QAD Enterprise Applications
Enterprise Edition

Training Guide

Co/By-Product Costing

70-3200A
QAD 2011 Enterprise Edition
Lab: Enterprise Edition 2011.1 r01 - Training
Workspace: 10USA > 10USACO
September 2011

CoByProductCosting_TG_v2011_1EE.pdf/njm/lkk

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Contents

What's New?

The following table summarizes significant differences between this document and the last published version.

Date/Version	Description	Reference
September 2011.1 EE	Rebranded for QAD 2011.1 EE	---

About this Course

Course Description

This QAD Co-Product/By-Product Costing training guide offers detailed instruction on setting up and costing a base process for co/by-product production. Details how costs are allocated in co/by-product production environment.

This guide may be taught individually or as a part of the Product Costing & Cost Management course set.

Course Objectives

Provides the detailed instruction on setting up and costing a base process for co/by-product production

Course Benefits

Provides flexible costing in a co/by-product production environment.

Audience

Finance and operations personal who will be responsible for setting and managing a co/by-product production environment

Prerequisites

- Introduction to Costing Training Guide
- Product Costing Training Guide
- Work Order Costing Training Guide
- Familiarity with the .NetUI
- Familiarity with Co/By Product Functionality

Course Credit & Scheduling

This course is valid for 3 credit hours. This course is typically taught in one half-day.

Virtual Environment Information

The hands-on exercises in this book should be used with the Enterprise Edition 2011.1 r01 - Training environment, in the 10USA > 10USACO workspace.

QAD Web Resources

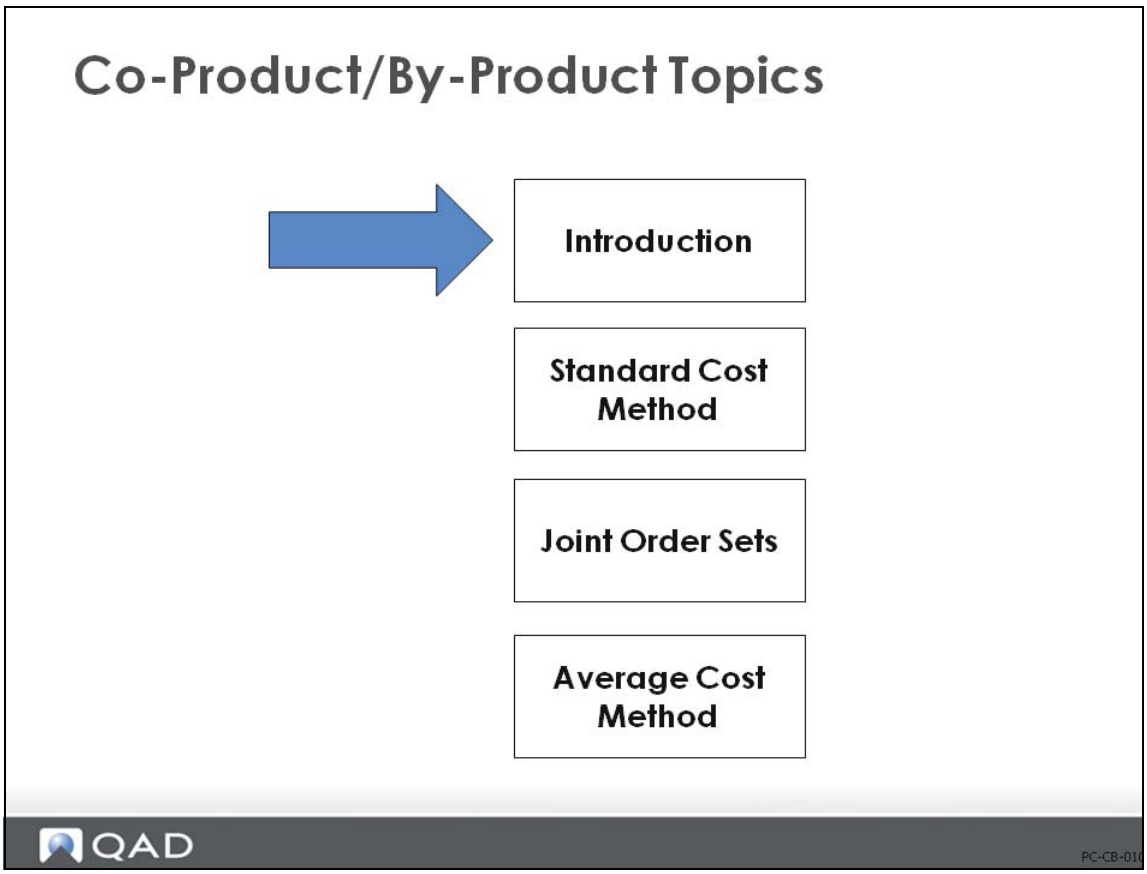
From QAD's main site, you can access QAD's Learning or Support sites.

http://www.qad.com/

Chapter 1

Co/By-Products

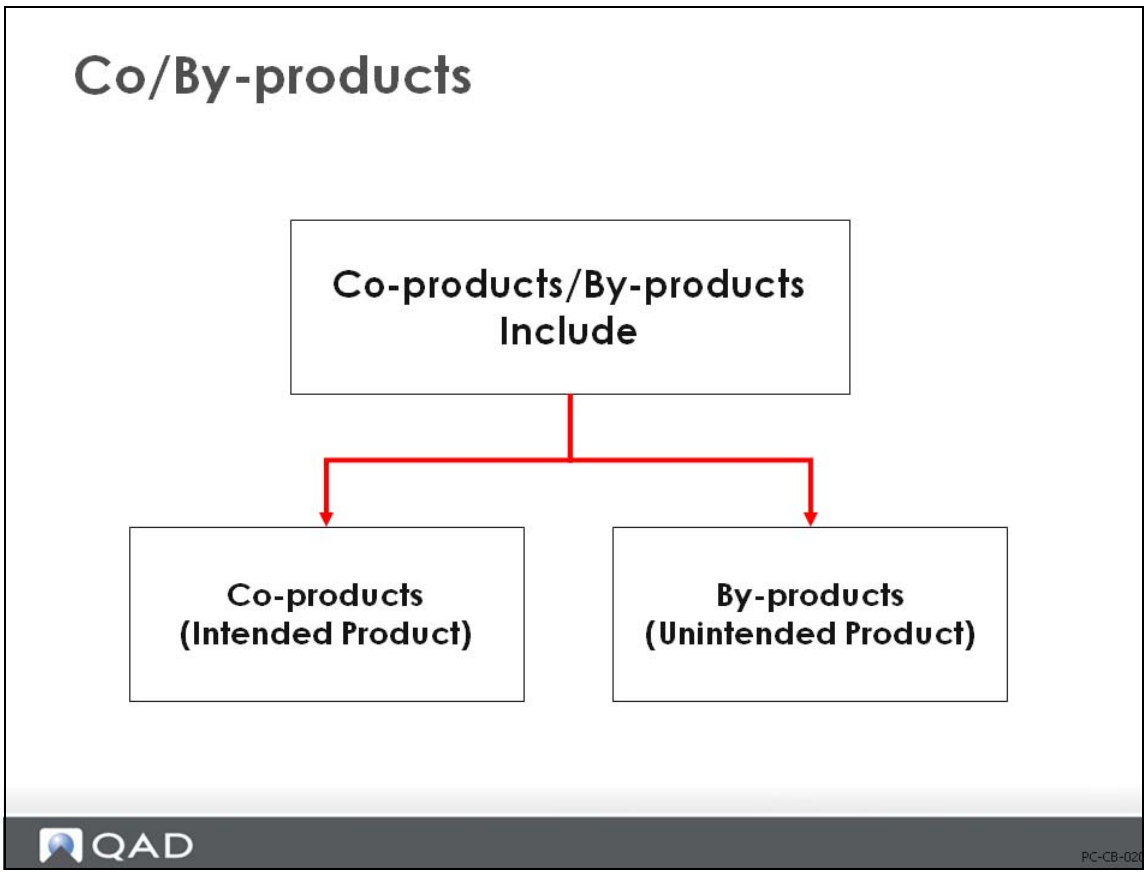
Co-Product/By-Product Topics



This chapter on co-product/by-product costing begins with an introduction that provides an overview of co-product/by-product concepts and definitions. This is followed by three sections on topics more specific to co-product/by-product costing: standard cost method, joint order sets, and average cost method.

Note Co-/By-Product costing applies to work orders, not repetitive orders

Introduction

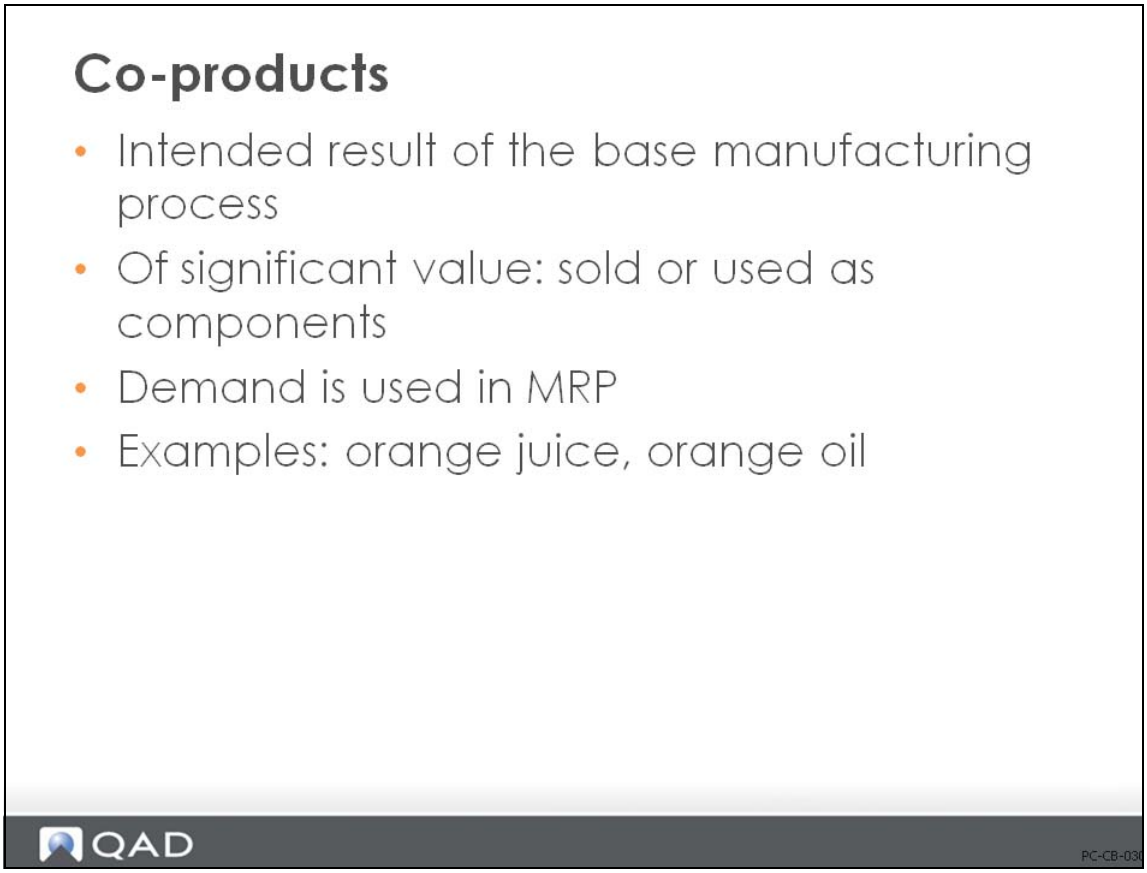


Overview

If a manufacturing process in QAD Enterprise Applications yields one product, the process is supported by regular bills of material (BOMS), formulas, processes, and routings. Co-products/by-products functionality manages processes that produce more than one product.

In processing co-products/by-products, you can keep information on both the intended products (called co-products) and the unintended products (called by-products). This introduction defines these and other key terms used in QAD Enterprise Applications co-products/by-products functionality.

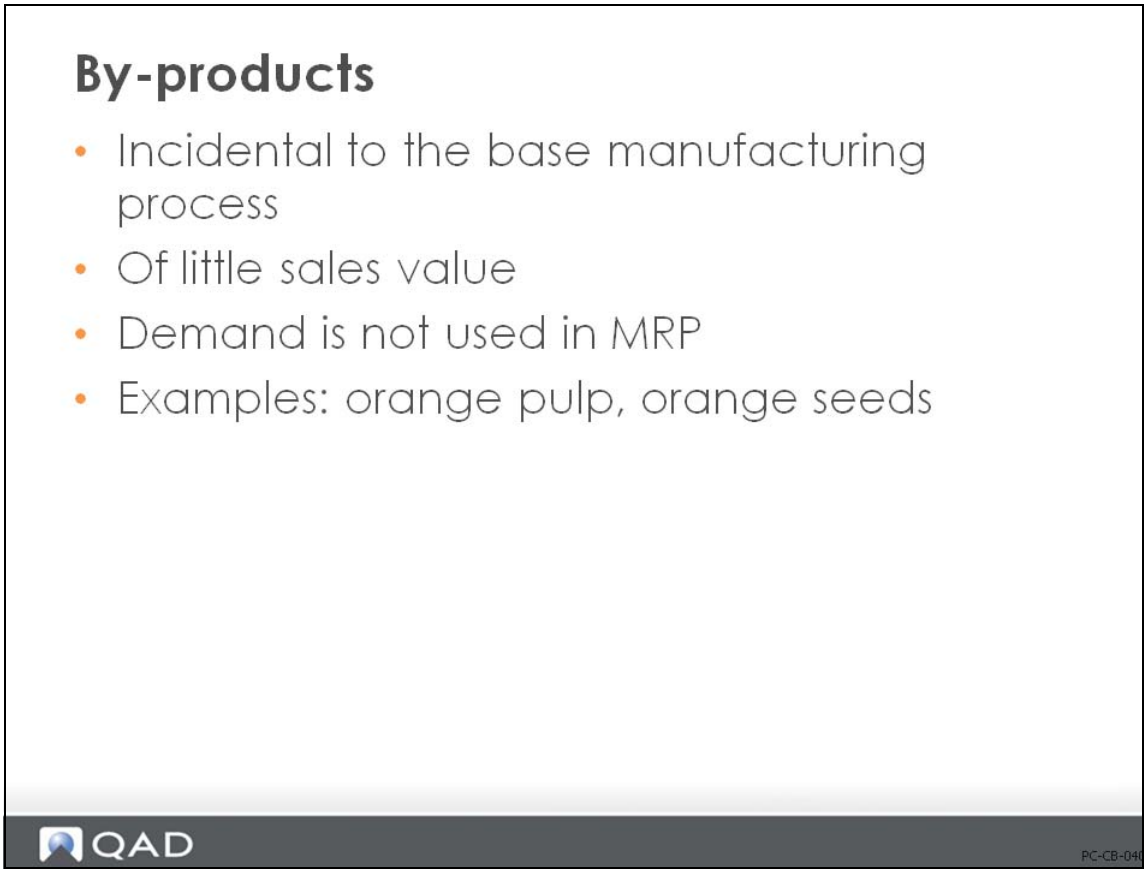
Definitions



Co-Products

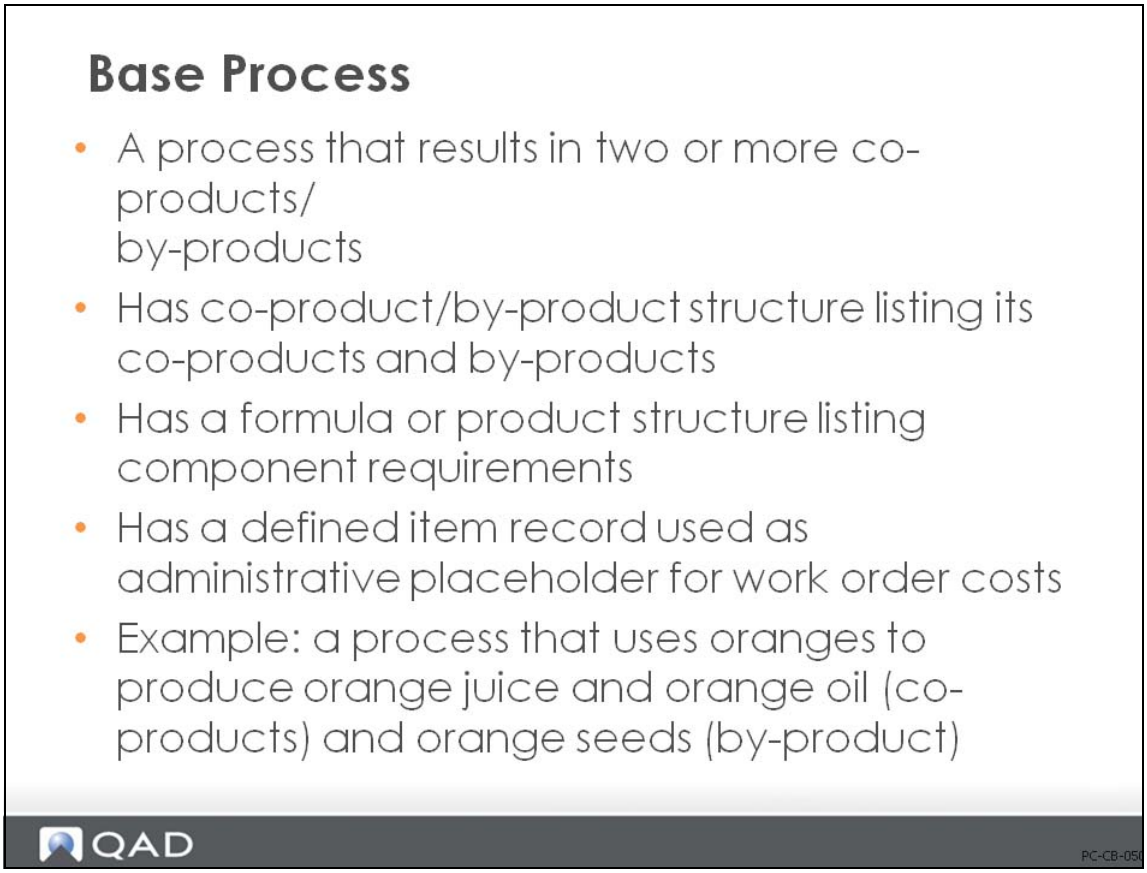
Co-products are intended results of a co-product/by-product process. They are of significant value and are sold or used as regular or routable components of other processes (product structures). Because co-products are the intended result, their demand drives planning of the co-products/by-products manufacturing process.

By-Products



A by-product in QAD Enterprise Applications may differ from the definition of a by-product used in other places. A by-product in QAD Enterprise Applications is incidental and usually has little or no value. By-product demand is not considered in planning. The cost of a by-product is fixed and is subtracted from the total cost of the manufacturing process. Often, by-products of manufacturing processes are products that can be sold as scrap.

