



QAD Enterprise Applications
Enterprise Edition

Training Guide QAD Co/By-Product Costing

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QAD Co/By- Product Costing Change Summary

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

| Date/Version | Description | Reference |
|---------------------------|--|------------------|
| April 2017/v2017 EE | Rebranded for QAD 2017 EE | -- |
| April 2016/v2016 EE | Rebranded for QAD 2016 EE, added link to Preface | -- |
| April 2015/v2015 EE | Rebranded for QAD 2015 EE | -- |
| March 2014/v2014 EE | Rebranded for QAD 2014 EE | -- |
| September 2013/v2013.1 EE | Rebranded for QAD 2013.1 EE | -- |
| March 2013/v2013 EE | Rebranded for QAD 2013 EE | -- |
| September 2012/v2012.1 EE | Rebranded for QAD 2012.1 EE; Consistency edit | -- |
| March 2012/v2012 EE | Rebranded for QAD 2012 EE | -- |
| September 2011/v2011.1 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. It provides details on how costs are allocated in co/by-product production environment.

This guide can be taught individually or as a part of the Product Costing and Cost Management course set, which consists of an introductory class, a class covering general setup topics, and a set of classes on specialized costing topics. Most students will benefit from taking the first two classes and then selecting the additional courses that apply to their business implementation. The complete list of classes is:

- Introduction to Product Costing
- Product Costing
- Advanced Repetitive Costing
- Average Costing
- Co/By-Product Costing
- Cost Management, including Simulation and Planning
- Purchase Costing
- Work Order Costing

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

Prerequisites

- *Training Guide: Introduction to Costing*
- *Training Guide: Product Costing*
- *Training Guide: Work Order Costing*
- Familiarity with the ..NET UI
- Familiarity with Co/By-Product functionality

Course Credit and Scheduling

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

Virtual Environment Information

The hands-on exercises in this book should be used with the latest Enterprise Edition learning environment in the 10USA > 10USACO workspace. When prompted to log in, specify *demo* for user ID and *qad* for password.

Additional Resources

If you encounter questions on QAD software that are not addressed in this book, several resources are available. The QAD corporate Web site provides product and company overviews. From the main site, you can access the QAD Learning or Support site and the QAD Document Library. Access to some portions of these sites depends on having a registered account.

<http://www.qad.com/>

QAD Learning Center

To view available training courses, locations, and materials, use the QAD Learning Center. Choose Education under the Services tab to access this resource. In the Learning Center, you can reserve a learning environment if you want to perform self-study and follow a training guide on your own.

QAD Document Library

To access release notes, user guides, training guides, and installation and conversion guides by product and release, visit the QAD Document Library. Choose Document Library under the Support tab. In the QAD Document Library, you can view HTML pages online, print specific pages, or download a PDF of an entire book.

For more information, see *QAD Costing User Guide*.

To find a resource, you can use the navigation tree on the left or use a powerful cross-document search, which finds all documents with your search terms and lets you refine the search by book type, product suite or module, and date published.

QAD Support

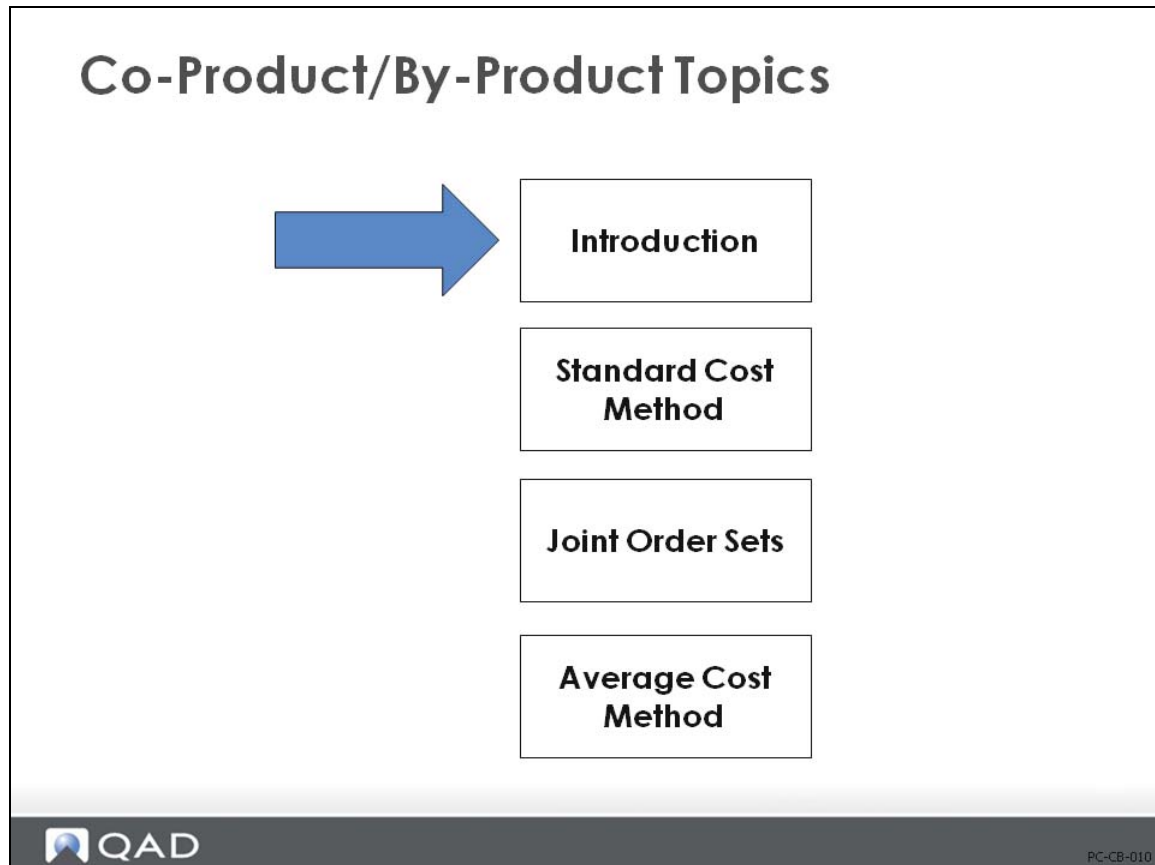
Support also offers an array of tools depending on your company's maintenance agreement with QAD. These include the Knowledgebase and QAD Forums, where you can post questions and search for topics of interest. To access these, choose Visit Online Support Center under the Support tab.

