Now click on the '**Lines**' tab at the top of the screen. This will contain the lines that will be used to make the Assembly. Add the following Lines

Line	**Line Type**	**Code**	**Qty**
10	**Item Code**	**B**	**10**
20	**Item Code**	**C**	**20**

This covers the material requirements to make **10** of the Parent Item (I.e. to cover BOM Batch Size entered above) ….but what about the Labour hours used to put it together?

There are two methods by which '**Labour**' can be attached to a BOM. I.e. Use a '**Descriptor**' or a '**Labour Code**'. If you intend to record Time Bookings by **Employee** then you would use a '**Labour Code**' (This is covered in more detail later). For now we will add a '**Descriptor**'. Therefore click on the '**Add**' Button and add the following:

Line	**Line Type**	**Code**	**Qty**
30	**Descriptor Code**	**GENERAL TIME**	**15**

This will mean that each Parent Item will require 1½ hours to assemble.   I.e. A total of 15 Hours to produce a BOM Batch Size of 10.

Add another Line as follows

Line	**Line Type**	**Code**	**Qty**
40	**Descriptor Code**	**GENERAL TIME**	**1**

In this instance go to the last line in the lower part of the screen and select '**Step**' '**QA**' You have now denoted that the process requires 0.1 hour to carry out a QA check against each Item.

'**Add**' another Line as follows

Line	**Line Type**	**Code**	**Qty**
50	**Descriptor Code**	**GENERAL TIME**	**4**

As above, go to the last line in the lower part of the screen and select '**Step**' '**QA**' Additionally, go to the field '**Run or Setup**' and select '**Setup**'

You have now stated that that the process requires 4 Hours to set up this Step in preparation for carrying out the 'Run' activity defined by Line 40

3.2. Phantoms

Go to the 'Detail' tab where you will see a checkbox, which if 'checked', will enable this BOM to be become a 'Phantom' when used in a higher assembly. To explain this let us assume that this Assembly is 'Butter'. If you created an Assembly Order for 'Butter' you would use 'Cream' as the Component (or Ingredient).

We could also have a Bill of Material called 'Cake' and it requires 'Butter' as one of its components (or ingredients).

Under normal circumstances if you raised an Assembly Order for 'Cake' then the Ingredient 'Butter' would be required. However, if the 'Phantom' checkbox is 'checked' then an Assembly Order for 'Cake' would state a requirement for 'Cream' taking into account the quantity of 'Butter' required.

3.2.1. 'Phantoms' In Action

If you wish to see this in action then go into *Inventory>Items* and add the following Item

Item Code	Description	UOM
D	Raw Material	Each

Now go into **Assembly>Bills of Material** and click the 'Add' button. On the presented Panel enter C into field 'Item Code' then click the 'Create' button to display the 'Bills Of Material' 'Detail' panel. In that panel 'check' the 'Phantom Setting' checkbox. Now click on the 'Lines' tab at the top of the screen and add the following Lines

Line	Line Type	Code	Qty
10	Item Code	D	2
20	Descriptor Code	GENERAL TIME	1

Finally, go into **Assembly>Assembly Orders** and create an Order with quantity **1** of Item **A**. In the generated Order ('Lines' tab) you will see that Item **D** is displayed with quantity of **4** (I.e. The quantity of 2 of **C** required in making 1 of **A** multiplied by the quantity 2 of **D** required to make 1 of **C**)

3.3. Scheduling

Across the centre of the BOM 'Detail' tab you will see fields relating to Leadtime, Setup, and Run Times.   These fields are used when creating the Assembly Order as follows:

> **Leadtime**: When creating an Assembly Order (as described in exercise 6) you will see a field called '**Required Date**'. The Leadtime days are subtracted from that date to arrive at a '**Start Date**'. (I.e. The calculated date or the current date whichever is the later).
> **Setup Duration**: The setup duration is applied to the created order using the calendar defined in *General>Settings>Work Times.*
> **Run Duration**: The run duration is then added to Setup time taking into account the Ordered Quantity; once again using the calendar defined in *General>Settings>Work Times.*
> The '**End Date**' is then evaluated and displayed on the generated Assembly Order.

We will look at the effect of this when we create an Assembly Order in section 6. For now enter the following information

       Leadtime: **4 Days**
       Setup Duration: **6 Hrs**
       Run Duration: **1 Hour per 10**

4. BOM Costs

The Standard Cost of an Item can either be manually entered against the Item via **Pricing>Item Pricing** or can be determined from the multi-level Bill Of Material structure as follows.