Base Process

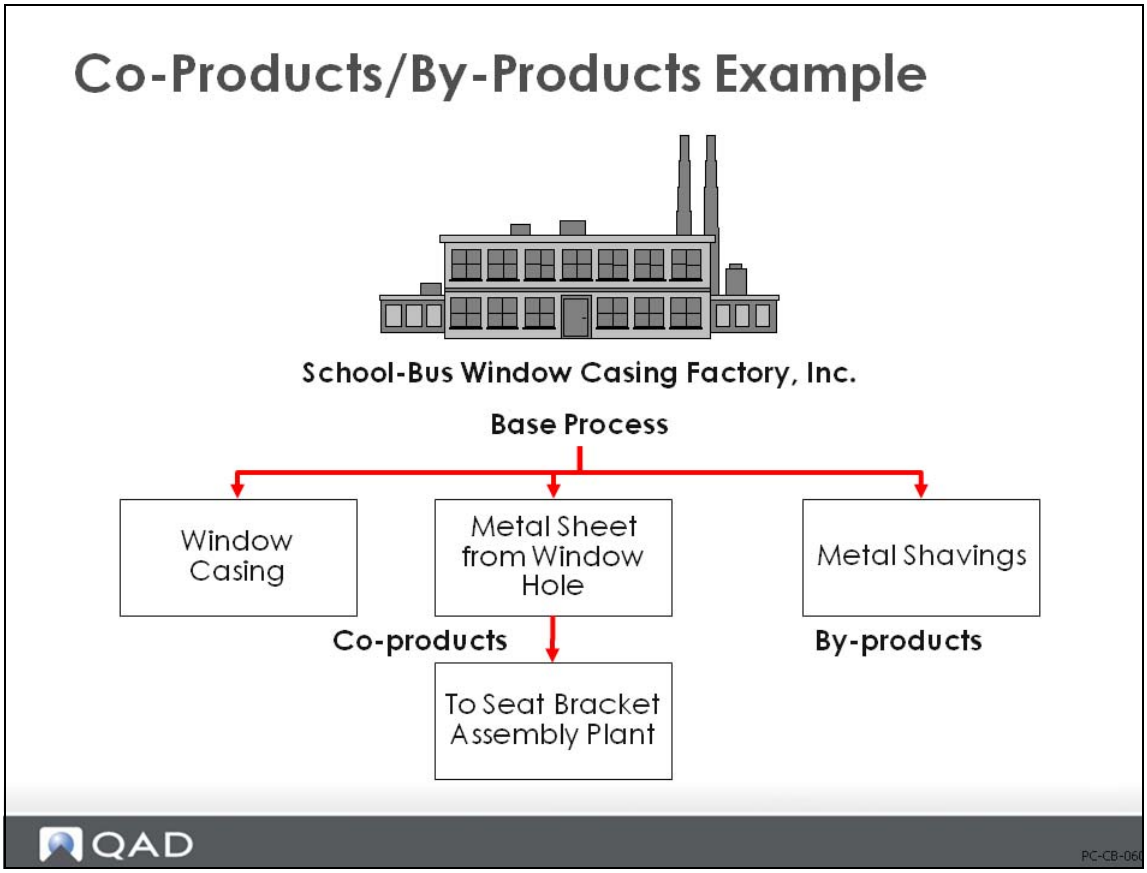


A base process is a common process that results in two or more co-products/by-products; it is "what you do" to obtain the usable co-products. Although you cannot sell it or stock it, you have a work order for it, issue component material to it, and record labor time against it.

- In QAD Enterprise Applications, the base process is an administrative place-holder - for example, work order costs are accumulated at the base process level

  A base process is not stocked, and it is not used in transactions such as unplanned receipts, purchase orders, sales orders, or any other transaction associated with stock

Co-Products/By-Products Example



In this example, two co-products are part of the manufacture of school-bus window frames - the window casing, stamped out of sheet metal, and the piece of sheet metal that results from cutting the window hole in the casing. We call this second piece of sheet metal the window hole.

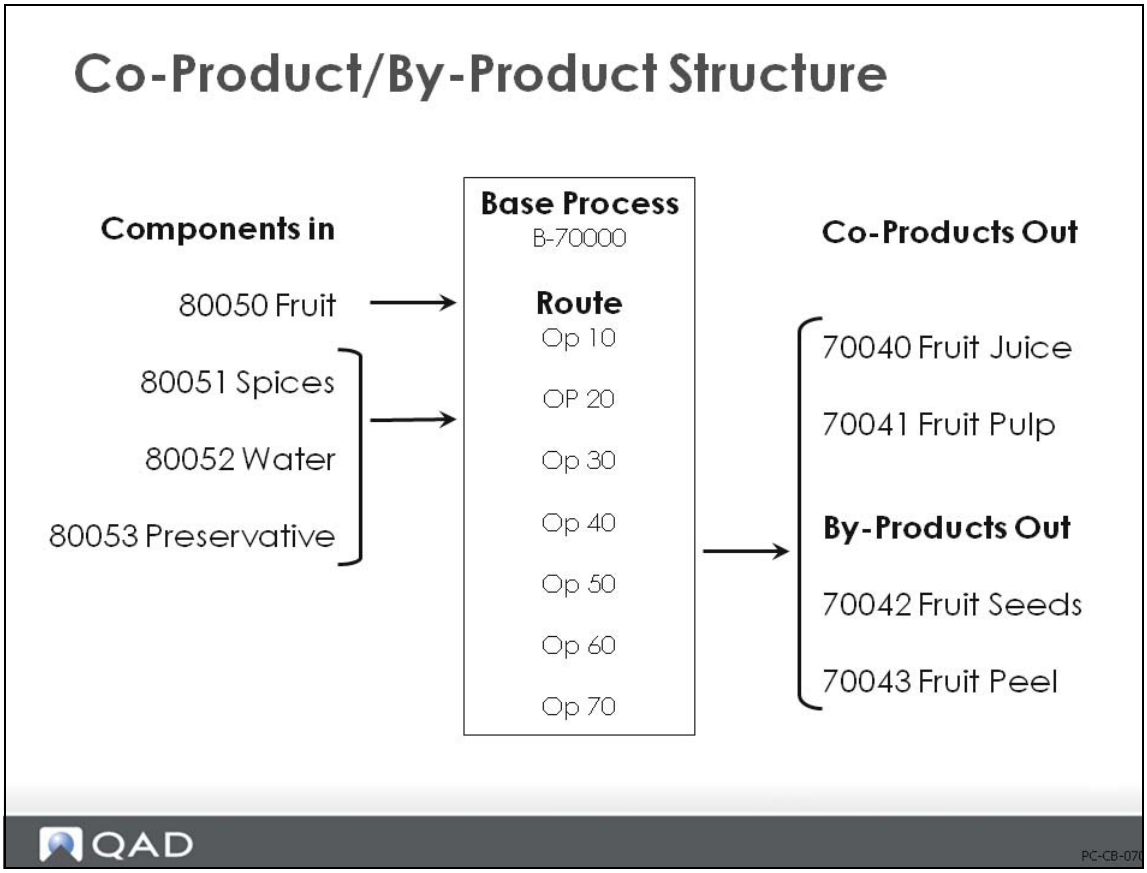
The window hole is a valuable component that is made into a bracket for a school-bus seat. The window casing is sold to the school-bus company and the window hole goes to the plant that produces school-bus seats.

Some might call the window hole a by-product. In QAD Enterprise Applications, it is a co-product. It has value as a component for another assembly.

After the window casing is stamped, holes are drilled and edges are ground. The metal shavings are waste. If they can be sold as scrap and therefore have some value, the planner should decide whether to process them as a co-product or by-product.

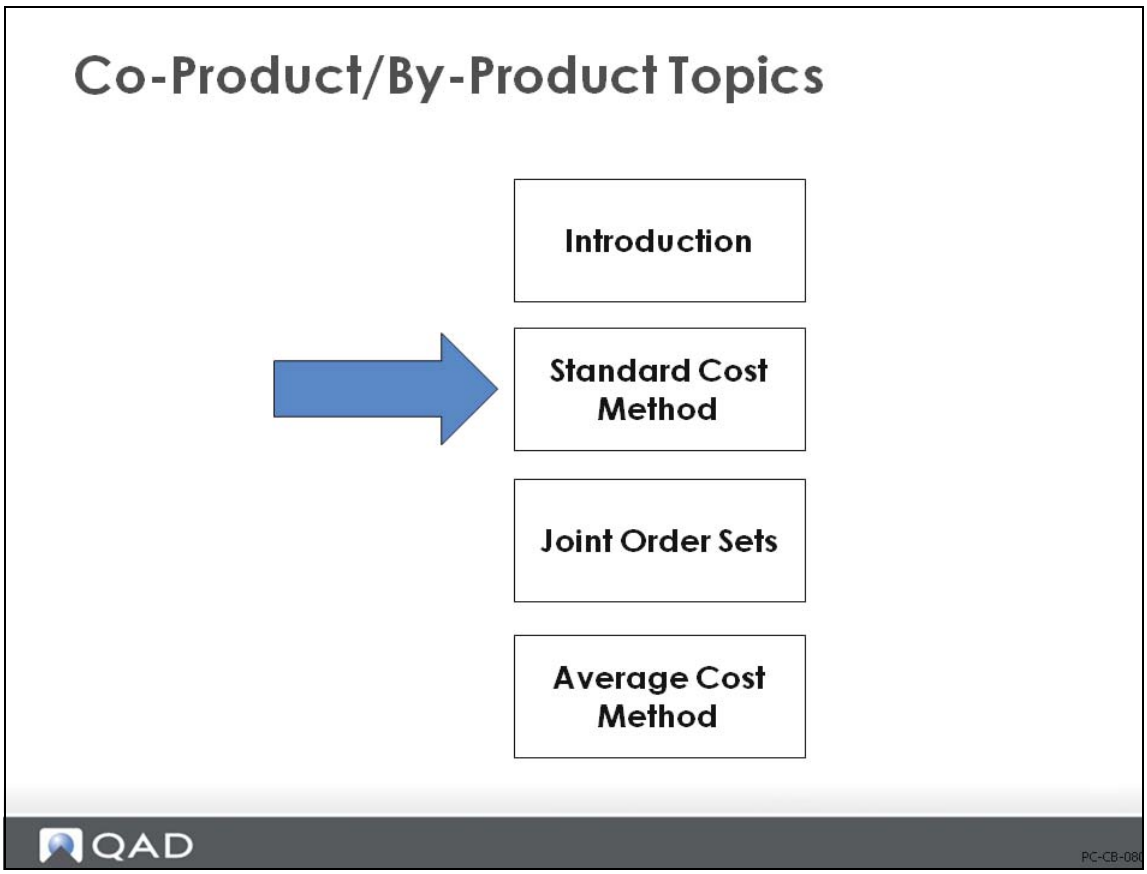
If our company manufactures entire school buses, the window casing can be a routable component of the school-bus assembly. When a work order is planned for a bus, a joint order is generated for a number of window casings and seat brackets.

Co-product/By-product Structure

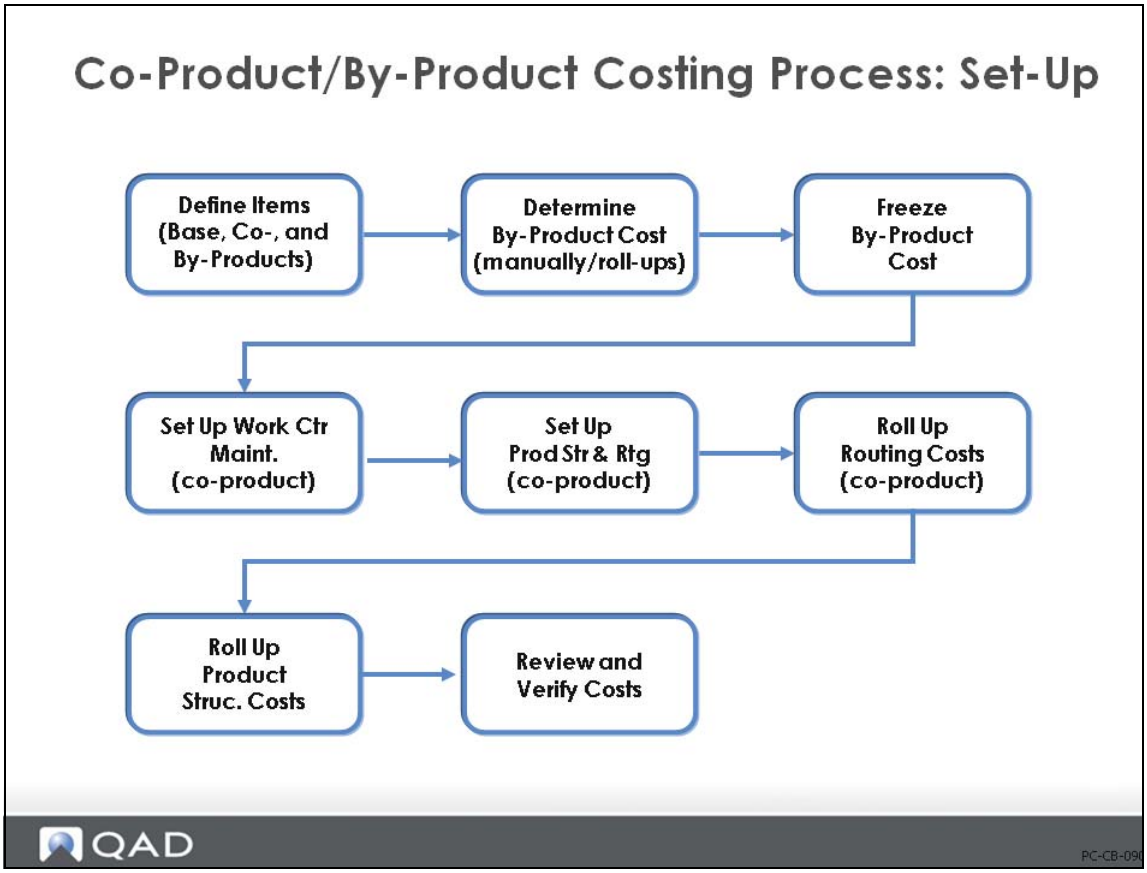


- The difference between a regular item and co-products/by-products is the co-product/by-product structure, which is a special type of product structure record (type “J”). The BOM defines the inputs to the process; the co-product/by-product structure defines the output of the process (co-products, by-products, and their quantities).
- MRP and work order entry/maintenance use the co-product/by-product structure to create a joint order set from an order (see Joint Order Sets)

Standard Cost Method



Co-Products/By-Products Cost Development Process: Set Up



As with regular items, the cost development process for co-product/by-products is based on information set up in Item Master Maintenance (1.4.1), Work Center Maintenance (14.5), Routing Maintenance (14.13.1), and Product Structure Maintenance (13.5). In addition to this data, the special product structure record, which describes the relationship between a Base Process and its Co/By-Products, is set up using Co/By-Product Maintenance (15.12.1).

Once item, work center, and process/formula information are set up, use Routing Cost Roll-Up and Product Structure Cost Roll-Up to determine the cost of the “base” process and, from that, the cost of the co-products (based on cost allocations).

By-Product Costs

By-product costs are determined separately - either manually in Item Cost Maintenance, or through its own BOM and product structure and cost roll-ups. If you enter or calculate a cost for a by-product, this cost is deducted from the base process cost prior to its allocation to the co-products. Also note that inventory receipts of by-products will be valued at this cost.

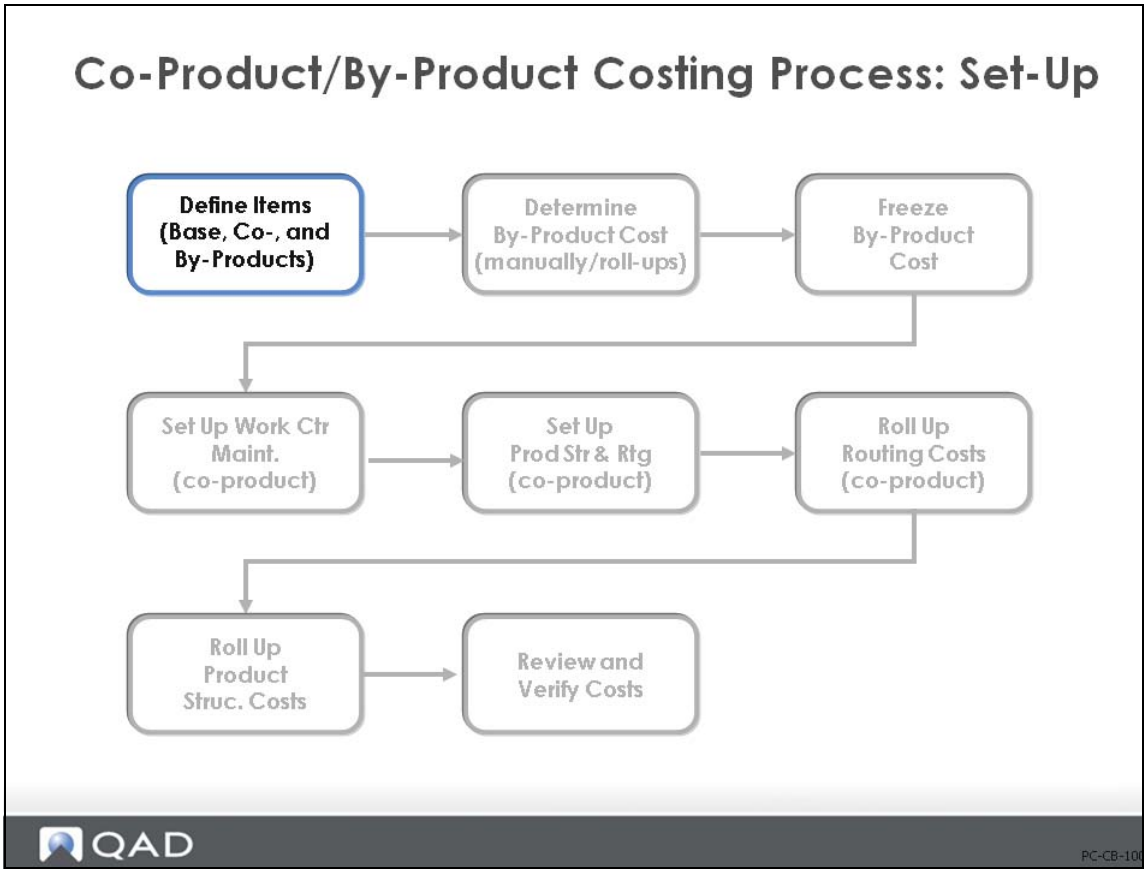
Chapter Organization

On the following pages, those steps in the cost development process that are unique to co-product/by-product cost development, or have fields that are of special importance to co-product/by-product cost development, are discussed in more detail. Other areas, that are covered elsewhere are not repeated here (for example, set up of Work Center Maintenance).