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Chapter 1

Co/By-Products

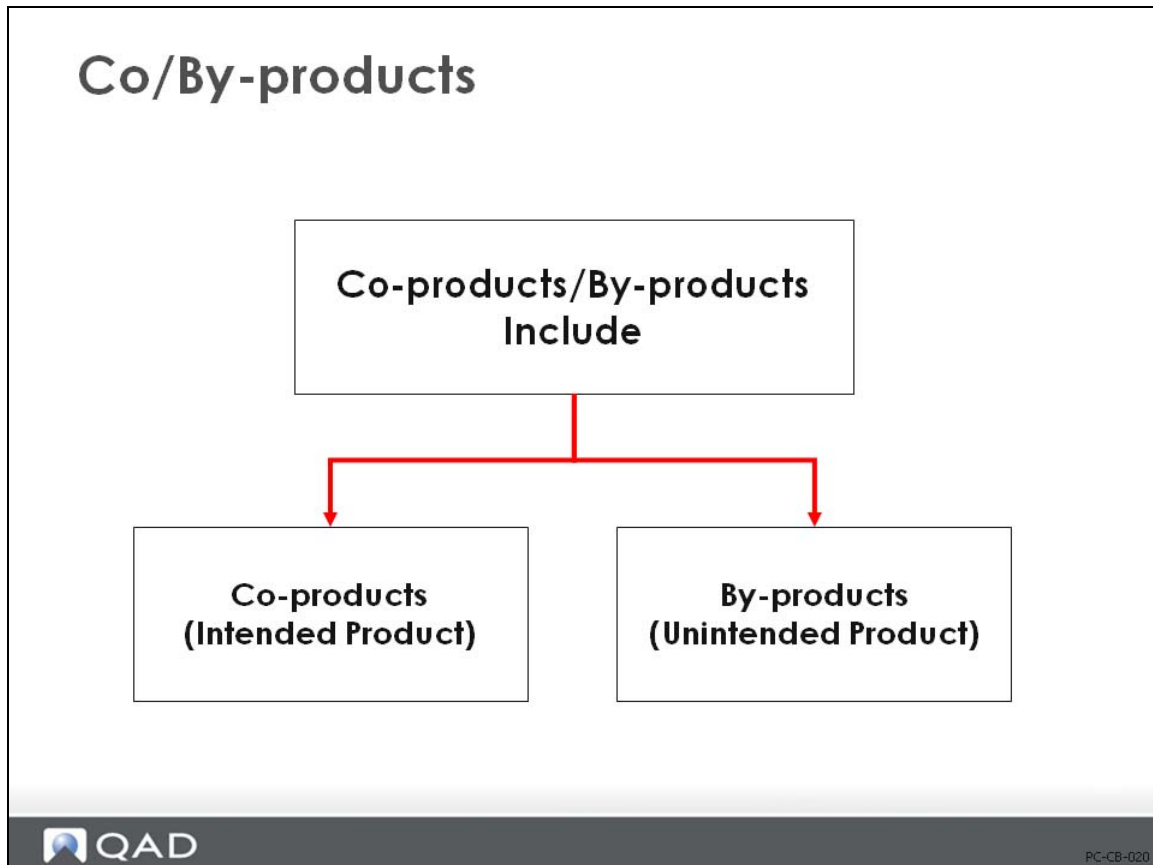
Co-Product/By-Product Topics



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

- Intended result of the base manufacturing process
- Of significant value: sold or used as components
- Demand is used in MRP
- Examples: orange juice, orange oil