In describing the process let us assume the product structures defined above. I.e.

Item C uses	Item	D	2 off	Run
	Descriptor	General Time	1.0 Hrs	Run
Item A uses	Item	B	1 off	Run
	Item	C	2 off	Run
	Descriptor	General Time	1.5 Hrs	Run
	Descriptor	General Time	0.1 Hrs	Run
	Descriptor	General Time	4.0 Hrs	Setup

We should first identify the Costs against the Purchased Items and Descriptor Codes. There are numerous ways that the Costs can be established and maintained and they are covered under a separate document. For now we will manually add a Cost to the relevant Items.

Costs are required against Items B and D so go into **Pricing>Item Costing** and add and save the following into the '**Standard Cost**' field against each record.

       Item **B** $**10**
       Item **D** $**4**

A Cost is also required against Descriptor **GENERAL TIME**. Therefore go into **Pricing>Descriptor Costing** then add and save a Standard Cost of $**30** per hour.

If we now get Ostendo to calculate Costs it will commence with the Item at the lowest level in a BOM and calculate the Costs at each higher level until all levels have been calculated. Once again, using the above example we would expect the following

Cost of D	=	$**4**			
Cost of B	=	$**10**			
Cost of C	=	$**38** calculated from			
	Item	D (2 off at $4 each)		=	$ 8
	Descriptor	GENERAL TIME (1 Hour at $30)		=	$30
			Total		------
					$38
Cost of A	=	$**137** calculated from			
	Item	B (1 off at $10 each)		=	$10
	Item	C (2 off at $38 each)		=	$76
	Descriptor	GENERAL TIME (1.5 Hour at $30)		=	$45
	Descriptor	GENERAL TIME (0.1 Hour at $30)		=	$ 3
	Descriptor	GENERAL TIME (4 Hour at $30 / 20)**		=	$ 6
			Total		------

** This is a Setup activity and the Cost per Item is the total setup cost divided by the **Quantity Use for Cost Roll-Up** quantity that you entered (above) in the '**Detail**' tab

To see if this is correct go into *Assembly>Standard Cost Rollup* and click on the '**OK**' Button.   If you go to Item **A** you will see that the system calculated value is displayed in '**Rolled Up Cost**' field. It is also shown in field '**New Std Cost**' where it can be amended if required. It is the value in this field that will be used to update the Standard Cost of this Item.

Having agreed with the Calculated/Amended Standard Cost 'check' the checkbox to the left of the line and click the '**Update Standard Costs for selected Lines**' button.

Go into *Pricing>Item Costing* and select the Item that you have just updated and click on the '**Detail**' tab. You will see that the record's **Standard Cost** field has been updated and a history record created

5. By Products and Co Products

Firstly let us define what they are**. Co-Products** are Items that are ALWAYS produced whenever the Parent Item is produced whereas a **By-Product** MAYBE (but not always) produced.

5.1. Co-Products

To add a Co-Product to a Bill Of Material you should first create the Co-Product. Therefore go into *Inventory>Items* and add

Item Code	Description	UOM
Co	CoProduct	Each

Now go into *Assembly>Bills Of Material* and select Assembly '**A**'. Go into the '**Detail**' tab and you will see - in the lower half of the screen - a tab named '**ByProducts & CoProducts**' Go into this screen and '**Add**' the following:

> **Code**: **CO**
> **Quantity**: **2**
> **Cost%**: **40**
> **Style**: Select '**CoProduct**' from the drop-down list

Let's look at what you entered.

1. The **quantity** relates to the number of Co-Products that will be produced when the '**BOM Batch Size**' of the Main product is made

2. The cost of both the Main Product and the Co-Product(s) are derived from the same Components in the Bill Of Material. The **Cost%** defines what percentage of the total BOM cost will be allocated to this Co-Product. This means that the difference between the sum of all Co-products' costs and the Assembly Cost represents the Cost of the Main Product.

5.2. By-Products

To add a **By-Product** to a Bill Of Material you should first create the By-Product. Therefore go into *Inventory>Items* and add

Item Code	Description	UOM

<div align="center">**By**   **ByProduct**   **Each**</div>

Now go into *Assembly>Bills Of Material* and select Assembly '**A**'. Go into the '**Detail**' tab and you will see - in the lower half of the screen - a tab named '**ByProducts & CoProducts***'* Go into this screen and '**Add**' the following:

> **Code**: **BY**
> **Quantity**: **1**
> **Cost%**: **2**
> **Style**: Select '**ByProduct**' from the drop-down list

Let's look at what you entered.