Standard or Average

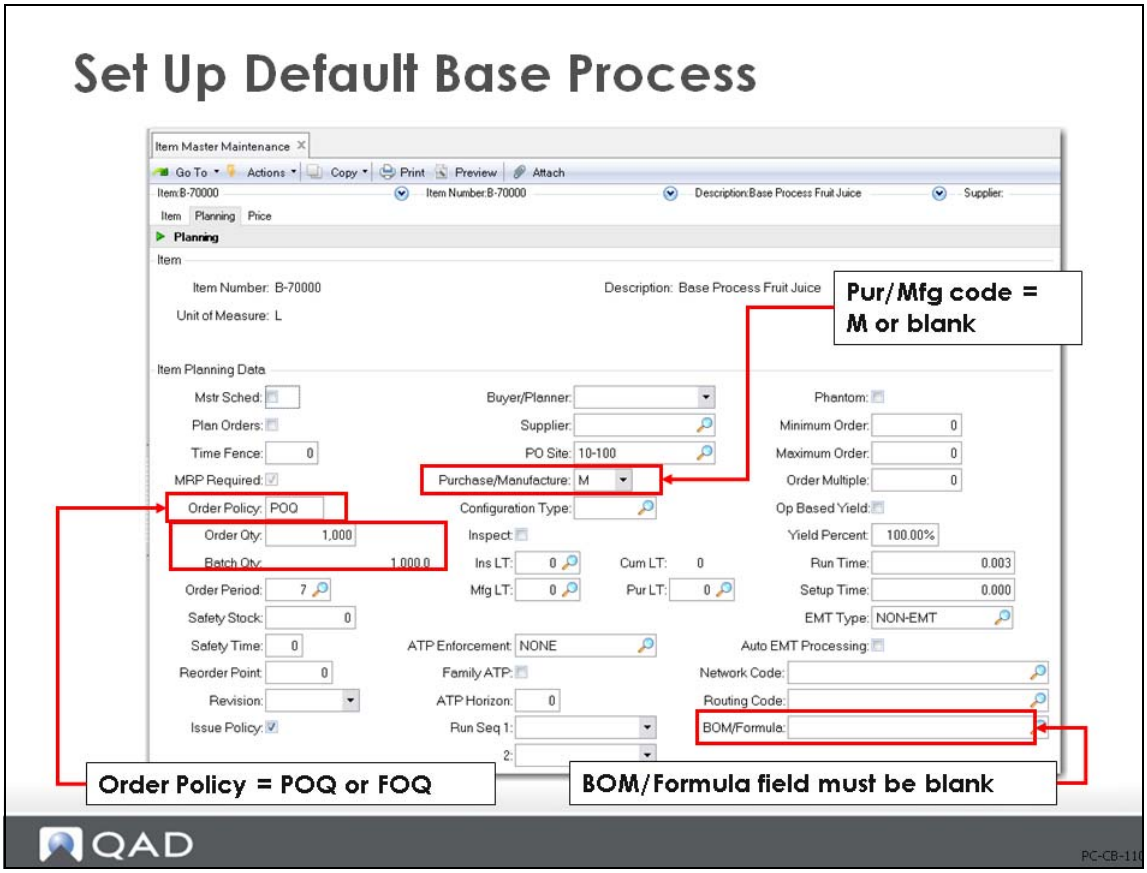
One of the first decisions to make is whether standard or average cost method will be used. Co-product/by-product functionality can be used with either method. This section focuses on standard costing; average costing is discussed beginning on Average Cost Method.

Define Items



- Base process
- Co-product
- By-product
- Components

Base Process



Enter information on the base process first. A base process must have a defined item record.

- Base processes are set up in Item Master Maintenance (1.4.1), as if they were items. Use base process “items” only for co-products/by-products.

  Set the base Pur/Mfg code to [M]anufactured or leave blank

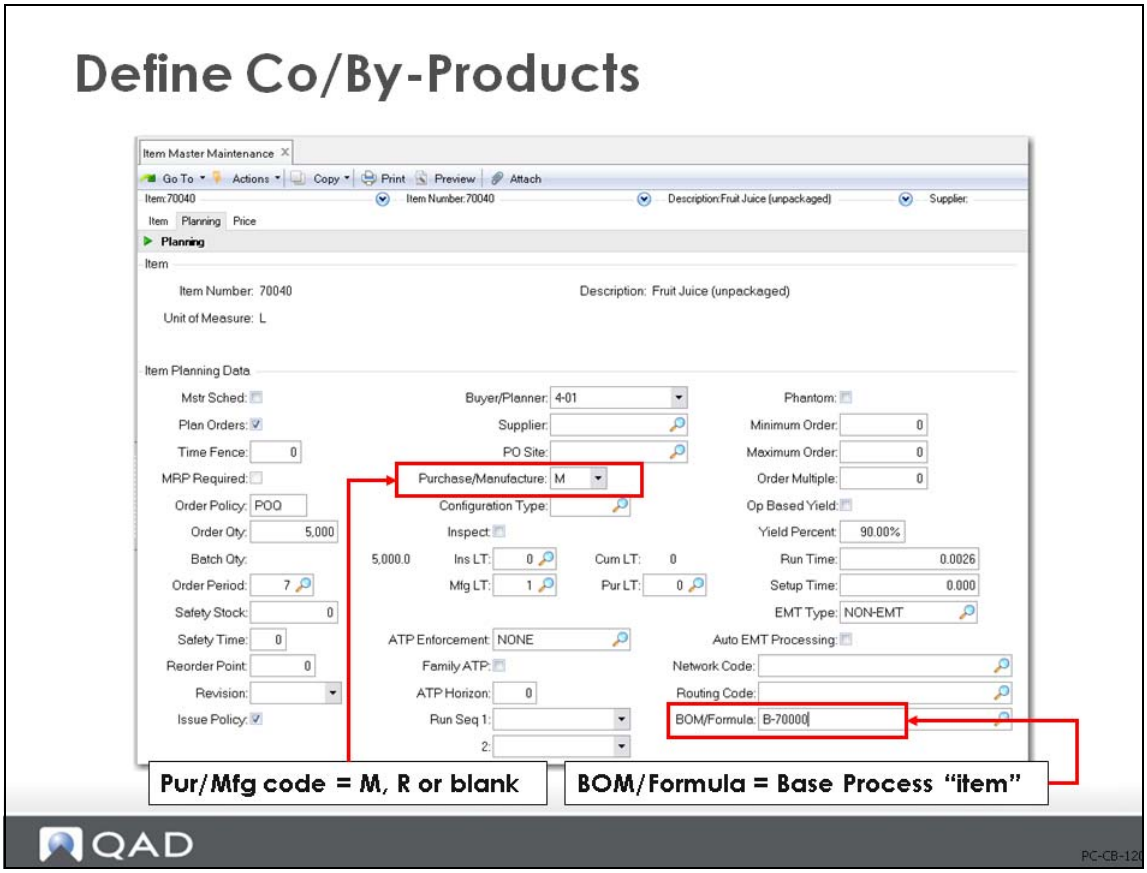
  Details such as batch size, order policy, and order modifiers are made specific to a site in Item Site Planning Maintenance (1.4.17), so that planning parameters are unique to the conditions at each site

  Order Policy must be POQ or FOQ

  The Order Quantity should match the Batch Quantity setup in Process/Formula Maintenance, and should be the normal batch size.

  The BOM/Formula field must be blank

Co-Products



Define the Co-product and By-product items in Item Master Maintenance (1.4.1). All of the component items used by the base process must be setup in Item Master Maintenance if they are not already items.

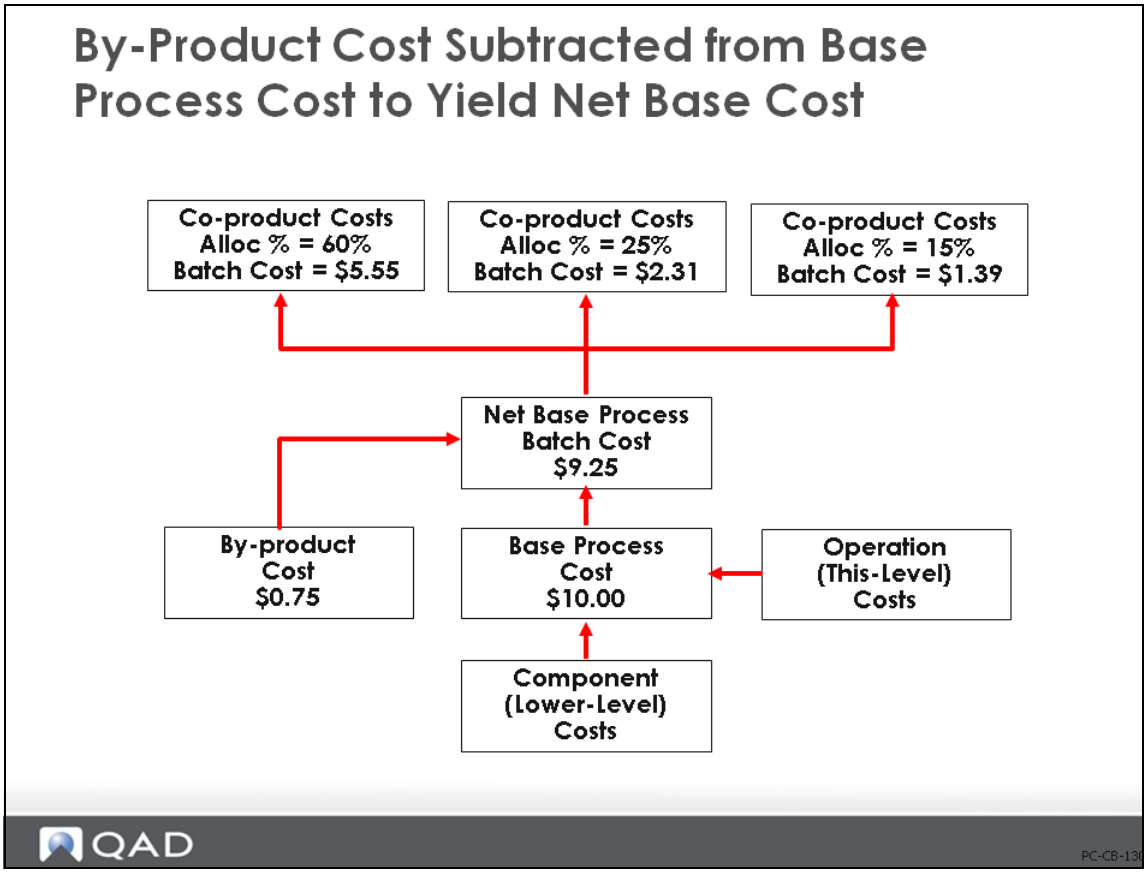
- Set the Pur/Mfg code to [M]anufactured, [R]outable, or leave blank
- For the Co-Products enter the base process that is used for costing and MRP as the BOM code in Item Planning Data
- Do not enter cost data for co-products, that will be calculated by the roll up process.

  Choose the default base process for each co-product with care. You can have only one BOM code for a co-product at each site. The costs developed for a co-product are based on that BOM code. The unit cost is used for the co-product in all base processes for the site.

  The same co-product can result from more than one base process, but only one base process determines a co-product's cost at a particular site. That is, a co-product receives costs only from the base process specified in the BOM/Formula field of the co-product's item record.

  The Order Policy and Order Modifiers of the base process are always used to plan and cost its co-products

By-Products



By-product costs are developed separately from the base process cost roll-up.

- You can enter by-product costs manually

  Use Item Master Maintenance (1.4.1), Item Cost Maintenance (1.4.9), or Item-Site Cost Maintenance (1.4.18)

- Or, you can have the system calculate by-product costs from regular product structures or formulas

  Any BOM/Formula code and Pur/Mfg code can be assigned to a by-product. You can use these codes to develop the by-product cost.

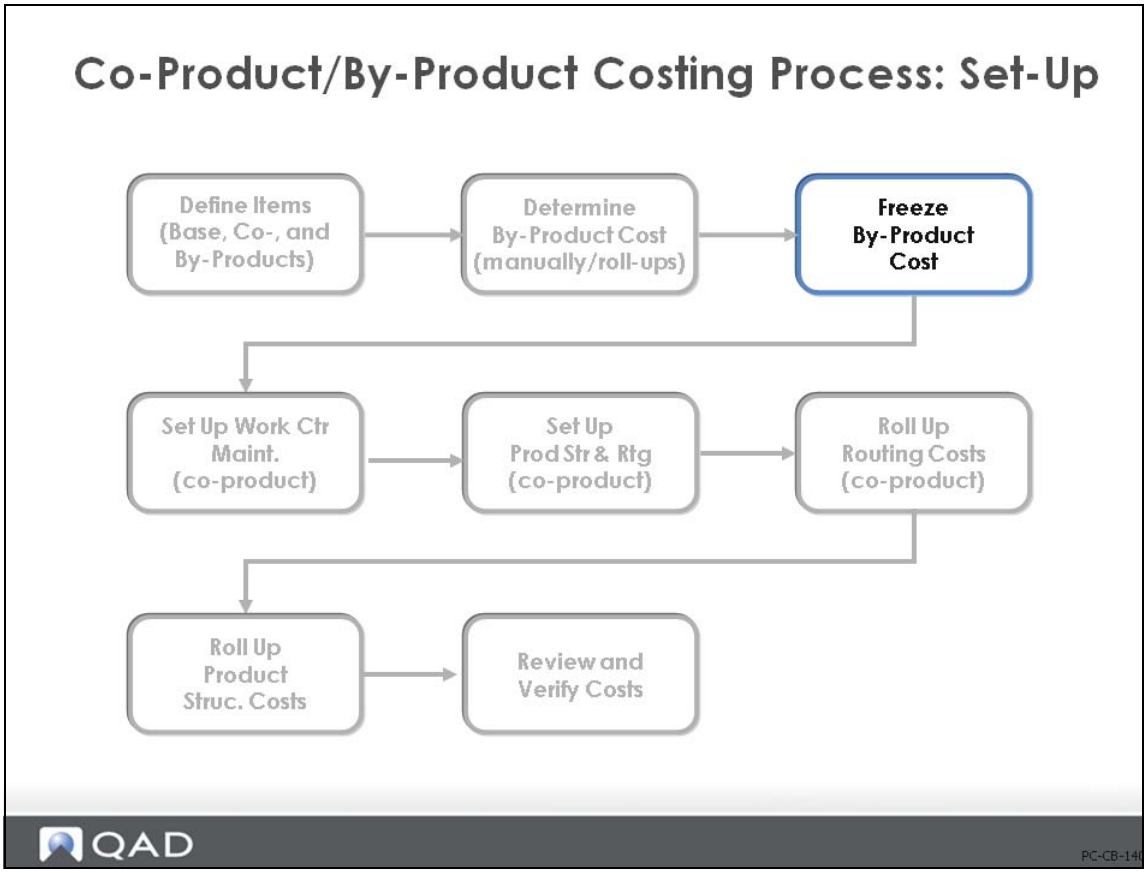
By-Product Costs Subtracted from Base Process Costs

By-product costs are subtracted from the base process batch cost before the cost is allocated to co-products. For costs to track correctly, you must have the following:

- A corresponding cost element in the cost set for the base process for each element in the by-product's cost set
- By-product cost elements that are not larger than the corresponding base process cost elements
- Frozen by-product costs

  By-products can never receive an allocation of the base process cost. They can, however, have costs rolled up for them in the normal way. These costs must be rolled up and frozen prior to rolling up the base process and co-product costs.

Freeze By-Product Cost



After by-product costs are established, freeze them to keep them from changing when co-product/by-product costs are rolled up - otherwise you may not be able to reconcile the costs.

Use Cost Roll-Up Freeze/Unfreeze (13.12.1)

Exercise 1: Setting Up Co/By-Product Costing

In this activity you will create a base process and add to it components, co-products and by-products. You will then roll up the costs and review various cost reports. You will use several components already in the database, but will also be creating new items and modifying others. In order to avoid conflict with other processes we will do this exercise in site 10-100.

1 Review Inventory Accounting Control (36.9.2), note the Current Cost is set to update with Average costs. You will be working with a general ledger cost set that is Standard.

2 Your base process is taken from the course material. Base Process B-70000 makes fruit juice from four components; fruit item 80050, spices item 80051, water item 80052 and a preservative item 80053. There are 7 operations in the process that yield 2 co-products; fruit juice item 70040, and fruit pulp item 70041 and two by-products, fruit seeds item 70042 and fruit peel item 70043. You bottle the juice, sell the pulp to a jam factory and compost the seeds and peel.

3 Use Item Master Maintenance (1.4.1) to create base process B-70000. It's unit of measure is L, you can call it anything, but it will make juice. Assign it to product line 30 and site 10-100.

4 In planning data set its Order Quantity to 5,000 and the Purchase/Manufacture code to M. That's all the data needed for a base process.

Use Item Master Maintenance (1.4.1) For the 80050, change the Unit of Measure to KG, delete the L in Lot/Serial Control, change the Site to 10-100, delete the Location Type “COOL,” delete the shelf life and Uncheck the Key Item box. All other data are ok.

5 Modify some current items. The items you want to use are currently setup at site 10-400 and have lot control. You will set them up at site 10-100 without lot control. Use Item-Site Data Maintenance (1.4.5) for the following items:

70040, 80051, 80052, 80053; in each case set the site code to 10-100; delete the L from the Lot/Serial field and let the location default. Delete shelf life and Key Item if present.

6 Add three new items, 70041 Fruit Pulp, 70042 Fruit Seeds, and 70043 Fruit Peel.

Use Item Master Copy (1.4.12) and copy the 80050 to the 70041, 70042 and 70043. Change the item code and description, all other data are the same.

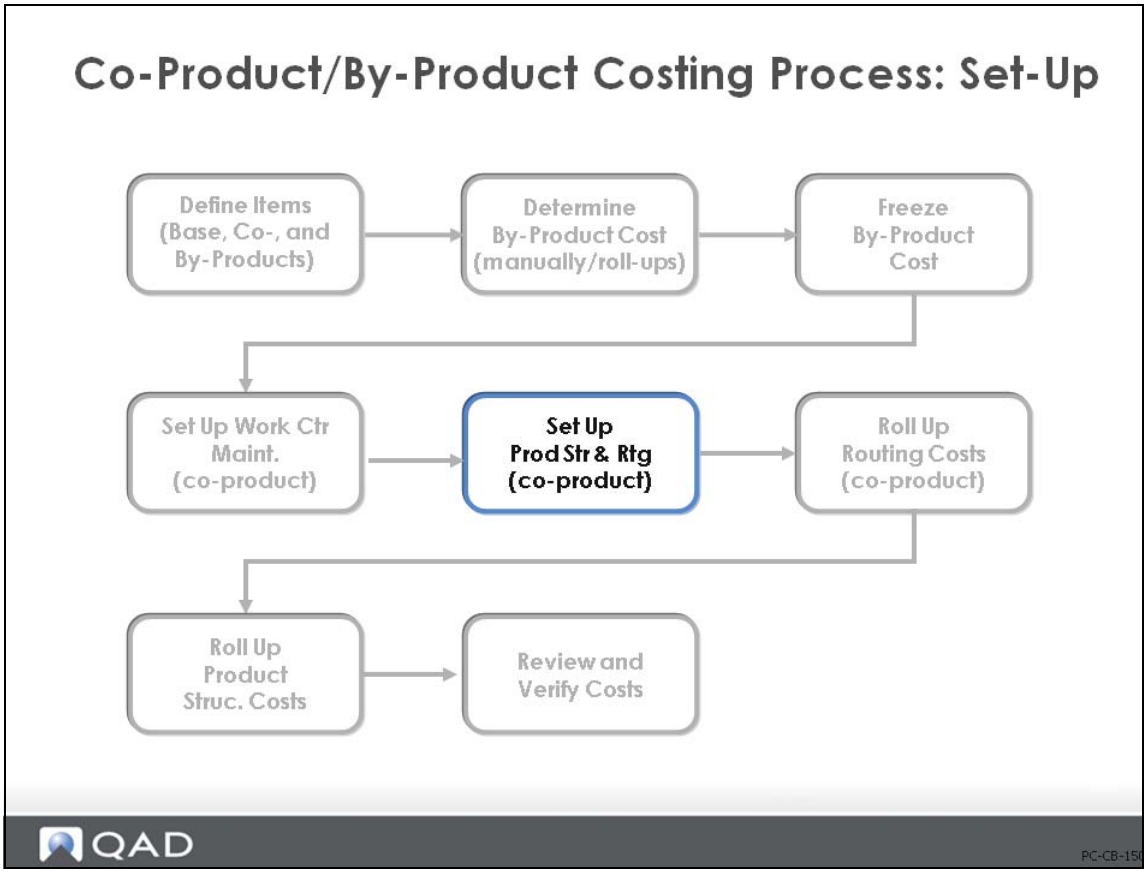
7 These items have no cost data at site 10-100.

Use Item-Site Cost Maintenance (1.4.18) to add costs to the GL Standard cost set for the components and by-products.