PC-CB-030

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

By-products

- Incidental to the base manufacturing process
- Of little sales value
- Demand is not used in MRP
- Examples: orange pulp, orange seeds



PC-CB-040

A by-product in QAD Enterprise Applications might 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

Base Process

- A process that results in two or more co-products/by-products
- Has co-product/by-product structure listing its co-products and by-products
- Has a formula or product structure listing component requirements
- Has a defined item record used as administrative placeholder for work order costs
- Example: a process that uses oranges to produce orange juice and orange oil (co-products) and orange seeds (by-product)

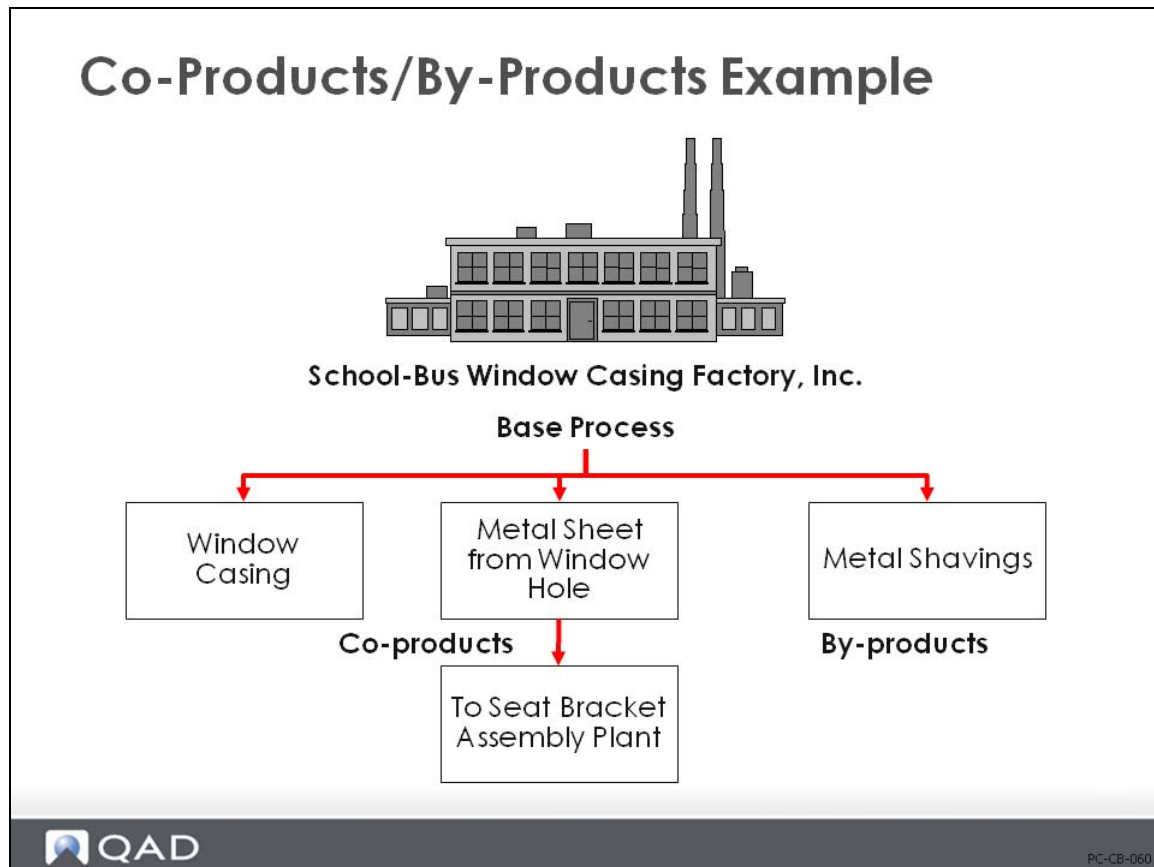


PC-CB-050

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
- 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.