1. The **quantity** relates to the nominal quantity of By-Products that may be produced when the '**BOM Batch Size**' of the Main product is made

2. Unlike the Co-Product the percentage Cost contribution is NOT deducted from the receipt cost of the Main Product.

5.3. Affect of Co-Products and By-Products on Standard Costing

If you now run the Standard Cost Roll-up as described in Section 4 you will see that the Standard Cost of Parent Item '**A**' is now **60**% of the total BOM cost.   You should note that:

- Co-Product Standard Costs are not evaluated because the Co-Products themselves can be associated with numerous Main Products and therefore can have widely varying Costs.
- By-Product Costs are never evaluated during Cost Rollup as they are only evaluated during the receipt process in an Assembly Order

We will now create an Assembly Order for the above BOM, issue the Components, then receive the Main Product, Co-Product and By-Product into stock

6. Assembly Orders

Assembly Orders can originate from the following sources:

- **On the Fly:** An order can be raised for any Inventoried Item by directly going into the Assembly Order screen and creating the Order.
- **Source On Demand:** Any Item flagged as being identified as an Assembly and whose supply method is '**Source on Demand**' will automatically have an Order Request created. Generation of these Orders is covered under the '**Inventory Control**' training guide
- **Planned Order:** A Planned Order is a Suggested Order generated via the Replenishment Run. Generation of these Orders is covered under the 'Inventory Control' training guide

6.1. Creating an Assembly Order

Go into *Assembly>Assembly Orders* and click on the '**Add**' button.   Amend the Required Date to (say) **5** days into the future, select Item '**A**' and enter an Order Quantity of **100** then click on the '**Create**' button

Let's have a look at what has been created:

In the 'Detail' Tab you will see:

The 'Start Date' is the 'Required Date' less 4 days
The Setup duration is 4 Hrs as held against the BOM
The Run Duration is 10 Hrs (Order Qty 100 divided by 10 per Hour run rate)

In the 'Lines' Tab the generated components include:

From the BOM for 'A'

10	Item Code	B	100
10	Descriptor Code	GENERAL TIME	150
20	Descriptor Code	GENERAL TIME	10
20	Descriptor Code	GENERAL TIME	4

'Blown through' from the BOM for 'Phantom' 'C' taking into account the Usage of 'C' in 'A'

| 10 | Item Code | D | 400 |
| 20 | Descriptor Code | GENERAL TIME | 200 |

6.2. Issuing Components

Assembly Order Lines can be issued in one of two ways

Direct Entry: The 'Actual' usage can be entered directly against individual Assembly Order Lines by going into the Assembly Order that you created and selecting the 'Lines' tab.

Highlight the first Component (Item 'B') and then click on the 'Actual Issues' tab. Click the 'Add' button to create a new line in the lower part of the screen. In that record enter (say) 70 in the 'Qty' field then click the 'Save' button. On the 'Line Info' bar directly above 'Qty' field you will see a 'Stock' button showing the current Stock and the Available Stock for this Item. If you click on this button then you will see more details about Item 'B'

Batch Entry: A separate Assembly Issue function allows you to select lines to be issued. This can cover:

- A Range of Assembly Orders
- A Specific Order
- A Step within a specific Assembly Order

To use this option you should minimise or close out of the Assembly Order screen then go to *Assembly>Assembly Issues*. Click on the 'Add' button to create a new batch. 'Save' the Batch and click on the 'Lines' tab. Click on the 'Select Assembly for Prefilling Issues' button and select the above Assembly Order. Click the 'Create' button to generate the Issue Lines. These will be prefilled with the outstanding Quantities to Issue. You can amend these quantities if required in addition to amending the Warehouse/Location details.
Upon completion go back to the 'Detail' tab and click the 'Post All Issue Entries' button.

Points to Note:

- In *Inventory>Settings>Item Rules* if field 'Disable Negative Stock for all Items' is 'checked' then you will be denied the Issue if it causes any Item to go into negative stock
- If the above field is not 'checked' then this action will also be denied if the specific Item has been flagged as not allowing negative stock. (See *Inventory>Items* then the 'Additional Inventory Settings' button on the 'Detail' view)

If you now go to *Inventory>Inventory Availability* you will see that the issue has been recorded in Transaction History and current stock

6.3. Receipt into Stock

Assembly Orders can be received in one of two ways

Direct Entry: The 'Actual' receipt can be entered directly against the Assembly Order by going into the Assembly Order that you created above and selecting the '**Order Receipts**' tab in the '**Detail**' view.