Item	GL Material Cost
80050	5.00
80051	1.00
80052	1.00
80053	1.00
70042	0.50
70043	0.50

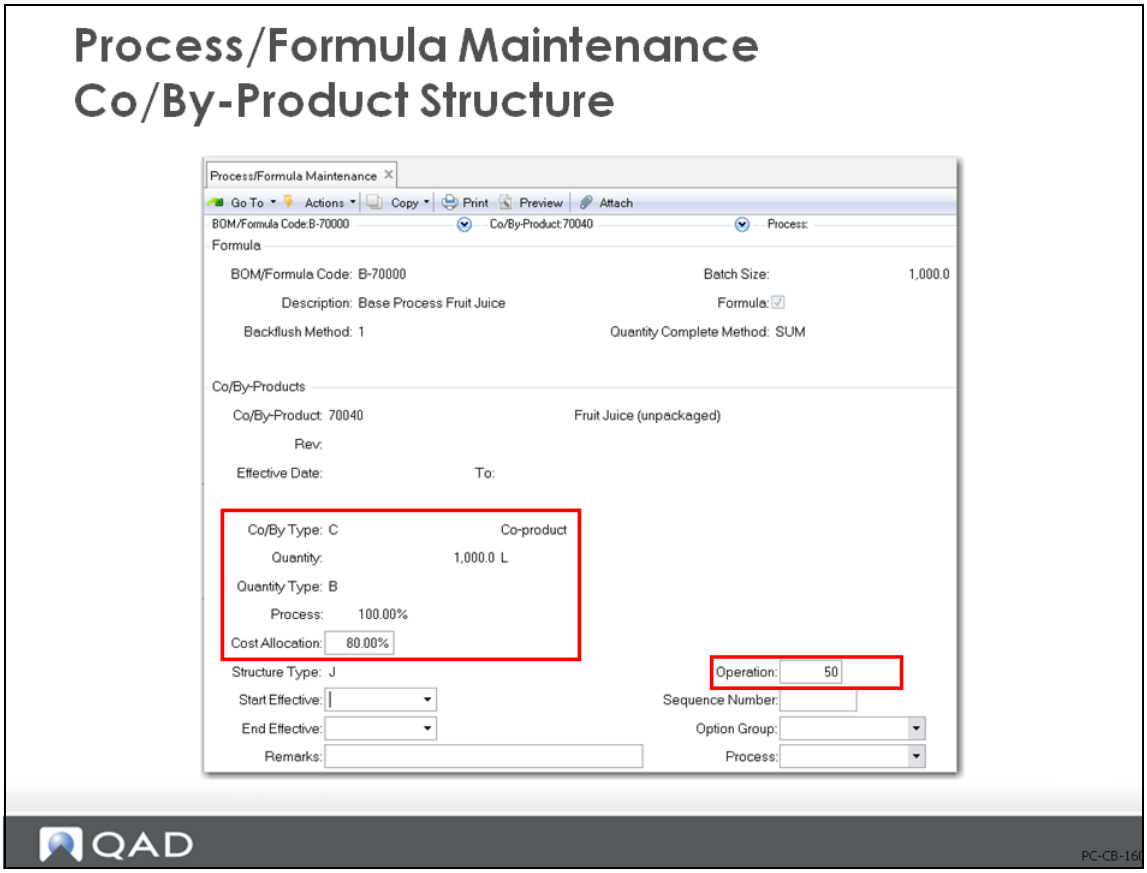
8 Use Cost Roll-Up Freeze/Unfreeze to freeze the costs of the by-products 70042 and 70043, at site 10-100 and for the Standard Cost Set.

Set Up Product Structure and Routing for Co-Products



Use Process/Formula Maintenance (15.18) to create the process route, the formula or product structure and define the co/by-products for this base process.

Process/Formula Maintenance



Process/Formula Maintenance (15.18) is entered with the Base Process BOM/Formula Code.

The first set of screens allow you to enter the process route operations as you would for any route/process definition. Define the operations, the work centers, milestone or not, set-up and run times, and any yield loss.

The second set of screens allow you to enter the components or ingredients, as you would with Product Structures or Formula Maintenance.

The third set of screens (shown above) allow you to enter the co/by products.

For each Co/By product enter it's Item number, the Co/By product type, C or B and the expected quantity per batch and the quantity type.

Set Quantity Type to [B]atch, [P]ercent, or blank (per base process unit)

Cost Allocation (%). Enter the percentage of base process cost to be allocated to this co-product. If co-product/by-product type is B, an allocation percentage cannot be entered.

Operation enter the operation number where the Co/By-Product is produced. The cost allocation percentages for the co-products should add up to 100 - or, costs will not track.

Based on work center/machine costs, the operation times, and the component material costs, the cost roll-up will determine the base process cost. And how much is allocated to the co-products.

Exercise 2: Working with Co/By-Products

1 Use Item-Site Planning Maintenance (1.4.17) for the two co-products; 70040 and 70041 at site 10-100. For the 70040 set the Purchase/Manufacture code to M, change the yield to 100% and enter the base process code, B-70000 in the BOM/Formula field.

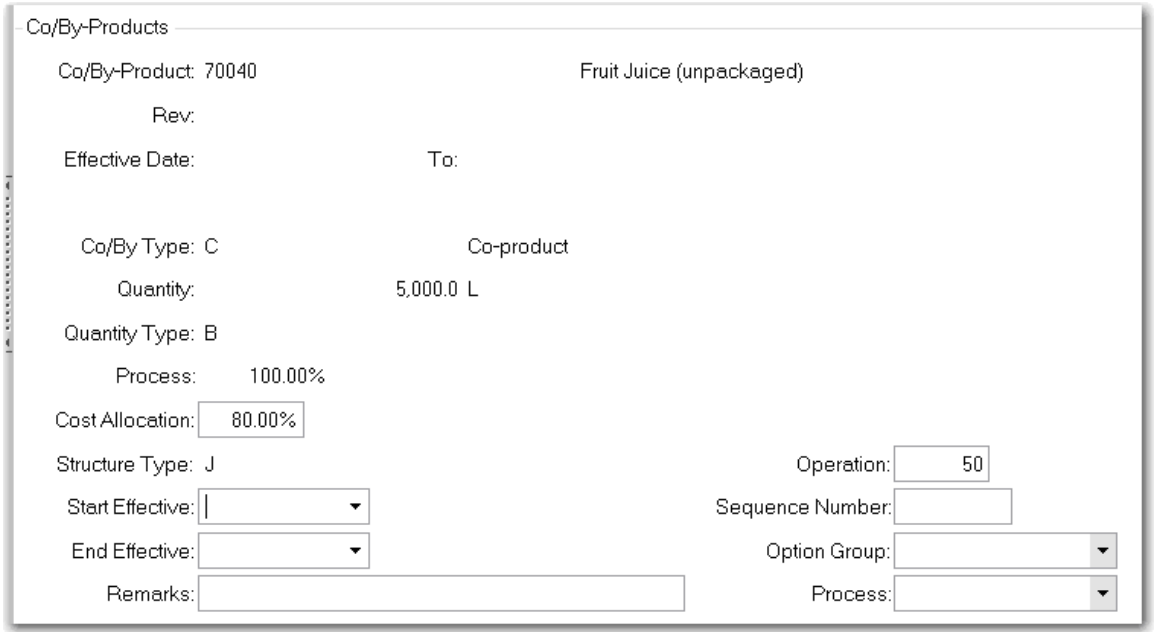
For the 70041 set the Purchase/Manufacture code to M and enter the base process code, B-70000 in the BOM/Formula field.

2 Use Formula Copy (15.8) to copy the formula (product structure) from the 70040 to the B-7000. The source formula does not have operation numbers assigned to the components.

Use Formula Maintenance (15.5) to issue the 80050 Fruit at operation 10, and all other components, 80051, 80052, and 80053 at operation 30.

3 Use Process Definition Copy (15.16) to copy the process (route) from item 70040 to the B-70000. Note the process route for the 70040 has a 90% yield, after the copy use Process Definition Maintenance (15.13) to change the yield on operation 10 to 100%.

4 Use Process/Formula Maintenance (15.18) for the B-70000 to add the Co/By-Products. In the header of the screen set the Backflush Method to 1, and the Quantity Complete Method to SUM.



Enter the Co/By Product number 70040, its Type code is C, the quantity is 5,000L, the cost allocation is 80% the operations number is 50.

In the same manner enter 70041 its Co/By Type is C, the Quantity is 50, Quantity Type is B, the Cost Allocation is 20% and the Operation is 50.

Enter the 70042 its Co/By Type is B, the Quantity is 5, Quantity Type is B, there is No Cost Allocation and the Operation is 50.

Enter the 70043 its Co/By Type is B, the Quantity is 5, Quantity Type is B, there is No Cost Allocation and the Operation is 50.

Use Process/Formula Inquiry (15.19) to review your work. It should look like this.

This inquiry shows the process operations by work center; and the set-up and run times. It shows the components and quantities per batch, and the operations they are issued at.

It shows the Co/By-Products, their quantities per batch and for the Co-Products their cost allocation.

QAD

Process/Formula Inquiry

10/

Base Process
BOM/Formula: B-70000 Base Process Fruit Juice
Effective Date: 10/29/10 Operations: Yes Components: Yes Co/By-Prod: Yes
Batch Size: 5,000.0 UM: L
Backflush Mthd: 1 Quantity Complete Method: SUM Output: PAGE

Operations

Op	Work Center	Start	Setup/Run	Move	Subcontract
10	5000 Prep		0.0	0.0	0.00
	GRADE, SORT		2.0		
20	5010 Chopper		0.0	0.0	0.00
	CHOP		1.0		
30	5020 Blender		0.0	0.0	0.00
	MIX/BLEND INGREDIENT		2.0		
40	5020 Blender		0.0	0.0	0.00
	COOK		2.0		
50	3040 Centrifuge		0.0	0.0	0.00
	REMOVE PEEL, SEEDS		2.0		
60	3100 Quality Testing		0.0	0.0	0.00
	QUALTIY TESTING		2.0		
70	3071 Process Tanks 20,00		0.0	0.0	0.00
	TRANSFER TO HOLDING TANK		2.0		

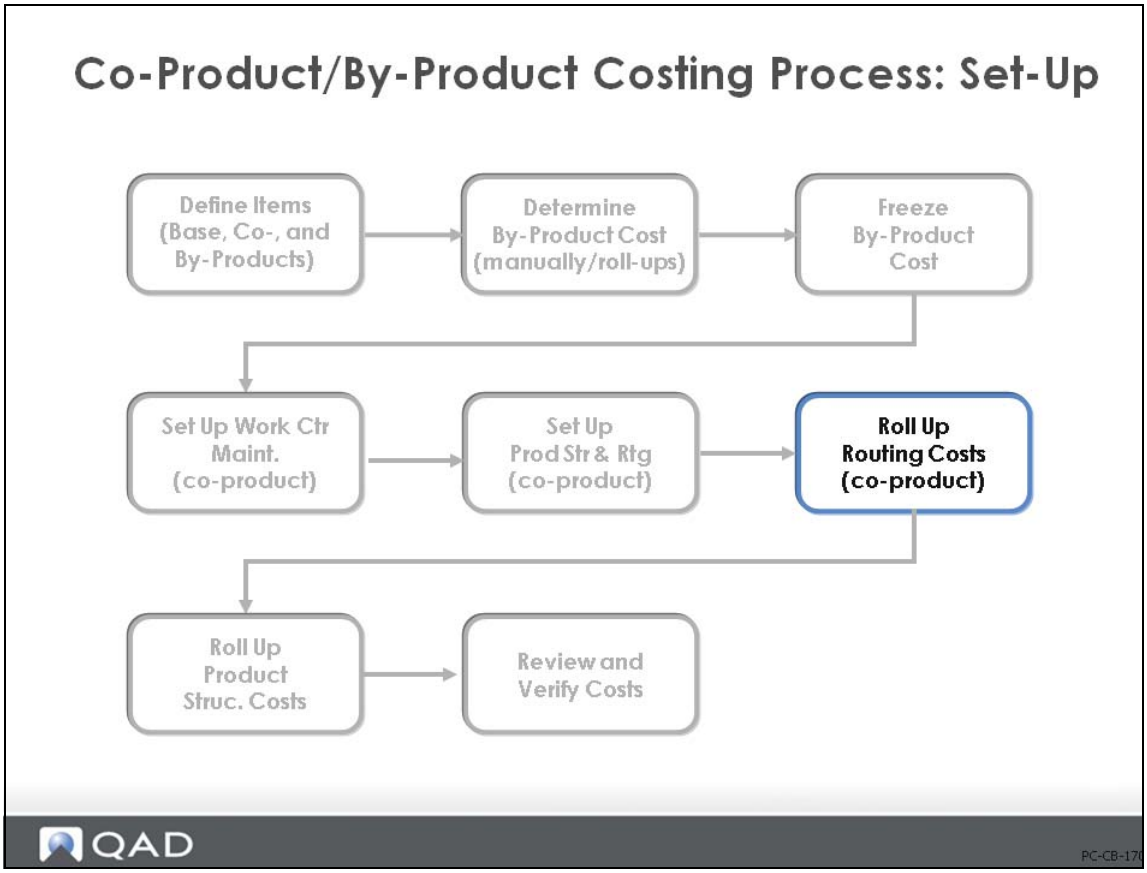
Components

Component Item	Description	Qty per B	UM	T	Op
80050	Fruit	10.0	KG	B	10
80051	Proprietary Spice Mix	5.0	G	B	30
80052	Sterlized Water	262.5	L	P	30
80053	Preservative	7,500.0	ML	P	30

Co/By-Products

Parent Item	Description	Quantity	UM	T	Cost Alloc	CT
70040	Fruit Juice (unpackaged)	5,000.0	L	B	80.00%	C
70041	Fruit Pulp	50.0	KG	B	20.00%	C
70042	Fruit Seeds	5.0	KG	B	0.00%	B
70043	Fruit Peel	5.0	KG	B	0.00%	B

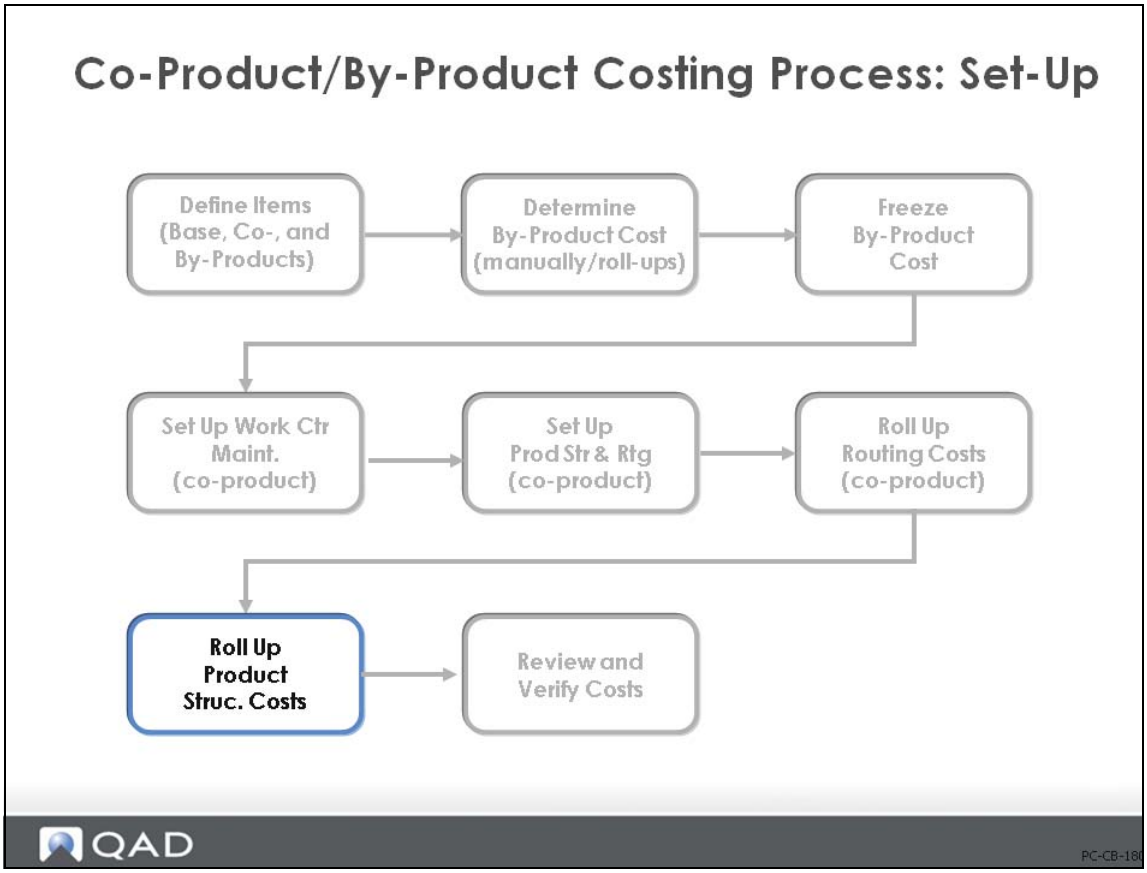
Roll Up Routing Costs



As with standard manufacturing processes, run Routing Cost Roll-Up (14.13.13), to establish this-level costs for the base process.

Costs are normally rolled up for all items at a site. Insure the range of item numbers selected for the roll up include all components, co/by-products and the base process item.

Roll Up Product Structure Costs



After routing costs are rolled up to the base process, run Product Structure Cost Roll-Up (13.12.13), or Simulation Structure Cost Roll-Up (30.13.19), to calculate lower-level costs for the base process and to allocate those base process costs to each of the co-products.

Costs are normally rolled up for all items at a site. Insure the range of item numbers selected for the roll up include all components, co/by-products and the base process item.