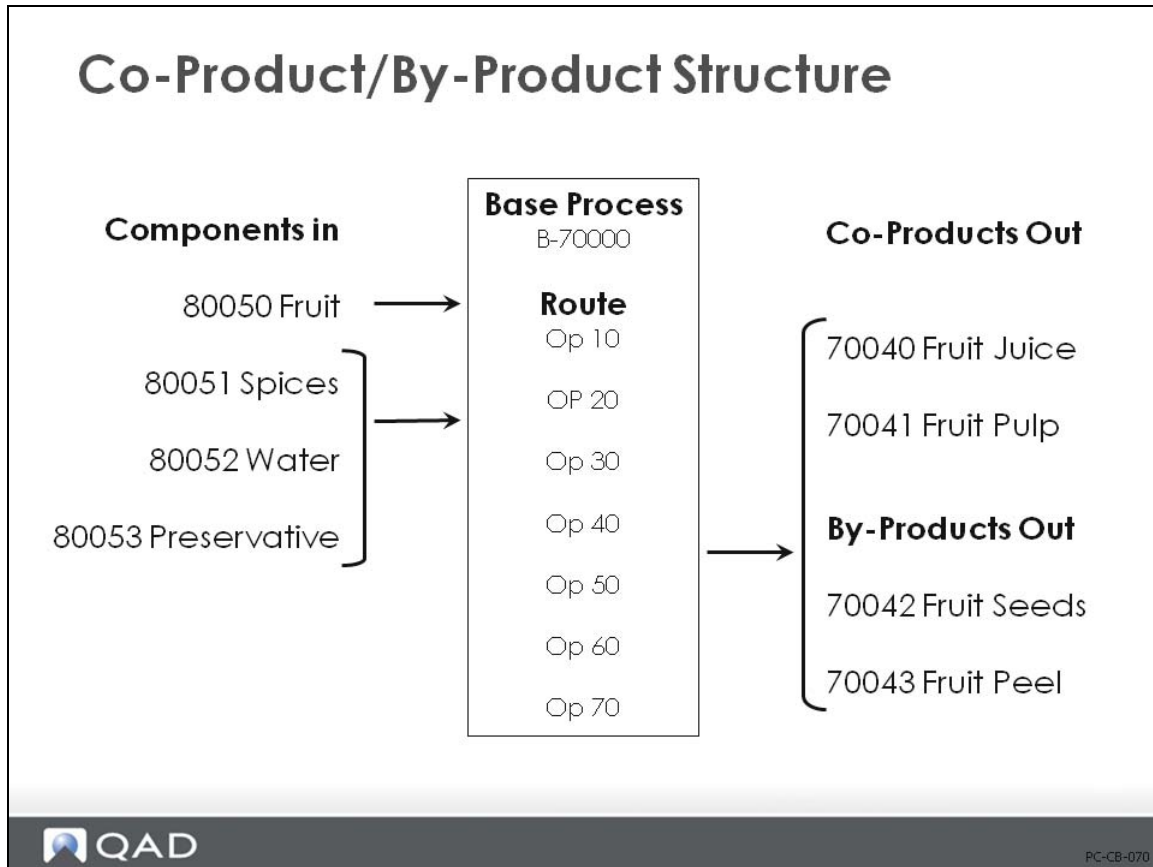
The window hole is a valuable component that is made into a bracket for a school-bus seat. The window casing is sold to the school-bus company and the window hole goes to the plant that produces school-bus seats.

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” on page 35).