Click the '**Add**' button to create a new receipt line in the lower part of the screen. You will see that it is populated with the Main product ('**A**'). If you click on the drop-down you can select the Main Product, Co-Product, or By-Product.

Batch Entry: A separate Assembly Receipt function allows you to select an Assembly Order an prefill the receipt lines with the Main Item, Co-Products, and By-Products

To use this option you should minimise or close out of the Assembly Order screen then go to *Assembly>Assembly Receipts*. Click on the '**Add**' button to create a new batch. '**Save**' the Batch and click on the '**Lines**' tab. Click on the '**Select Assembly for Prefilling Receipts**' button and select the above Assembly Order. Click the '**Create**' button to generate the Receipt Lines. These will be prefilled with the outstanding Main Item and Co-Product Quantities to Receive. You can include By-Products by clicking on the '**Add**' Button and adding these to the list. Amend the displayed quantities if required in addition to amending the Warehouse/Location details. You should also note that if the product has 'sub-level' variations (Colour, Size, Batch, etc) then these should be specified in this screen prior to posting the receipts.

Upon completion go back to the '**Detail**' tab and click the '**Post All Receipt Entries**' button.

If you now go to *Inventory>Inventory Availability* you will see that the receipt has been recorded in Transaction History and current stock

7. Labour

The above process has concentrated on Items and Descriptors being used to make the end product and can include Labour activities covered by a '**Labour**' style Descriptor.

If, however, you are going to record **Employee** times against a Labour Activity then you should not use a 'Labour' style Descriptor but use a '**Labour Code**' instead.

The Labour Code identifies the skill level and hence the 'Planned Cost' of an activity whereas the Employee books time against the Labour Code to record the 'Actual Cost' of carrying out that activity.

7.1. Adding a Labour Code to a BOM

Go into *Labour>Labour Codes* and select **LAB-ASSEMBLY**. You will see that it has a Standard Cost (**$26**) linked to it. This Cost will be used to determine the '**Planned**' Cost of an Assembly Order.

Go into *Assembly>Bills of Material* and select Assembly **C** that you created in section 3.2.1. Click on the '**Lines**' tab at the top of the screen and add the following Labour Code to the existing Lines

Line	Line Type	Code	Qty
30	**Labour Code**	**LAB-ASSEMBLY**	**3**

Finally, go into *Assembly>Standard Cost Rollup* and carry out a 'Cost Roll Up'. If you select Item **C** and then click on the '**Detail**' tab you will see the Cost for **LAB-ASSEMBLY** comes from the above record.

7.2. Booking Employee Times

If you go into *Labour>Employees* and click on '**Bob Drum**' you will see - in the '**Detail**' tab - that an '**Employee Unit Cost**' has been entered. If you click on the '**Labour Codes**' tab you will see an entry that signifies that when **Bob Drum** carries out work against a '**LAB-ASSEMBLY**' then Bob Drum's Unit Cost will be used PLUS a Fixed and Variable Overhead Cost. You will see that the total Cost per hour comes to **$37**

Go into *Jobs>Job Orders* and create a new Assembly Order for quantity **1** of Item **C**. In the Assembly Order '**Details**' screen you will see that the Planned Order Costs are **$121** comprising of

Item Code	**D**	**2 @ $4**	**= $8**
Descriptor Code	**GENERAL TIME**	**1 @ $35**	**= $35**
Labour Code	**LAB-ASSEMBLY**	**3 @ $26**	**= $78**

Go into the '**Lines**' tab on the Assembly Order and click on the '**Actual Issues**' tab in the lower part of the screen.

Issue the required quantities against both the Item Code and Descriptor Code.

Against the Labour Code Line select Employee '**Bob Drum**' and enter **3 Hrs**

If you now go to the Assembly Order '**Details**' screen you will see that the Actual Order Costs are **$154** comprising of

Item Code	**D**	**2 @ $4**	**= $8**
Descriptor Code	**GENERAL TIME**	**1 @ $35**	**= $35**
Labour Code	**LAB-ASSEMBLY**	**3 @ $37**	**= $111**

In this instance the recovery Cost of **$37** per hour is taken from the Employee record when that Employee books time against the Labour Code.

A detailed Cost summary sheet can be printed by clicking on the '**Reports**' Button to the right of the screen and selecting Report '**Assembly Costing Sheet**'

8. Assembly Order Closure

Once the Assembly Order status is changed to '**Closed**' any remaining Work In Progress costs are posted to an '**Assembly Order Variance**' Account. Subsequent bookings are allowed against this order but any costs will by-pass the WIP Control Account and post directly to '**Assembly Order Variance**'.