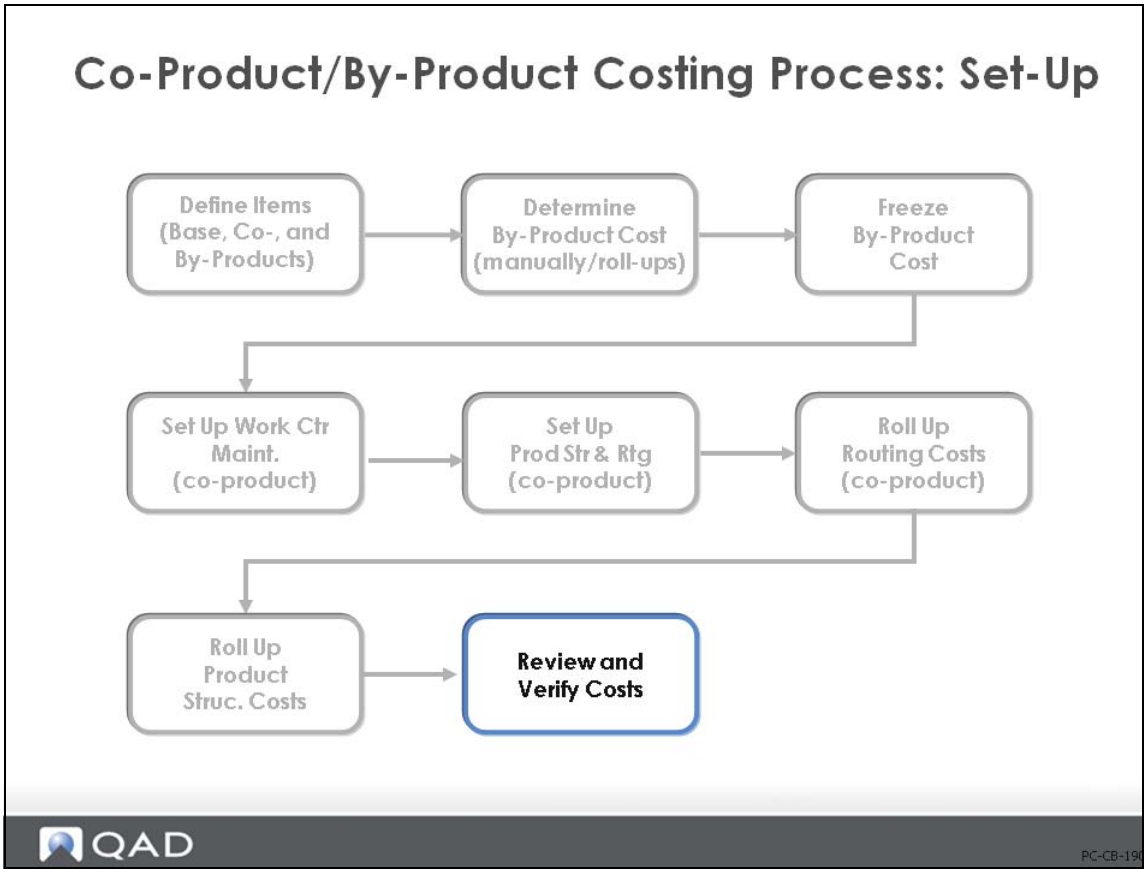
Co-product costs are calculated by Product Structure Cost Roll-Up (13.12.13), by the:

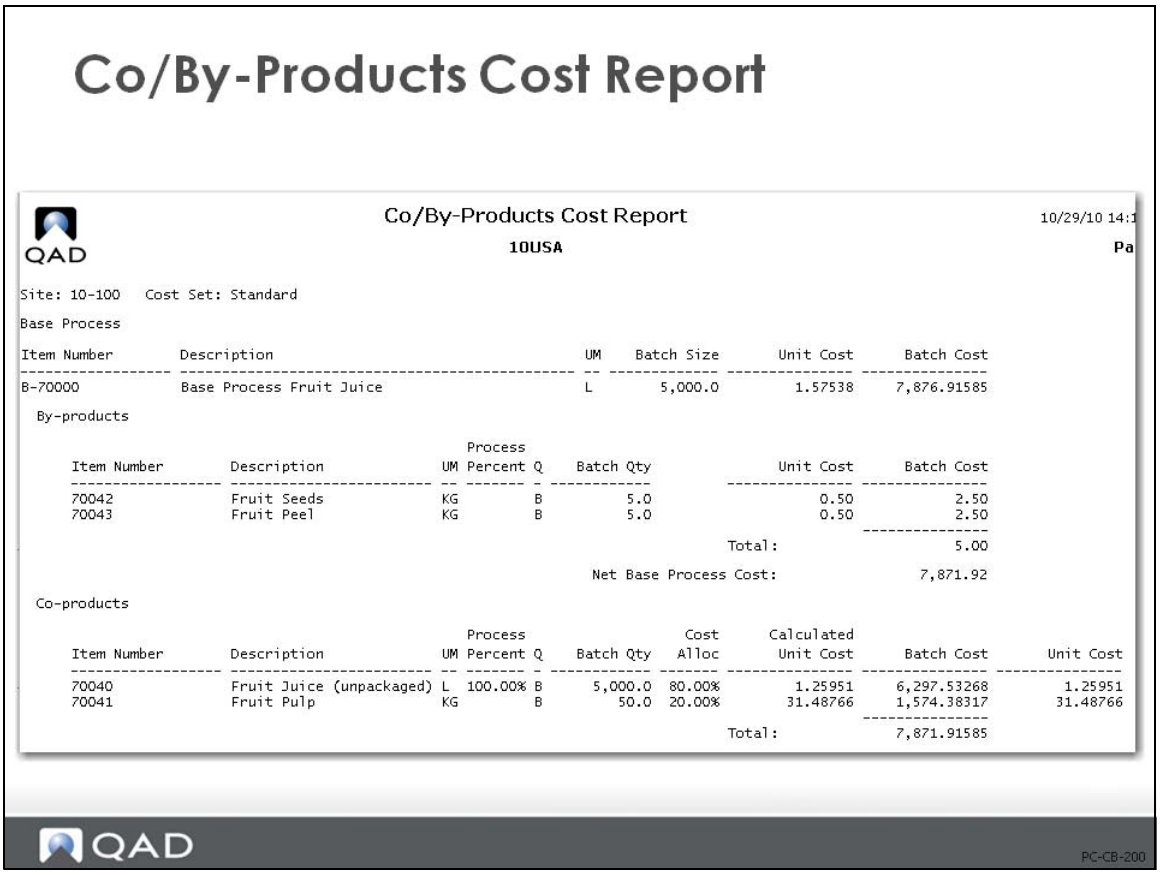
- Cost of the base process
- Allocation percent for the co-products
- Expected quantities for the co-products/by-products produced by the base process

The cost that is rolled up to the base process is a batch cost, allocated to the co-products based on the Cost Allocation field in Process/Formula Maintenance (15.18), or Co/By-Product Maintenance (15.12.1)

To arrive at the unit cost for each co-product, the batch cost is divided by the quantity per for each co-product as entered in the Quantity field in Process/Formula Maintenance (15.18), or Co/By-Product Maintenance (15.12.1)

Review and Verify Costs





Review Costs

To verify that costs are correct for base process items and their lower-level components, review costs using one of the following reports.

- Product Structure Cost Report (13.12.4).

This report identifies an item as a co-product or a base process. The Base Process Item will show the component items and the cost per unit of the base process.

- Co/By-Products Cost Report (13.12.7). This report shows you how co-product costs were calculated from a base process and its by-products.

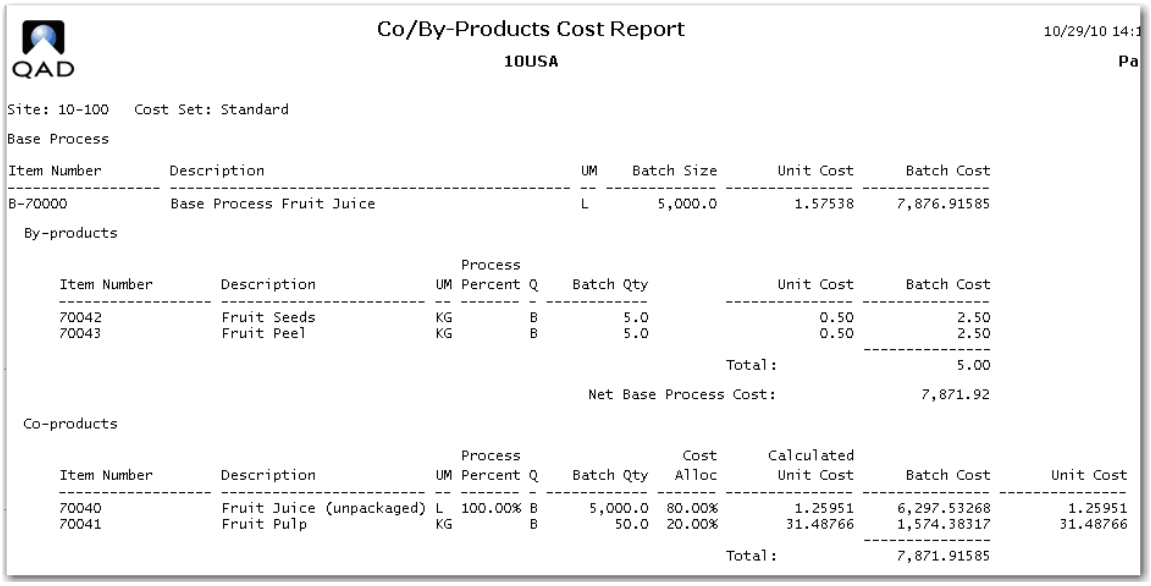
Recalculating Costs

Recalculate costs whenever purchase or manufacturing costs, or structures or routings change.

Only roll up a Current cost set (or some other non-GL cost set). If the changes are correct, copy these costs to the GL cost set.

Exercise 3: Roll Up the Base Process Costs

1. Use Routing Cost Roll Up (14.13.13) to roll up the cost of your base process. For Site 10-100 and the Standard Cost Set roll up all items (leave the Item Number selection fields blank) this is to ensure all items in the structure get rolled up.
2. Use Product Structure Cost Roll-Up (13.12.13) to roll up the cost of your base process. For Site 10-100 and the Standard Cost Set roll up all items (leave the Item Number selection fields blank) this is to insure all items in the structure get rolled up.
3. Review the Product Structure Cost Report (13.12.4) for your base process
4. Review the Co/By-Products Cost Report (13.12.7) for your base process. It should look like this.



QAD

Co/By-Products Cost Report 10/29/10 14:1

10USA Pa

Site: 10-100 Cost Set: Standard

Base Process

Item Number	Description	UM	Batch Size	Unit Cost	Batch Cost
B-70000	Base Process Fruit Juice	L	5,000.0	1.57538	7,876.91585

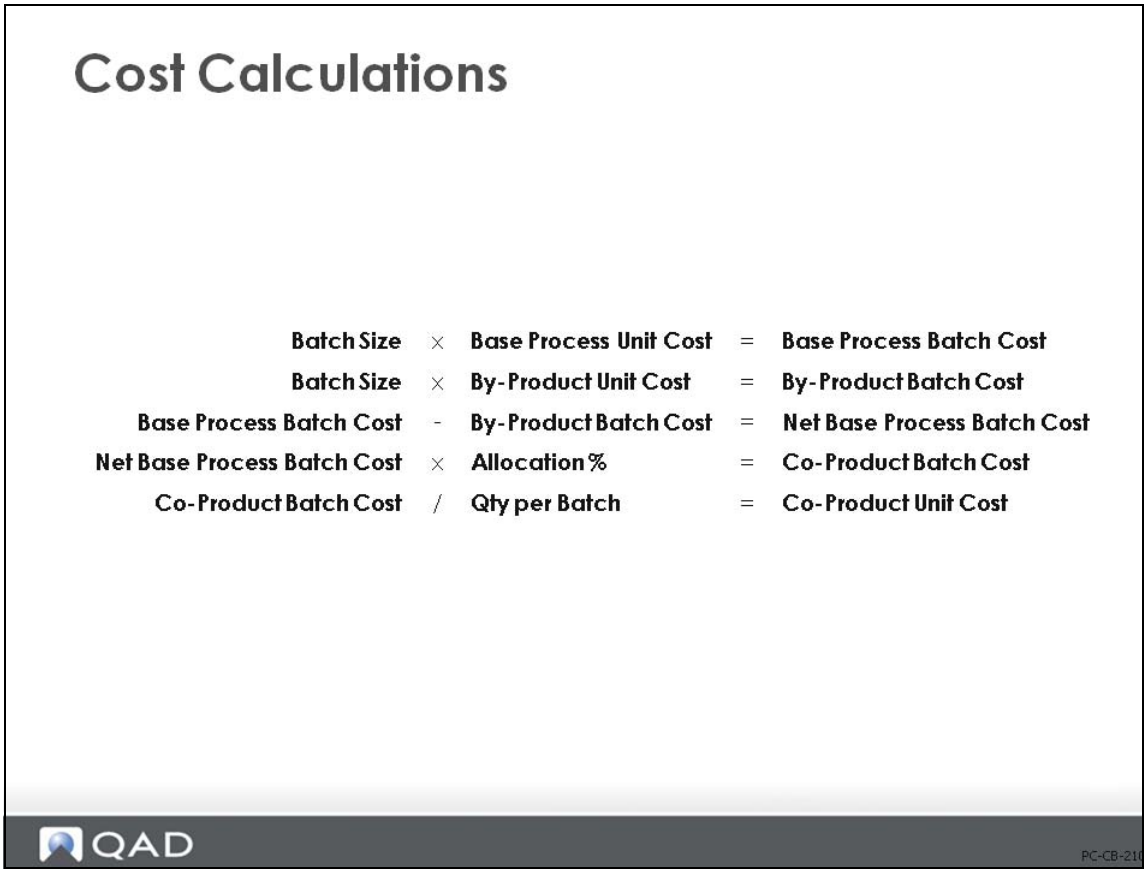
By-products

Item Number	Description	UM	Process Percent	Q	Batch Qty	Unit Cost	Batch Cost
70042	Fruit Seeds	KG		B	5.0	0.50	2.50
70043	Fruit Peel	KG		B	5.0	0.50	2.50
						Total:	5.00
						Net Base Process Cost:	7,871.92

Co-products

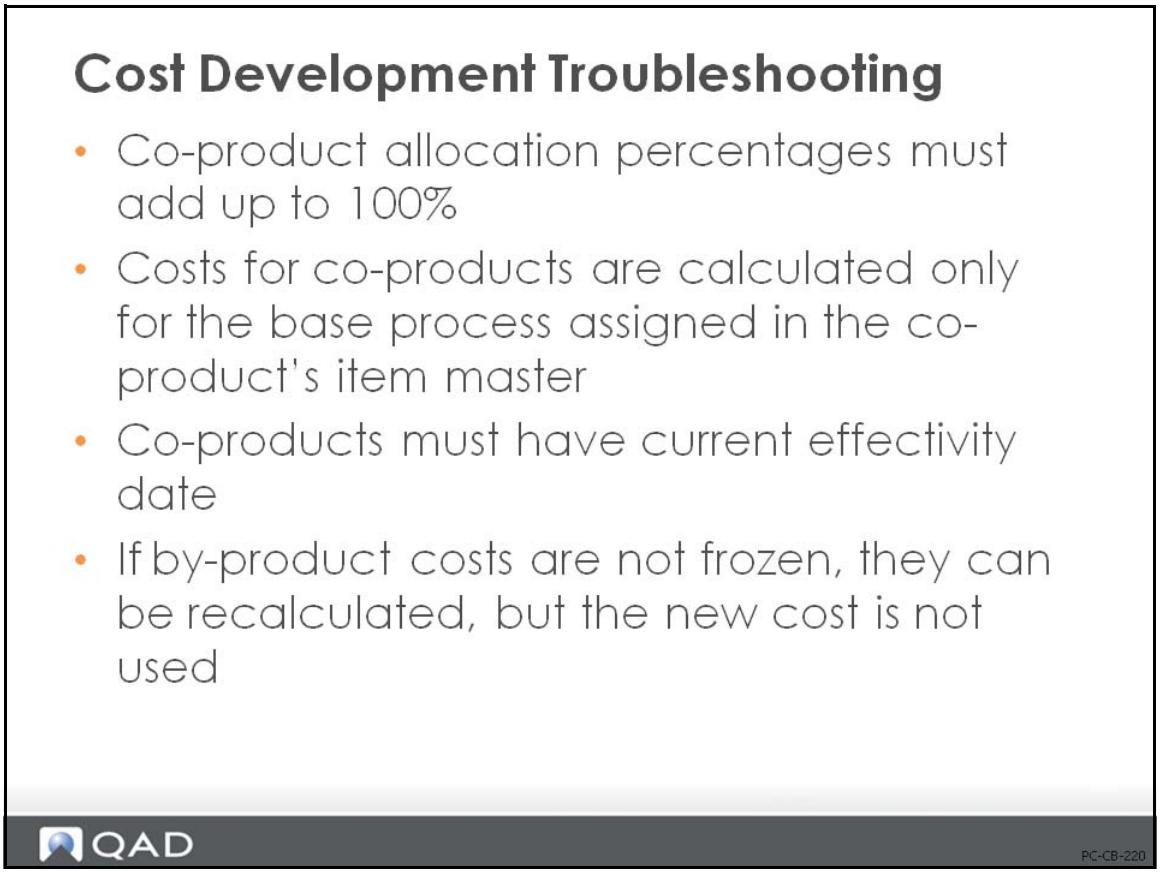
Item Number	Description	UM	Process Percent	Q	Batch Qty	Cost Alloc	Calculated Unit Cost	Batch Cost	Unit Cost
70040	Fruit Juice (unpackaged)	L	100.00%	B	5,000.0	80.00%	1.25951	6,297.53268	1.25951
70041	Fruit Pulp	KG		B	50.0	20.00%	31.48766	1,574.38317	31.48766
							Total:	7,871.91585	

Cost Calculations



The cost calculations related to base processes, by-products, and co-products are shown in the figure above.

Cost Development Troubleshooting



Co-product Costs

There are a number of ways to set up co-products that causes their costs to be different than expected:

- Cost allocation among co-products does not add up to 100%

  You receive warnings if you enter a co-product/by-product structure with cost allocation percentages that do not add to 100%. The warnings do not prevent you from leaving the percentages the way you entered them, though.

- Co-product in more than one base process

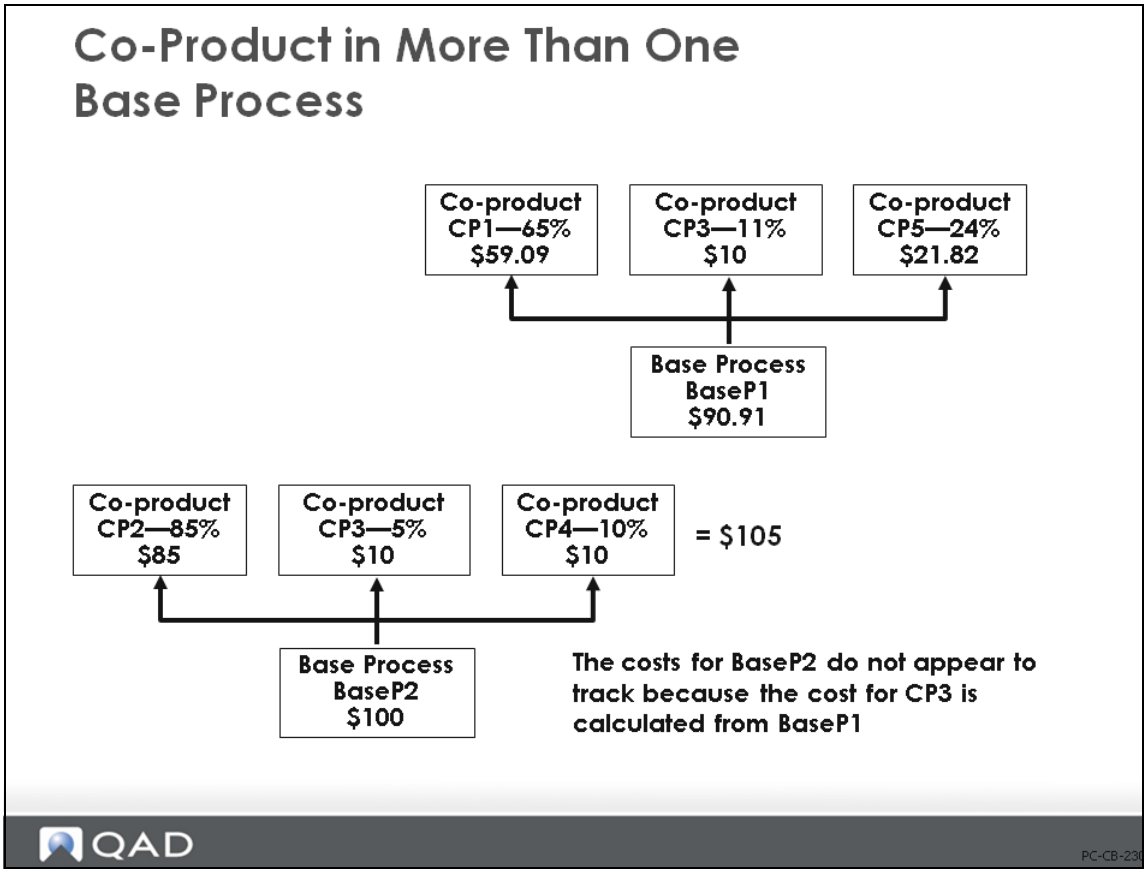
  At a single site, if a co-product is in the co-product/by-product structure of more than one base process, the cost of the co-product is established by the base process whose item number is entered in the BOM/Formula code for the co-product. That co-product does not receive an allocation of costs from the other base processes from which it is produced. So, for the other base processes, adding up co-product costs does not appear to track to the base process cost. (See example on following page.)