Standard Cost Method


Co-Product/By-Product Topics

Introduction

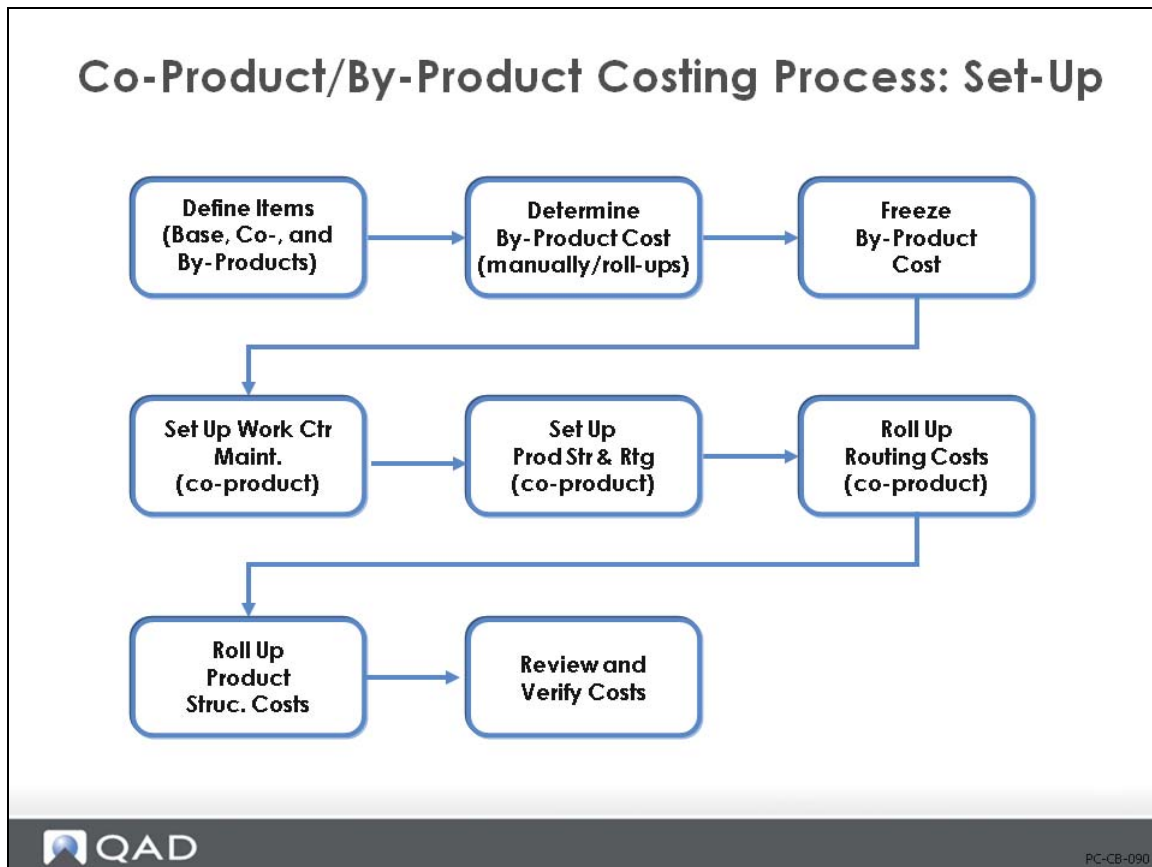
Standard Cost Method

Joint Order Sets

Average Cost Method

 QAD PC-CB-080

Co-Products/By-Products Costing Process: Setup



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 coproducts. Also note that inventory receipts of by-products will be valued at this cost.

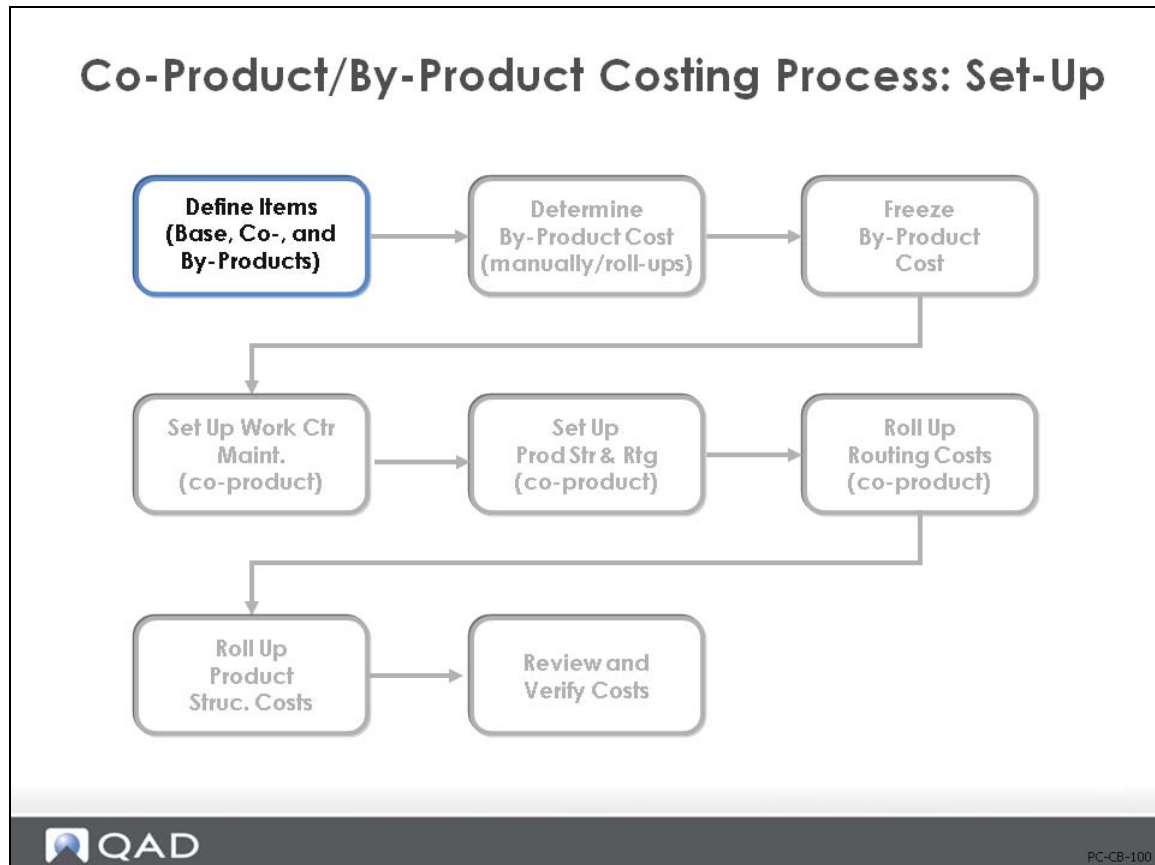
Chapter Organization

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, setup 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