- A co-product has an expired effectivity date

- By-product costs were not frozen

  If by-product costs are not frozen once subtracted from the base process gross cost, the system recalculates the by-product costs, changing the value of the base process net cost.

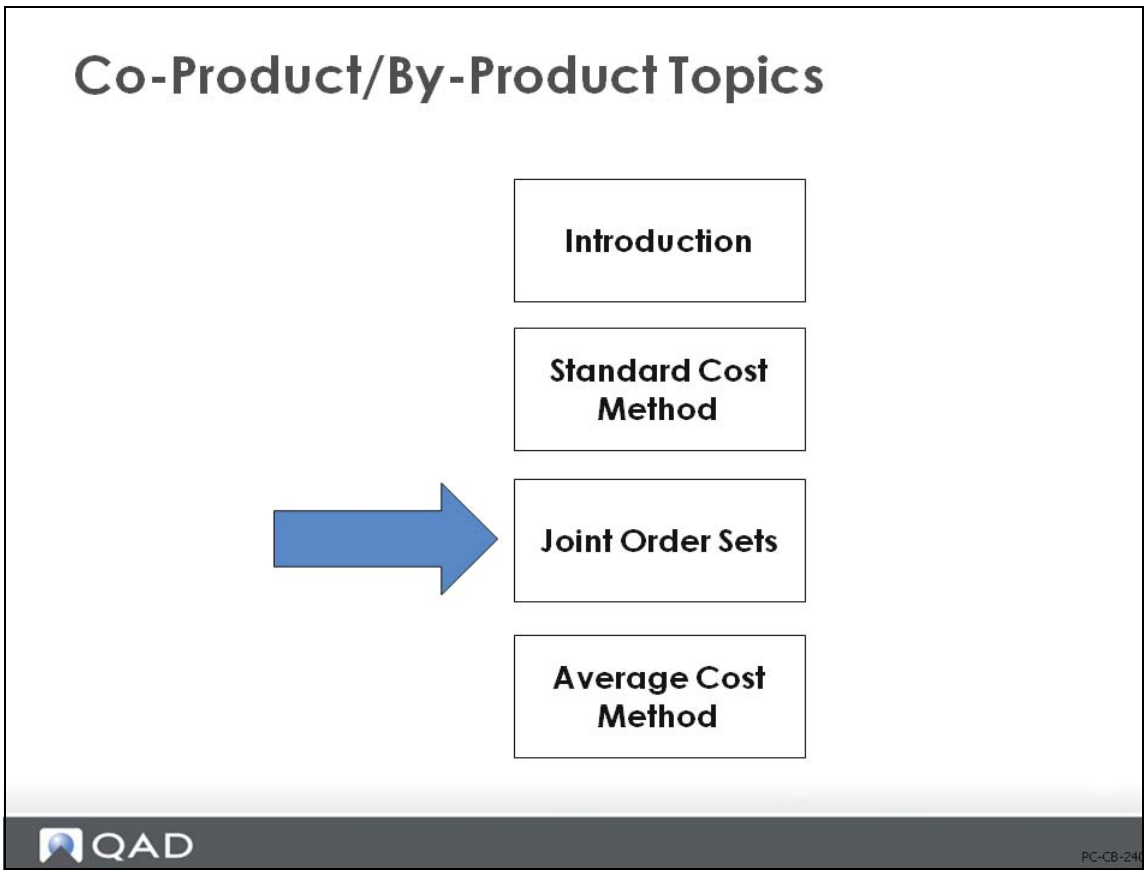
Co-product in More Than One Base Process



Here is an example of a co-product (CP3) that is associated with two base processes (BaseP1 and BaseP2). The cost for CP3 is calculated from BaseP1. It appears, therefore, that the costs for BaseP2 does not track.

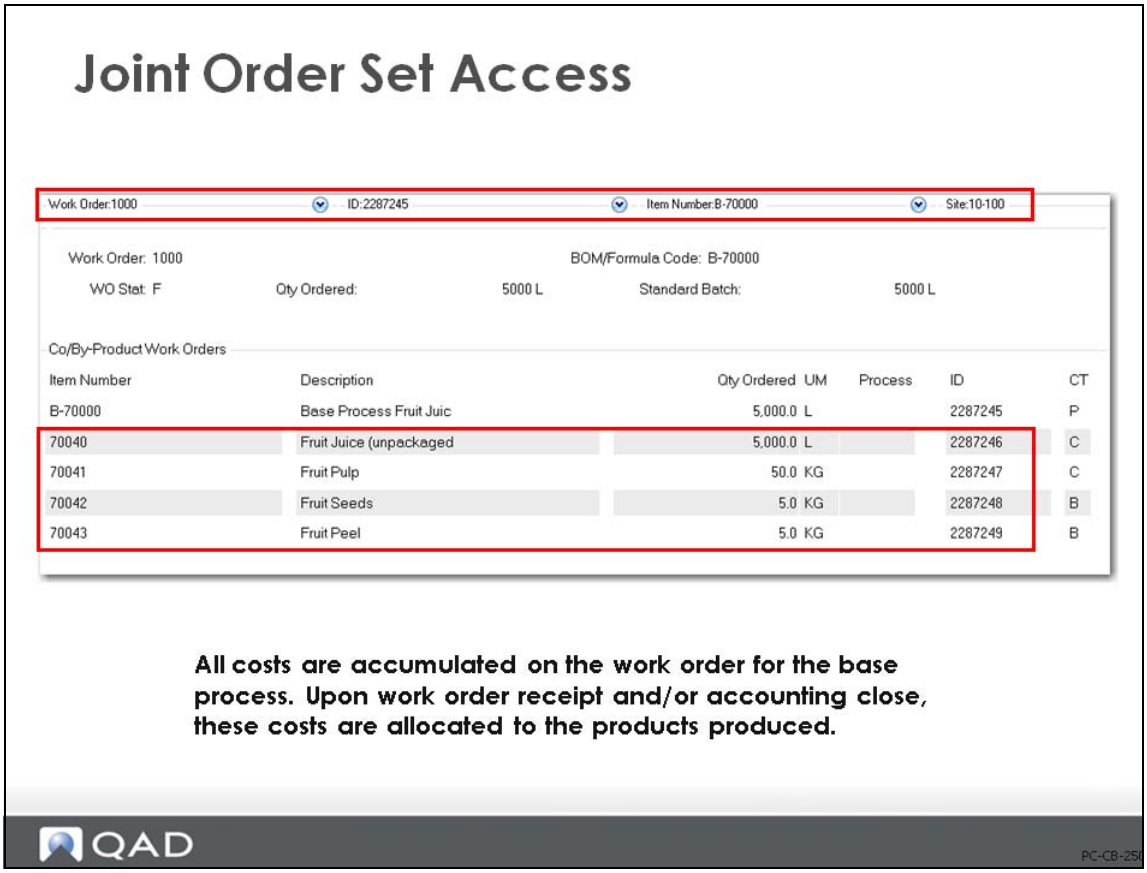
Five percent of the batch cost for BaseP2 is not allocated because it is assigned to CP3 in the co-product/by-product structure. The cost for CP3 is established elsewhere, so it does not add up with CP2 and CP4 to the base process batch cost for BaseP2.

Joint Order Sets



In this section, co-product/by-product work orders, which form joint order sets, are discussed, along with mix variances. The chapter ends with a look at average cost method.

Introduction



In the joint order set, a work order is generated for the base process as well as for each co-product and by-product in the joint order structure. Although the base process is not an item received to stock, the work order for the base process provides a record for accumulating all labor and material costs expended to make the items.

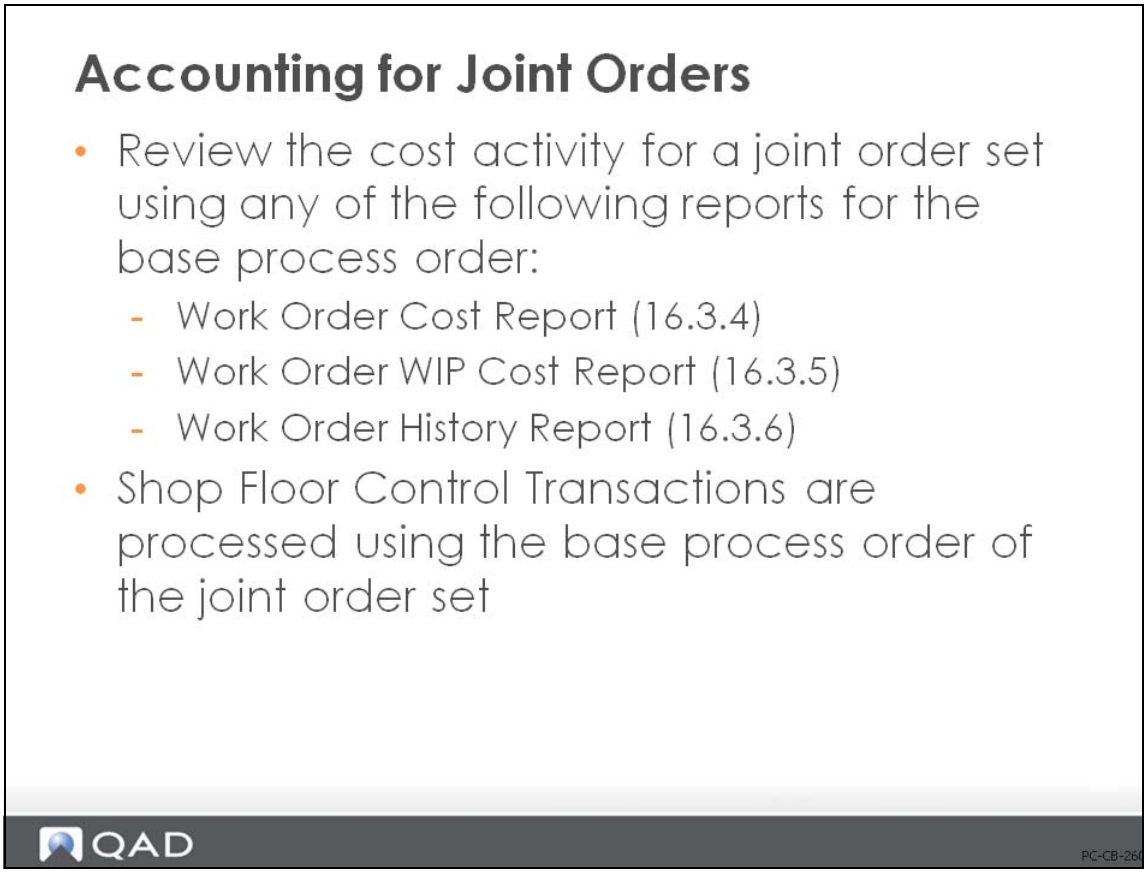
The graphic above shows the joint work orders created when an work order for 5000 of the base process B-70000 was created. Based on the Co/By-Product Structure the system has created work orders to receive 5000L of the first co-product, 50KG of the second co-product and 5KG of each of the by-products.

The work order for the base process includes the work order bill and the work order route.

All orders in the joint order set share the same work order number, site and status as the base order, but each has a unique work order ID.

- For variations in the process, you can define valid alternate formula/structures and routings. Only one set of formula/BOM and routing is used for planning and costing, however.

Accounting for Joint Orders



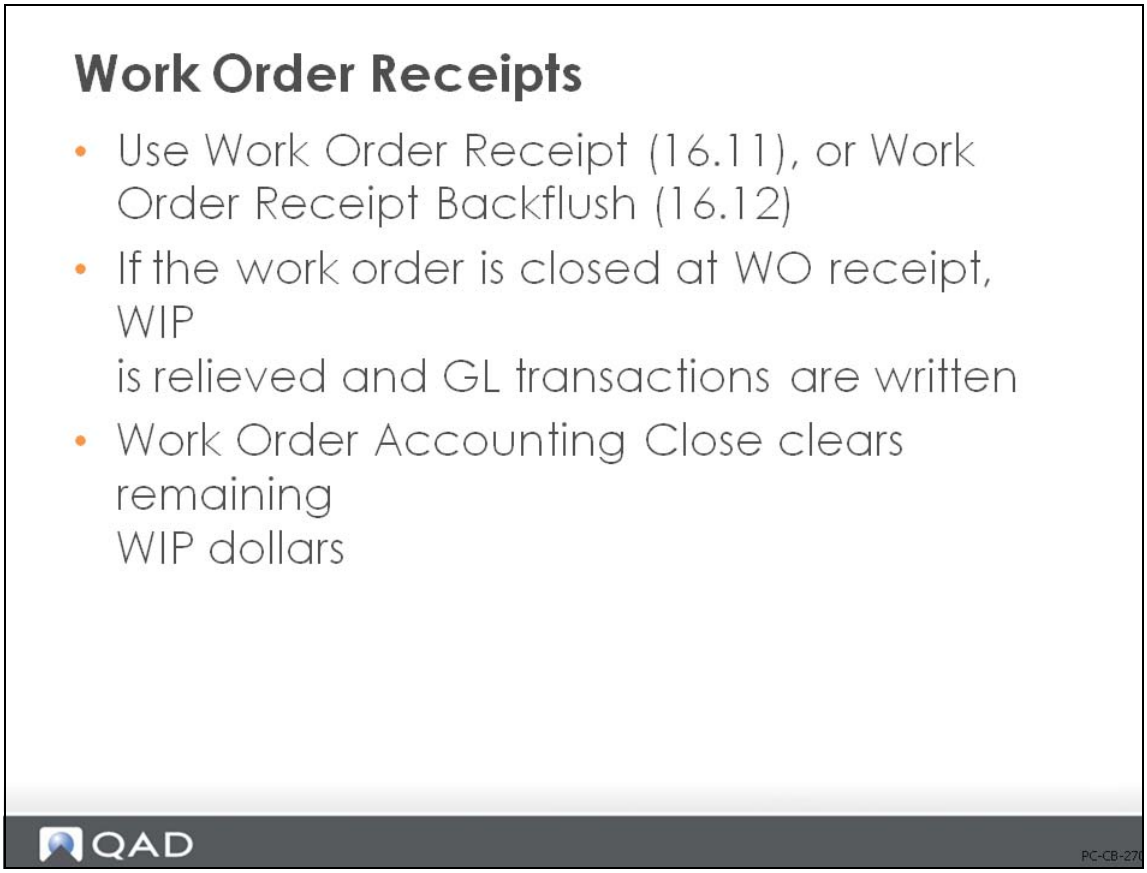
You can track all WIP costs associated with a joint order set as shop floor transactions are made.

Check cost details by making an inquiry against the work order for the base process

The base process product line determines the work order accounts for a joint order (with the exception of the mix variance account and cost center).

The mix variance account and cost center are specific to the product line for the item on each of the joint orders themselves

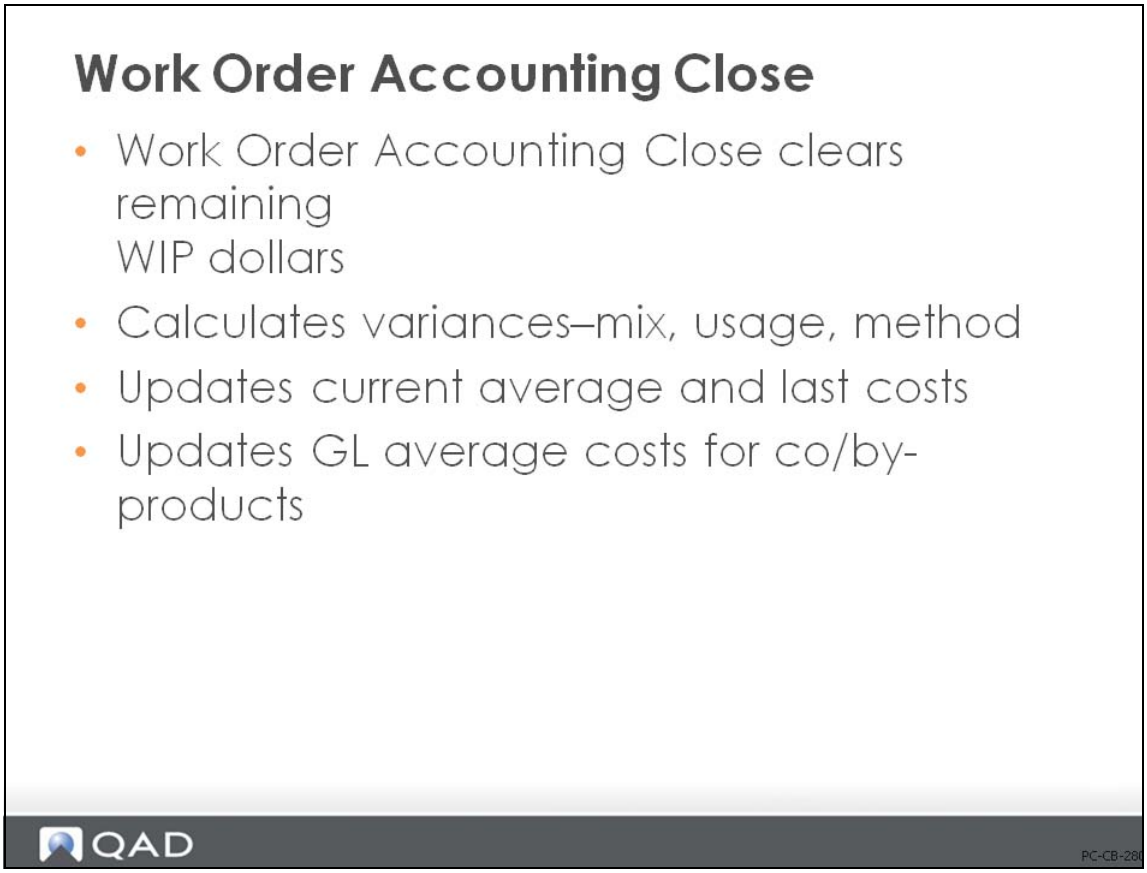
Work Order Receipts



If you close the joint order set when you receive the work order to stock, WIP is reduced and GL transactions are written. If you do not close the set when you receive it to stock, WO Accounting Close allocates any WIP costs that remain.

- Any item can be received, in addition to the co-products and by-products of the joint order set
- If only pre-defined substitute items can be received, you must set these up in Item Substitution Maintenance (13.19), and set Modify Co/By-Product Receipts to Yes in the Compliance module control file (1.22.24)
- A work order is created for each received item that is not part of the joint order set

Processing Joint Orders at Work Order Close



Work Order Accounting Close (16.21), calculates variances (mix, usage, and method), updates current average and last costs, and updates GL average costs for co-products and by-products.

- Method variance, rate and usage variances are calculated and booked in the same way as regular work orders. Mix variance is calculated and booked to joint order sets only.

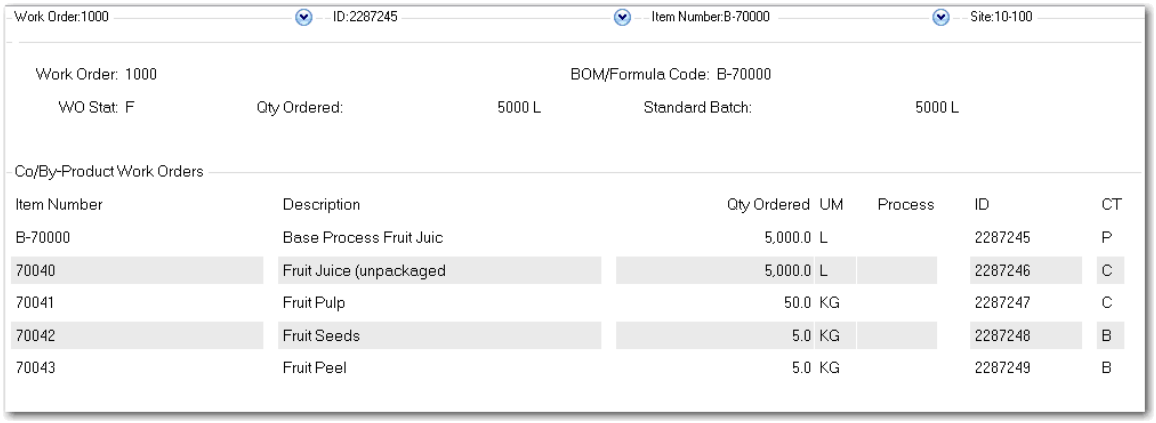
  If co-product costs do not add up to the base process net cost when work orders are closed, method change variances result

Reviewing Joint Orders

- To print information for each order related to a base process work order, use Work Order WIP Cost Report (16.3.5)
- To print information on items received and scrapped from a joint order set, use Work Order Cost Report (16.3.4)

Exercise 4: Work Orders

1 Use Work Order Maintenance (16.1) to create a work order for your base process, B-70000 at Site 10-100 for 5,000L. Note the joint order set this creates.



Item Number	Description	Qty Ordered	UM	Process	ID	CT
B-70000	Base Process Fruit Juic	5,000.0	L		2287245	P
70040	Fruit Juice (unpackaged	5,000.0	L		2287246	C
70041	Fruit Pulp	50.0	KG		2287247	C
70042	Fruit Seeds	5.0	KG		2287248	B
70043	Fruit Peel	5.0	KG		2287249	B

2 Use Work Order Release/Print (16.6) to release the work order. Note how the system first prints a section to receive the expected Co/By-Products, then the pick list, then the process route.

3 You are short all of the component items. Use Receipts - Unplanned (3.9) to receive enough of each component into site 10-100 to complete your work order.

4 Use Work Order Receipt Backflush (16.12) to complete your work order. As you enter the screen note the check boxes for Receive - Backflush - Receive All and Receipt Qty = Open Quantity. If you are receiving the order at standard you can check all the boxes and the system will do most of the work for you.

The system steps you through the receipt screen, then the component issue screen, then the order close screen. You can make any changes to either issues or receipts as needed.

Review the Work Order Cost Report (16.3.4), because you did not report any labor the report shows only the value of the components issued and the Co/By-Products received. Review the Work Order WIP Cost Report (16.3.5), shown here.

QAD

Work Order WIP Cost Report 10/29/10 15:1

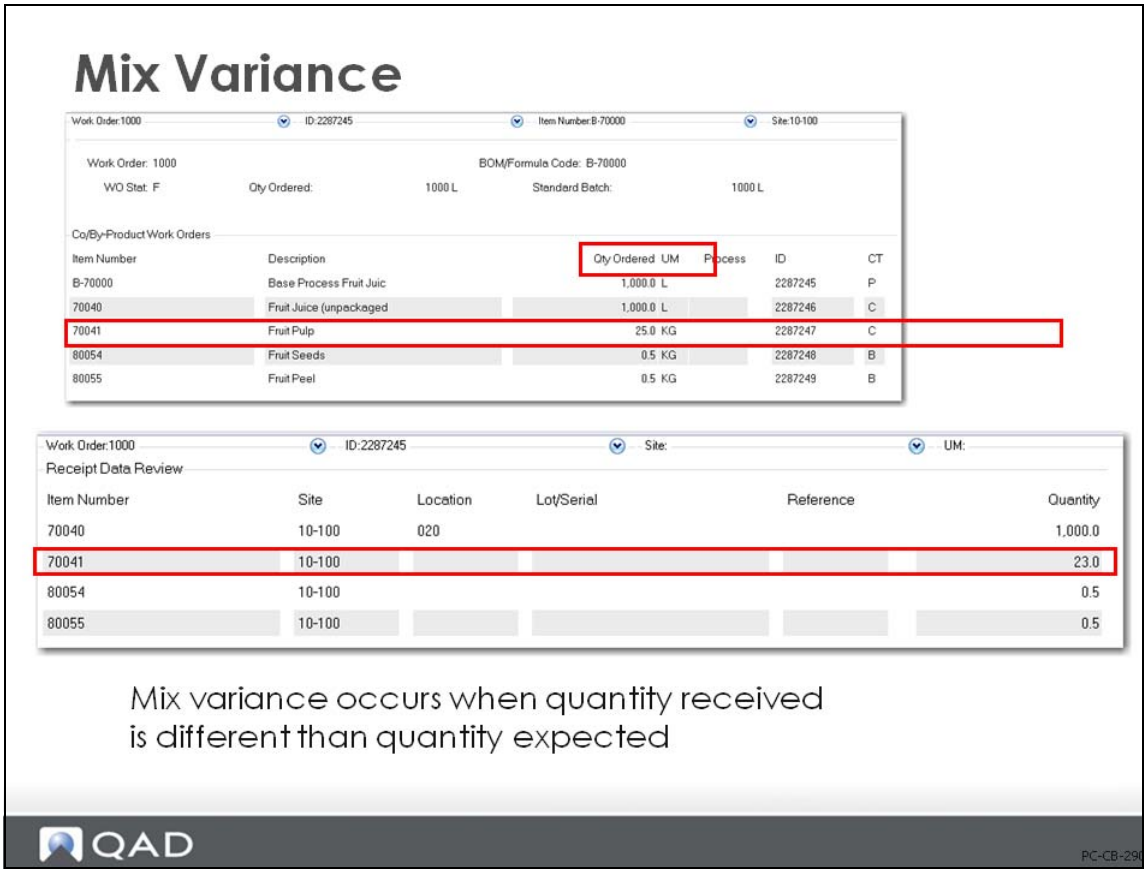
10USA Pag

Account: 1550 Mech Project:

Work Order Batch	ID	Item Number	Material Labor	Burden Subcontract	Qty Finish Open	Avg Unit Cost	Completed Cost WIP Cost
1000	2287245	B-70000	7,911.31	0.00			
		Base Process Fruit Juice	0.00	0.00			
		Co/By-Products:					
1000	2287246	70040			5,000.0	1.259506536	6,297.53268
		Fruit Juice (unpackaged)			0.0		0.00
1000	2287247	70041			50.0	31.4876634	1,574.38317
		Fruit Pulp			0.0		0.00
1000	2287248	70042			5.0	0.50	2.50
		Fruit Seeds			0.0		0.00
1000	2287249	70043			5.0	0.50	2.50
		Fruit Peel			0.0		0.00
						WI	34.40
		Project Total:	15,817.62	-0.0041665			7,876.91585
			0.00	0.00			34.40
		Cost Ctr Total:	15,817.62	-0.0041665			7,876.91585
			0.00	0.00			34.40
		Sub-Acct Mech Total:	15,817.62	-0.0041665			7,876.91585
			0.00	0.00			34.40
		Account 1550 Total:	15,817.62	-0.0041665			7,876.91585
			0.00	0.00			34.40
		Report Total:	15,817.62	-0.0041665			7,876.91585
			0.00	0.00			34.40

If you would like to see how mix variances are generated, create another work order and receive some of the items for a non-standard quantity.

Mix Variance



Mix var results if qty of co/by-product rec'd to stock differs from qty expected.

[Order Qty - (Rec Qty + Scrap Qty)] * Unit Cost

Standard costs for co-products/by-products are derived based on the quantity per base process batch defined in the co-product/by-product structure. When the joint order set is closed, a mix variance occurs if the quantity of a co-product/by-product that is received to stock differs from the quantity expected, or if a substitute item is received. (In a standard product structure, this would be recorded as a material usage variance.)

Mix variance amounts, if any, are updated on the affected co-product/by-product work order and subtracted from the WIP amount of the base process work order. A GL transaction is created debiting the mix variance account specified on the co-product/by-product work order and debiting (unfavorable) or crediting (favorable) the WIP account specified on the base process work order.

Mix Variance Formula

The mix variance formula is:

*Mix Variance = [Order Quantity – (Receipt Quantity + Scrap Quantity)] * GL Unit Cost*

The sum of the receipt quantity and scrap quantity for a co-product/by-product is the quantity produced from the base process.

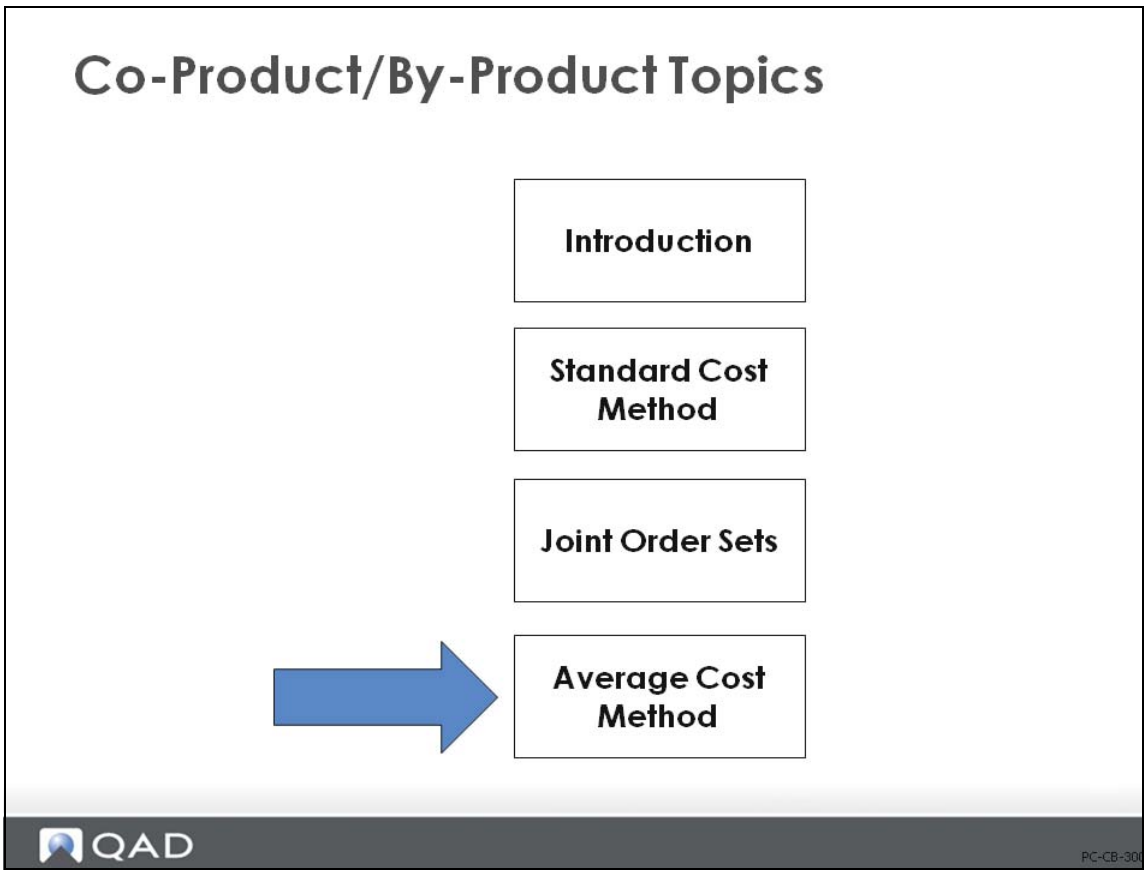
You may not see a mix variance if you changed the quantity ordered to the quantity expected. (You can change the quantity ordered only when the work order status is [A]llocated, [E]xploded, or [R]eleased.) The quantity expected, then, is the work order quantity at the time of receipt to stock, not the quantity derived from the co-product/by-product structure.

Unexpected Receipts

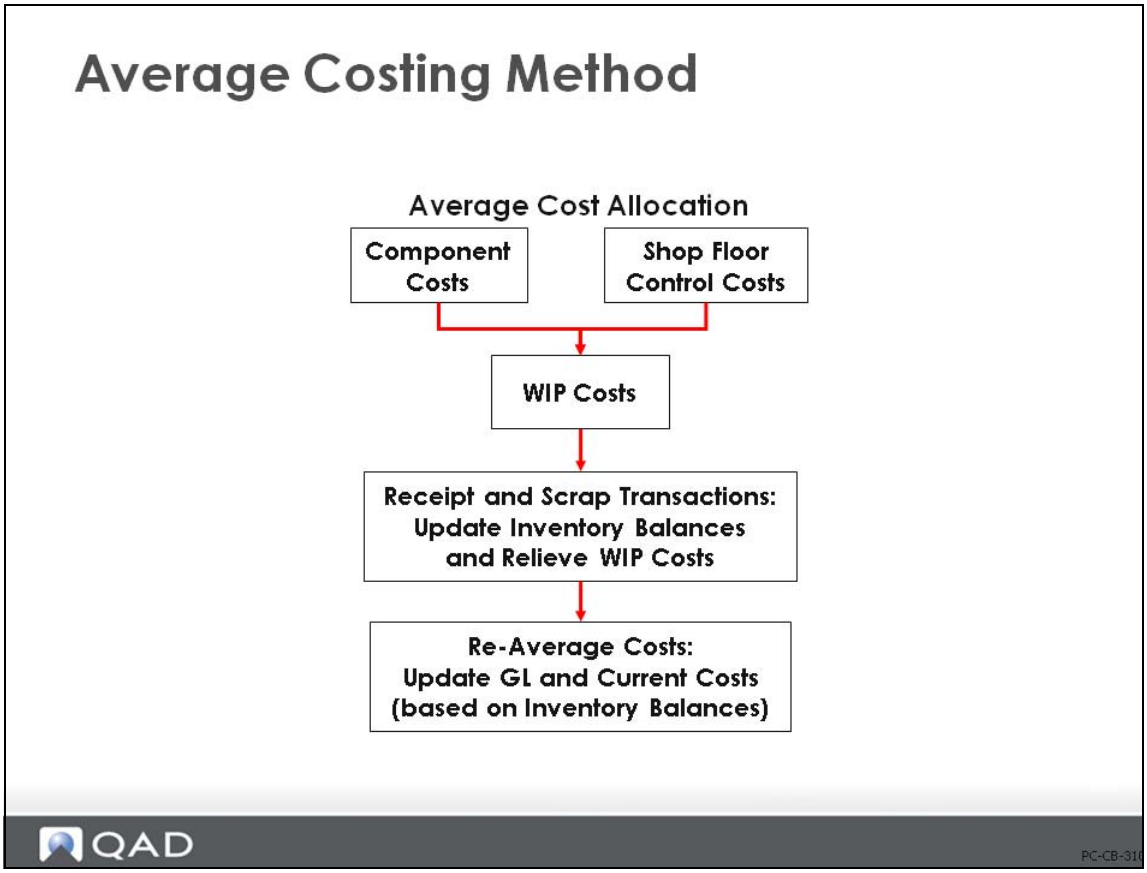
Unexpected joint order receipts are receipts of items against a joint order set that do not exist on any order in the set. This is different than receiving a valid substitute item. An unexpected receipt is always has a mix variance. A work order is added to the set for the unexpected item. The order quantity on the joint orders for other items are unchanged by the unexpected receipt. Use Work Order Maintenance (16.1), to change the quantities on other joint orders, if necessary.

Unexpected receipts are common in many industries. For instance, a process might be expected to yield oil that is a certain grade. If oil of another grade is produced instead, it would be received as a different product - an unexpected receipt.

Average Cost Method



Introduction



Costs are averaged by taking the costs accumulated in WIP and adjusting the costs of items in inventory received from WIP. QAD Enterprise Applications does this in the following steps.

1. WIP costs accumulate with a base process work order from component issues and shop floor control transactions.
2. Co-products and by-products are received from WIP at the “current” average GL cost.
3. When the costs are re-averaged, the remaining (positive or negative) WIP costs are allocated to the co-products.

Allocation and re-averaging of co-product costs occurs when the joint work order is closed in Work Order Receipt (16.11), or Work Order Receipt Backflush (16.12); also by running Work Order Accounting Close (16.21).

If additional costs for a work order are recorded after costs are allocated, the remaining costs can be reallocated by opening the closed work order and closing it again.

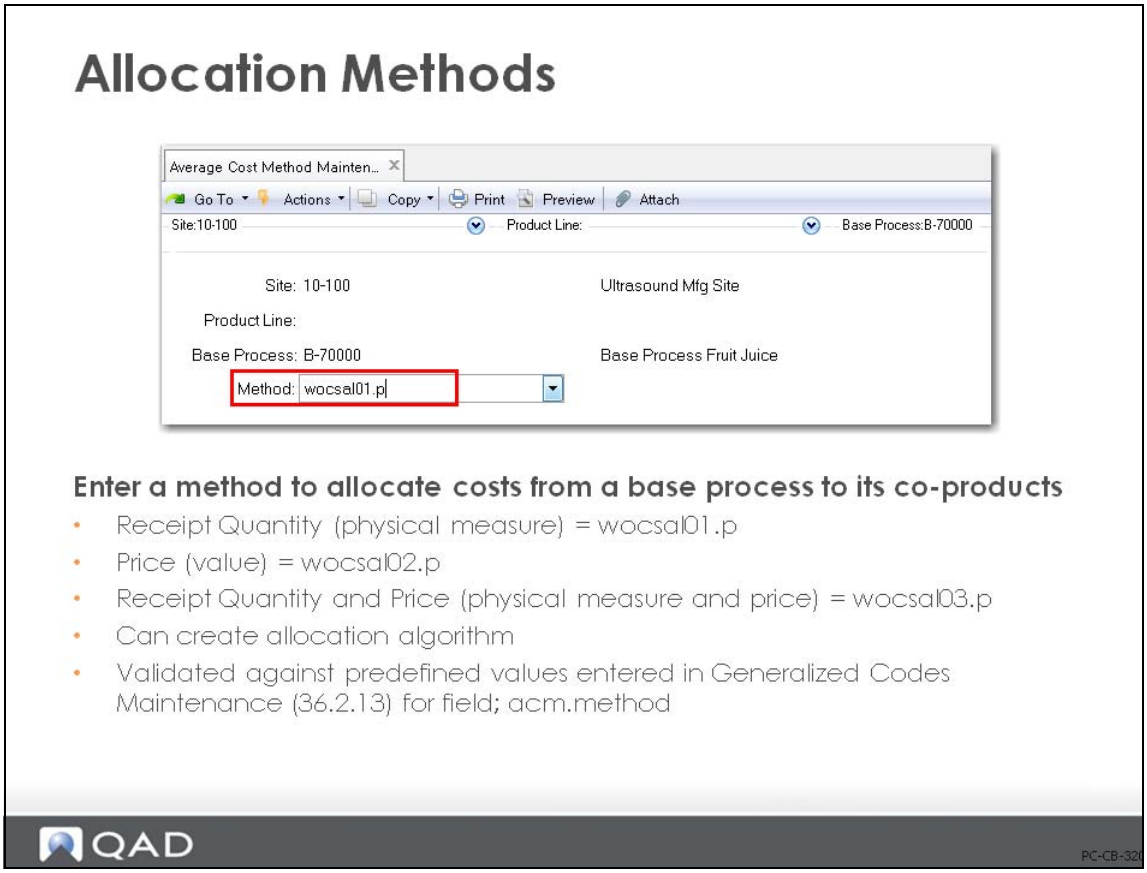
Re-averaging of Costs Is Time Sensitive

Re-averaging of co-product costs is time sensitive. The greater the time between receipt and close, the greater the probability that some of the products produced have been consumed.

To maximize the accuracy of average costs and reduce costs booked to discrepancy accounts, the following should be emphasized.