Set Up Default Base Process

Pur/Mfg code = M or blank

Order Policy = POQ or FOQ

BOM/Formula field must be blank

Item Master Maintenance X
 Go To Actions Copy Print Preview Attach
 Item: B-70000 Item Number: B-70000 Description: Base Process Fruit Juice Supplier:
 Item Planning Price
 Planning
 Item
 Item Number: B-70000 Description: Base Process Fruit Juice
 Unit of Measure: L
 Item Planning Data
 Mstr Sched: Buyer/Planner:
 Plan Orders: Supplier:
 Time Fence: 0 PO Site: 10-100
 MRP Required: Purchase/Manufacture: M
 Order Policy: POQ Configuration Type:
 Order Qty: 1,000 Inspect:
 Batch Qty: 1,000.0 Ins LT: 0 Cum LT: 0
 Mfg LT: 0 Pur LT: 0
 Order Period: 7 Safety Stock: 0
 Safety Time: 0 ATP Enforcement: NONE
 Reorder Point: Family ATP:
 Revision: ATP Horizon: 0
 Issue Policy: Run Seq 1:
 2:
 Phantom:
 Minimum Order: 0
 Maximum Order: 0
 Order Multiple: 0
 Op Based Yield:
 Yield Percent: 100.00%
 Run Time: 0.003
 Setup Time: 0.000
 EMT Type: NON-EMT
 Auto EMT Processing:
 Network Code:
 Routing Code:
 BOM/Formula:

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 (manufactured) 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 set up in Process/Formula Maintenance, and should be the normal batch size.
- The BOM/Formula field must be blank

Co-Products

Define Co/By-Products

Item Master Maintenance X

Go To Actions Copy Print Preview Attach

Item: 70040 Item Number: 70040 Description: Fruit Juice (unpackaged) Supplier:

Item Planning Price

Item

Item Number: 70040 Description: Fruit Juice (unpackaged)

Unit of Measure: L

Item Planning Data

Mstr Sched: Buyer/Planner: 4-01 Phantom:

Plan Orders: Supplier: Minimum Order: 0

Time Fence: 0 PO Site: Maximum Order: 0

MRP Required: Purchase/Manufacture: M Order Multiple: 0

Order Policy: POQ Configuration Type: Op Based Yield:

Order Qty: 5,000 Inspect: Yield Percent: 90.00%

Batch Qty: 5,000.0 Ins LT: 0 Cum LT: 0 Run Time: 0.0026

Order Period: 7 Mfg LT: 1 Pur LT: 0 Setup Time: 0.000

Safety Stock: 0 ATP Enforcement: NONE Auto EMT Processing:

Safety Time: 0 Family ATP: Network Code:

Reorder Point: 0 ATP Horizon: 0 Routing Code:

Revision: Issue Policy: Run Seq 1: BOM/Formula: B-70000

2:

Pur/Mfg code = M, R or blank BOM/Formula = Base Process "item"

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 set up in Item Master Maintenance if they are not already items.

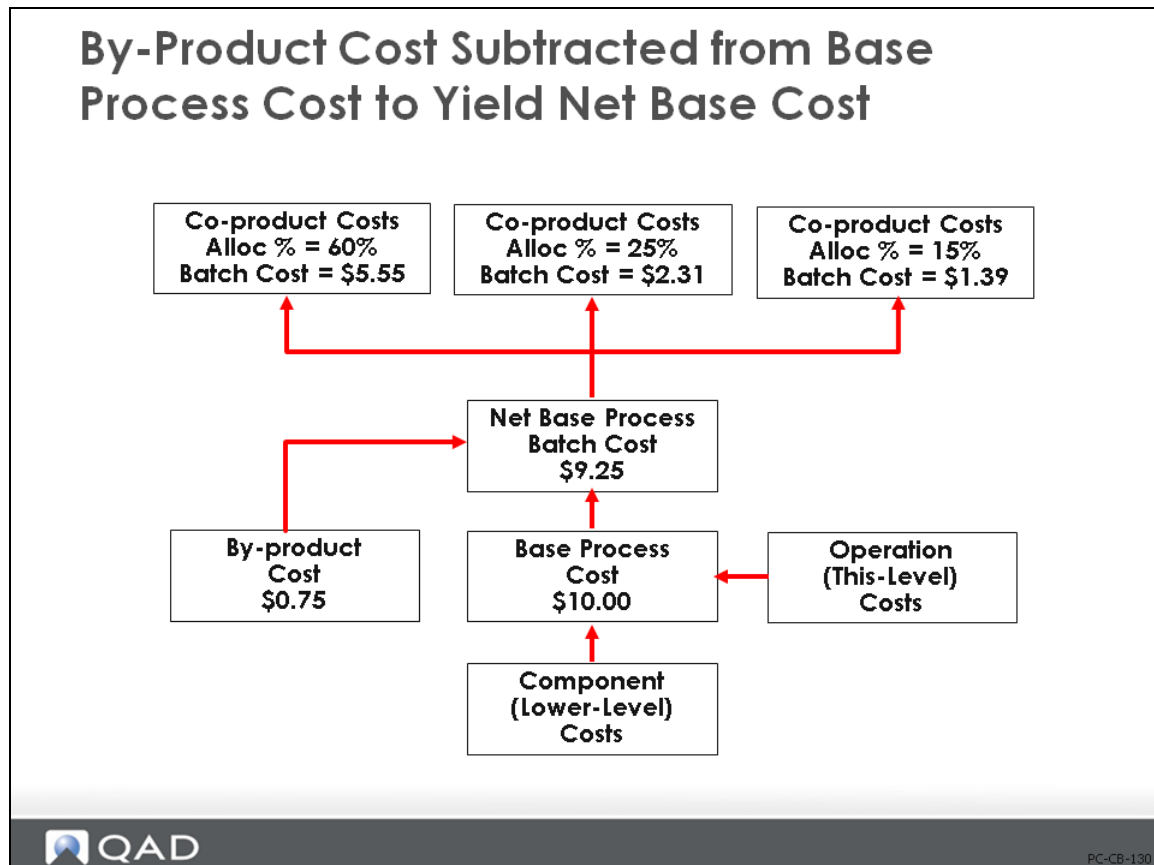
- Set the Pur/Mfg code to M (manufactured), R (routable), or leave blank
- For the Co-Products enter the base process that is used for costing and MRP as the BOM code in Item Planning Data
- Do not enter cost data for co-products, that will be calculated by the roll up process.

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.

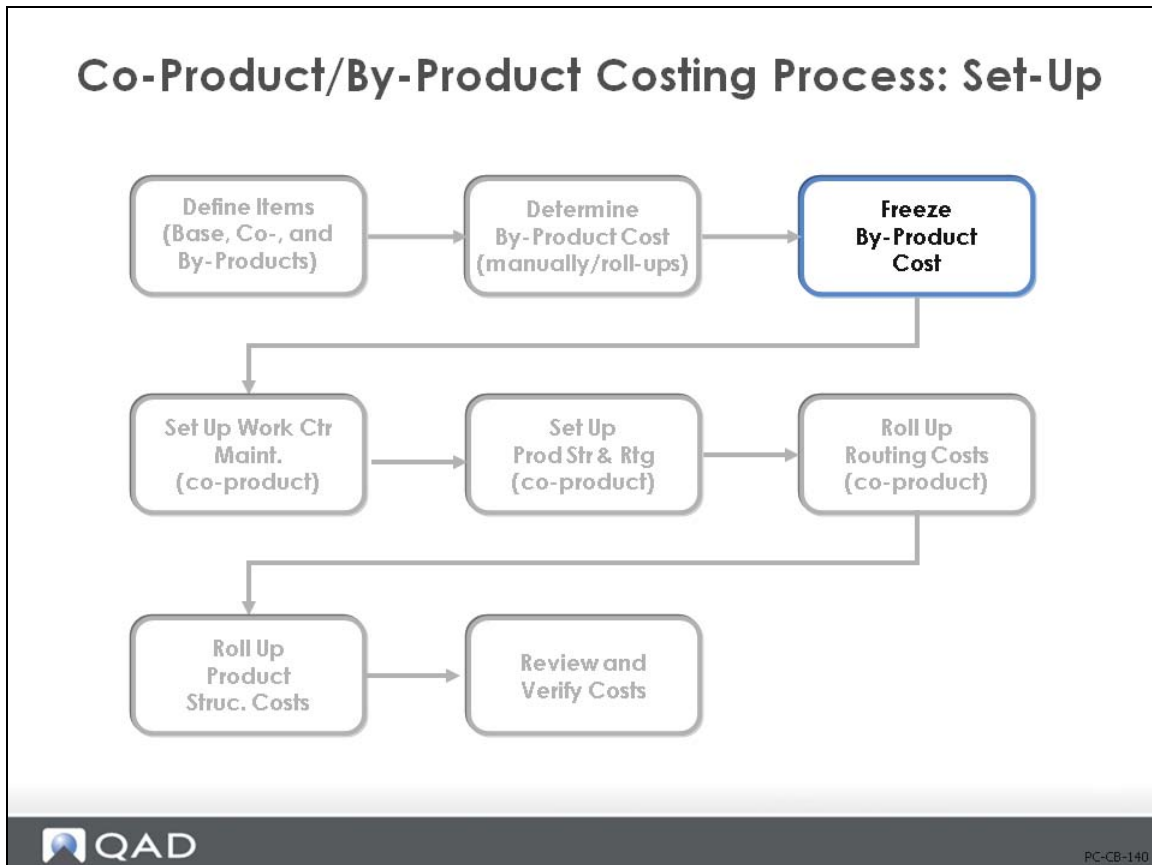
By-Product Costs Subtracted from Base Process Costs

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 might 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 exercise 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
 - Preservative: item 80053

There are 7 operations in the process that yield:

- Two co-products: fruit juice (item 70040) and fruit pulp (item 70041)
- 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.
 - a Specify unit of measure L.
 - b You can enter any description, but it will make juice.
 - c Assign it to product line 30 and site 10-100.
 - d In planning data, set its Order Quantity to 5,000 and the Purchase/Manufacture code to M. That is all the data needed for a base process.
- 4 Use Item Master Maintenance (1.4.1) for item 80050:
 - a Change the Unit of Measure to KG.
 - b Delete the L in Lot/Serial Control.
 - c Change the Site to 10-100.
 - d Clear the Location Type COOL.
 - e Clear the shelf life and uncheck the Key Item box.