- Complete reporting of co-product and by-product quantities when all quantities for all items are completed
- Set work order status to Closed when receipt quantities are reported
- Run Work Order Accounting Close (16.21), on a regular basis to process recently closed work orders

Allocation Methods



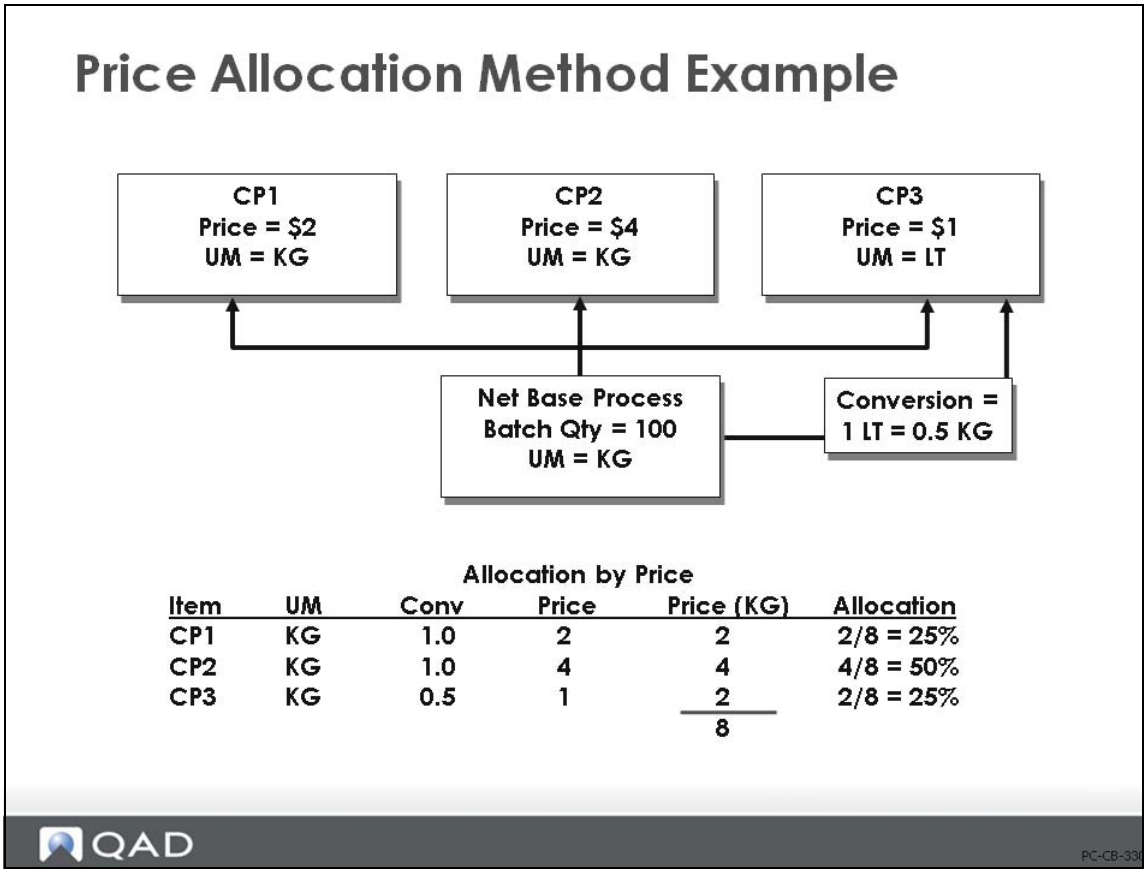
Define the average cost allocation method using Average Cost Method Maintenance (15.12.5). The system provides three methods for allocating costs from a joint order set to co-products:

- Receipt Quantity (wocsal01.p)
- Price (wocsal02.p)
- Receipt Quantity and Price (wocsal03.p)

If you need other methods, you can provide your own programs. If no method is specified for a site, the Receipt Quantity method is used.

All allocation percentages are calculated by comparing receipt quantities, price and extended price using equivalent units of measure (the unit of measure for the base process).

Price Allocation Method Example



In this example of the allocation by price method of average costing, co-product CP1 has a unit of measure of kilograms (KG) that is the same unit of measure specified for the base process. The price divided by the conversion factor leaves the price the same at $2. CP2 has a price of $4.

CP3 has a unit of measure of liters (LT) and a conversion factor of 1 LT per 0.5 KG. When CP3's price of $1 is divided by the conversion factor (0.5), the price for an equivalent unit of measure is $2. The allocation percentage for CP1 is its price of $2 divided by $8 (the sum of the equivalent prices of the three co-products). That yields an allocation percentage of 25%.

CP2's allocation percentage = $4 / $8 = 50%

CP3's allocation percentage = $2 / $8 = 25%

Other Allocation Methods

Allocation by Receipt Quantity

Allocation by receipt quantity is the default method, and it allocates cost based on physical measure.

Example If 50 kilograms (kg) of CP1, 30 kg of CP2, and 20 kg of CP3 are produced, the percentage of cost allocated to the co-products based on receipt quantity would be 50% for CP1, 30% for CP2, and 20% for CP3 based on the following calculations:

CP1 = 50 kg / (50 kg + 30 kg + 20 kg) = 50%
CP2 = 30 kg / (50 kg + 30 kg + 20 kg) = 30%
CP3 = 20 kg / (50 kg + 30 kg + 20 kg) = 20%

Item	UM	Conv	Receipt Qty	Receipt Qty (KG)	Receipt Based Allocation
CP1	KG	1.00	50.00	50.00	50%
CP2	KG	1.00	30.00	30.00	30%
CP3	KG	0.50	40.00	20.00	20%

Allocation by Receipt Quantity and Price

This method allocates cost based on the combination of price and physical measure. All quantities are converted to the base process unit of measure.

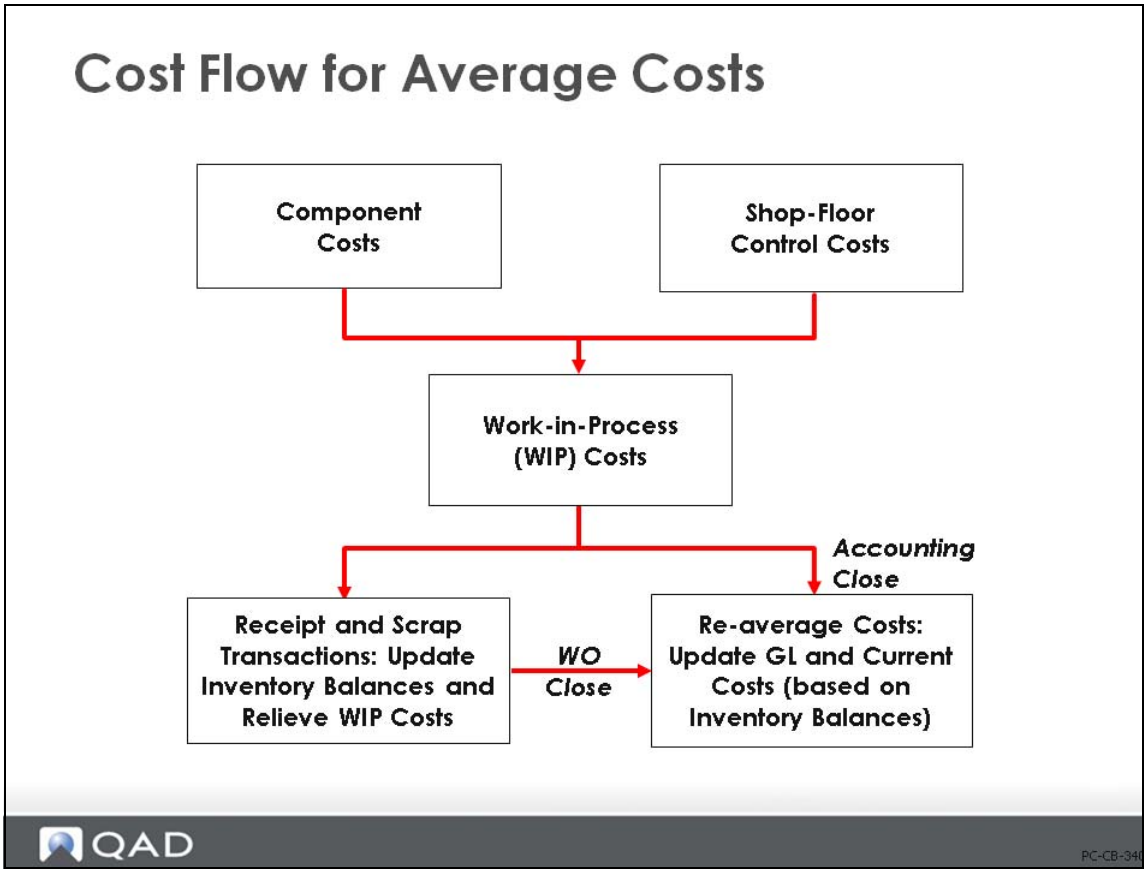
Example If the price per kilogram for CP1 is $2, for CP2 is $4, and CP3 is $2, then the percentage of cost allocated to the co-products based on receipt quantity and price would be 38.46% for CP1, 46.15% for CP2, and 15.39% for CP3 based on the following calculations:

CP1 = 50 kg × $2/kg = $100
CP2 = 30 kg × $4/kg = $120
CP3 = 20 kg × $2/kg = $40

CP1 = $100 / ($100 + $120 + $40) = 38.46%
CP2 = $120 / ($100 + $120 + $40) = 46.15%
CP3 = $40 / ($100 + $120 + $40) = 15.39%

Item	UM	Conv	Rcpt Qty	Rcpt Qty (KG)	Price	Price (KG)	Price Qty	Price/Rcpt Allocation
CP1	KG	1.00	50.00	50.00	2.00	2.00	100	38.46%
CP2	KG	1.00	30.00	30.00	4.00	4.00	120	46.15%
CP3	LT	0.50	40.00	20.00	1.00	2.00	40	15.39%

Cost Flow for Average Costs



Cost averaging for co-products occurs when you close a work order using the following programs.

- Work Order Receipt (16.11)
- Work Order Receipt Backflush (16.12)
- Work Order Accounting Close (16.21)

When you run Work Order Accounting Close, the following occurs.

- Co-product costs are re-averaged by taking any remaining positive or negative WIP costs and allocating them to the co-products. If additional costs are recorded for a work order after costs are allocated, the remaining costs can be reallocated by reopening the closed work order, applying the transaction, and closing it again.
- General ledger (GL) and current costs are updated

By-product Costs

By-product costs are not re-averaged. They are fixed - just as they are frozen during calculation of standard costs in cost roll-up.

- By-product costs are deducted in cost roll-up. Similarly, by-product costs are deducted from accumulated WIP costs before those costs are allocated to the co-products associated with a base process.

Appendix A

Variances and Components Reference

Purchase-Related Variances	
Purchase Price	
Calculated at PO Receipts, 5.13.1	[PO Unit Cost - (GL Unit Cost - OH)] * PO Qty Rcv'd
Reports: Transaction Receipts Report, 5.9.14; Transactions Detail Inquiry, 3.21.1	
AP Rate	
Calculated at Supplier Invoice Create, 28.1.1.1	(Invoice Unit Cost - PO Unit Cost) * Invoice Qty
Reports: Matching Variance Rpt. 28.2.7 Transactions Detail Inquiry, 3.21.1	
AP Usage	
Calculated at Supplier Invoice Create, 28.1.1.1	(Invoice Qty - PO Receipt Qty) * PO Unit Cost
Reports: Matching Variance Rpt. 28.2.7; Transactions Detail Inquiry, 3.21.1	
Manufacturing-Related Variances	
Material Rate	
Calculated at WO Component Issue, 16.10; WO Receipt Backflush, 16.12; Repetitive Backflush, 18.22.13	(WO BOM Unit Cost at Issue - GL Unit Cost) * Actual Qty Iss'd
Reports: Work Order Cost Report, 16.3.4; Transactions Detail Inquiry, 3.21.1	
Material Usage	
Calculated at WO Accounting Close, 16.21; Cum Order Close, 18.22.10; Post Accumulated Usage Var, 18.22.9	{Actual Qty Issued - [qty per * (qty completed + qty rejected)]} * GL Unit Cost
Reports: Work Order Cost Report, 16.3.4; Transactions Detail Inquiry, 3.21.1; Repetitive Operations Accounting Report, 18.22.4.9	
Labor Rate	
Calculated at SFC feedback, 16.20.1, 16.20.2, 16.20.3; can be deferred until WO Receipt, 16.11, 16.12; Repetitive Backflush, 18.22.13	Per Operation: [(Actual Set-Up Rate - Std Set-Up Rate) * Actual Set-Up Hrs] + [(Actual Run Rate - Std Run Rate) * Actual Run Hrs]
Reports: Work Order Cost Report, 16.3.4; Operations Accounting Rpt, 16.20.13.10; Rep Ops Accounting Rpt, 18.22.4.9	Set-up and run rates are equal to the payroll rate (defined in 14.13.21) or the work center rate if payroll is not set up No variances if no labor reporting
Labor Usage	
Calculated at SFC feedback, 16.20.1, 16.20.2, 16.20.3; can be deferred until WO Receipt, 16.11, 16.12; Post Accumulated Usage Var, 18.22.9; Cum Accounting Close, 18.22.10	Per Operation: [(Actual Set-Up Hrs - Std Set-Up Hrs) * Std Set-Up Rate] + [(Actual Run Hrs - *Std Run Hrs) * Std Run Rate]
Reports: WO Cost Report, 16.3.4; Operations Accounting Rpt, 16.20.13.10; Rep Ops Accounting Rpt, 18.22.4.9	*Std Run Hrs = Std Run Hrs * (Qty Completed + Qty Rejected)

Burden Rate	
Calculated at SFC feedback, 16.20.1, 16.20.2, 16.20.3; WO Receipt, 16.11, 16.12; Repetitive Backflush, 18.22.13 *Reports:* WO Cost Report, 16.3.4; Operations Accounting Rpt, 16.20.13.10; Rep Ops Accounting Rpt, 18.22.4.9	Per Operation: [(Actual Set-Up Bdn - Std Set-Up Bdn) * Actual Set-Up Hrs] + [(Actual Run Bdn - Std Run Bdn) * Actual Run Hrs] Actual Set-Up Bdn = (Actual Set-Up Rate * Lbr Bdn %) + Lbr Bdn Rate + (Mach Bdn Rate * Mach/Op) Std Set-Up Bdn = (Std Set-Up Rate * Lbr Bdn %) + Lbr Bdn Rate + (Mach Bdn Rate * Mach/Op) Actual Run Bdn = (Actual Run Rate * Lbr Bdn %) + Lbr Bdn Rate + Mach Bdn Rate Std Run Bdn = (Std Run Rate * Lbr Bdn %) + Lbr Bdn Rate + Mach Bdn Rate
Burden Usage	
Calculated at SFC feedback, 16.20.1, 16.20.2, 16.20.3; can be deferred until WO Receipt, 16.11, 16.12; Post Accumulated Usage Var, 18.22.9; Cum Order Close, 18.22.10; *Reports:* WO Cost Report, 16.3.4; Operations Accounting Rpt, 16.20.13.10; Rep Ops Accounting Rpt, 18.22.4.9	Per Operation: [(Act Set-Up Hrs - Std Set-Up Hrs) * Std Set-Up Bdn] + [(Act Run Hrs - Std Run Hrs) * Std Run Bdn] Std Set-Up Bdn = (Std Set-Up Rate * Lbr Bdn %) + Lbr Bdn Rate + (Mach Bdn Rate * Mach/Op) Std Run Bdn = (Std Run Rate * Lbr Bdn %) + Lbr Bdn Rate + Mach Bdn Rate
Subcontract Rate	
Calculated at PO Receipt, 5.13.1	(Subcontract PO Unit Cost - Subcontract Unit Cost from Routing) * Qty Received
Subcontract Usage	
Calculated at WO Accounting Close, 16.21; Post Accumulated Usage Var, 18.22.9; Cum Order Close, 18.22.10	[Qty Received - (Op Qty Completed + Op Qty Rejected)] * Subcontract Unit Cost from Routing
Method	
Calculated at WO Accounting Close, 16.21; Cum Accounting Close, 18.22.10	Balance of WO/ID value remaining
Mix (Co/By-Products)	
Calculated at WO Accounting Close, 16.21	[Order Qty - (Receipt Qty + Scrap Qty)] * GL Unit Cost

Variances by Transaction Flow

PO Receipts

Purchase Price Variance

[PO Unit Cost - (GL Unit Cost - OH)] * PO Qty Rcv'd

Subcontract Rate Variance

(Subcontract PO Unit Cost - Subcontract Unit Cost from Routing) * Qty Received

Voucher Maintenance

Accounts Payable Rate Variance

(Invoice Unit Cost - PO Unit Cost) * Invoice Qt

Accounts Payable Usage Variance

(Invoice Qty - PO Receipt Qty) * PO Unit Cost

Work Order Component Issue

Material Rate Variance

(WO BOM Unit Cost at Issue - GL Unit Cost) * Actual Qty Iss'd

Labor Feedback

Labor Rate Variance

[(Actual Set-Up Rate - Std Set-Up Rate) * Actual Set-Up Hrs] + [(Actual Run Rate - Std Run Rate) * Actual Run Hrs]

Labor Usage Variance

[(Actual Set-Up Hrs - Std Set-Up Hrs) * Std Set-Up Rate] + [(Actual Run Hrs - *Std Run Hrs) * Std Run Rate]

*Std Run Hrs = Std Run Hrs * (Qty Completed + Qty Rejected)

Burden Rate Variance

[(Actual Set-Up Bdn - Std Set-Up Bdn) * Actual Set-Up Hrs] +
[(Actual Run Bdn - Std Run Bdn) * Actual Run Hrs]

Burden Usage Variance

[(Act Set-Up Hrs - Std Set-Up Hrs) * Set-Up Bdn] + [(Act Run Hrs - Std Run Hrs) * Run Bdn]

Work Order Accounting Close

Subcontract Usage Variance

[Qty Received - (Op Qty Completed + Op Qty Rejected)] * Subcontract Unit Cost from Routing

Material Usage Variance

{Actual Qty Issued - [qty per * (qty completed + qty rejected)]} * GL Unit Cost

Method Variance

Components of Item Cost	
Material	
Dependent On	*Defined In*
Material/Purchase Price	Item Master Maintenance, 1.4.1, 1.4.9, 1.4.18
Quantity Per	Product Structure Maintenance, 13.5, 15.5
Scrap %	Product Structure Maintenance, 13.5, 15.5
Phantom	Item Master Maintenance, 1.4.1, 1.4.7, 1.4.17
Pur/Mfg	Item Master Maintenance, 1.4.1, 1.4.7. 1.4.17
Structure Type	Product Structure Maintenance, 13.5
Yield %	Routing Maintenance, 14.13.1
Labor	
Dependent On	*Defined In*
Work Center Labor Rates	Work Center Maintenance, 14.5
Work Center Setup Rates	Work Center Maintenance, 14.5
Run Time per Unit	Routing Maintenance, 14.13.1, 14.13.2
Setup Time per Lot	Routing Maintenance, 14.13.1, 14.13.2
Order Quantity	Item Master Maintenance, 1.4.1
Subcontract Cost	Routing Maintenance, 14.13.1
Burden	
Dependent On	*Defined In*
Work Center Labor Burden Rates	Work Center Maintenance, 14.5
Work Center Labor Burden Percent	Work Center Maintenance, 14.5
Work Center Machine Burden Rate	Work Center Maintenance, 14.5
Machines/Operation	Work Center Maintenance, 14.5
All of the items under Labor (above)	