The other data is ok.

- 5 Modify some current items. The items you want to use are currently set up 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; clear the L from the Lot/Serial field and let the location default. Clear shelf life and Key Item if present.

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

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

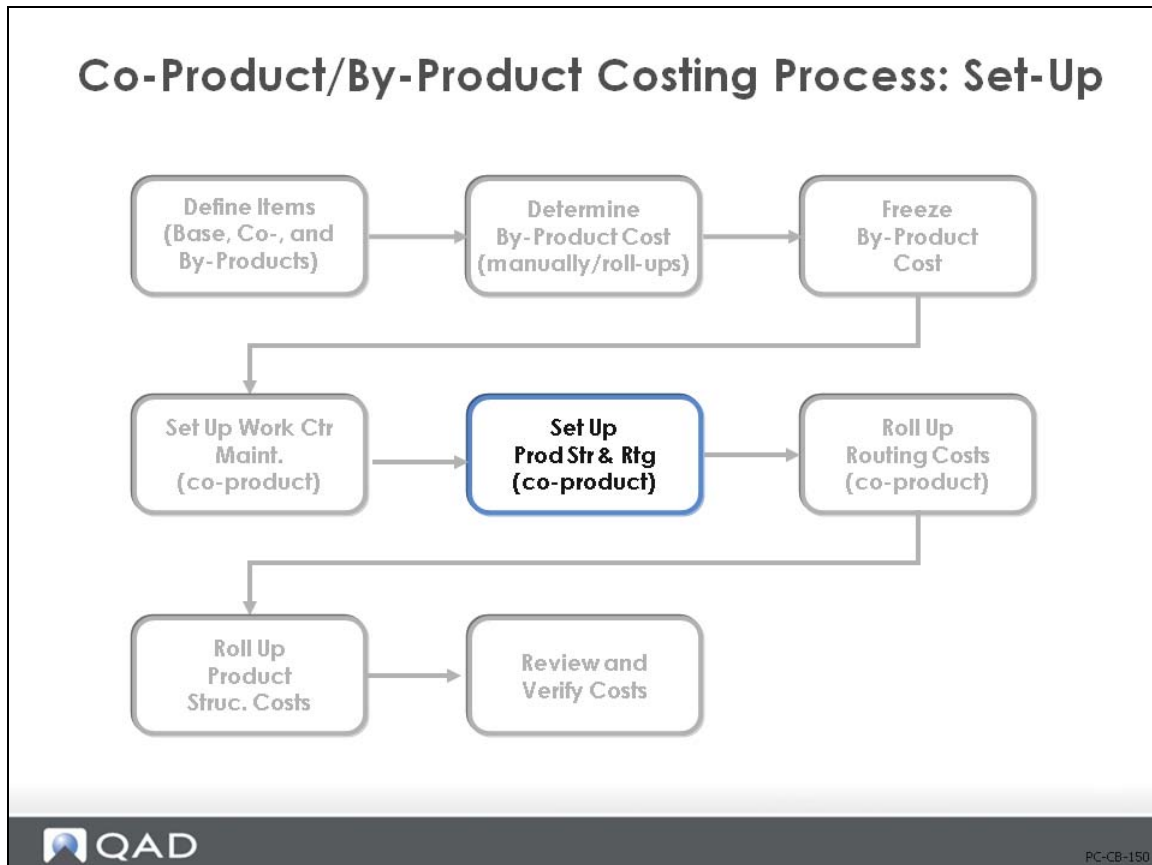
- 7 These items have no cost data at site 10-100.

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 Co/By-Product Structure

Process:Formula Maintenance X

Go To Actions Copy Print Preview Attach

BOM/Formula Code: B-70000 Co/By-Product: 70040 Process:

Formula

BOM/Formula Code: B-70000 Batch Size: 1,000.0

Description: Base Process Fruit Juice Formula:

Backflush Method: 1 Quantity Complete Method: SUM

Co/By-Products

Co/By-Product: 70040 Fruit Juice (unpackaged)

Rev:

Effective Date: To:

Co/By Type: C Co-product

Quantity: 1,000.0 L

Quantity Type: B

Process: 100.00%

Cost Allocation: 80.00%

Structure Type: J

Start Effective:

End Effective:

Remarks:

Operation: 50

Sequence Number:

Option Group:

Process:

QAD PC-CB-160

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, setup 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 its 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 (batch), P (percent), 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.

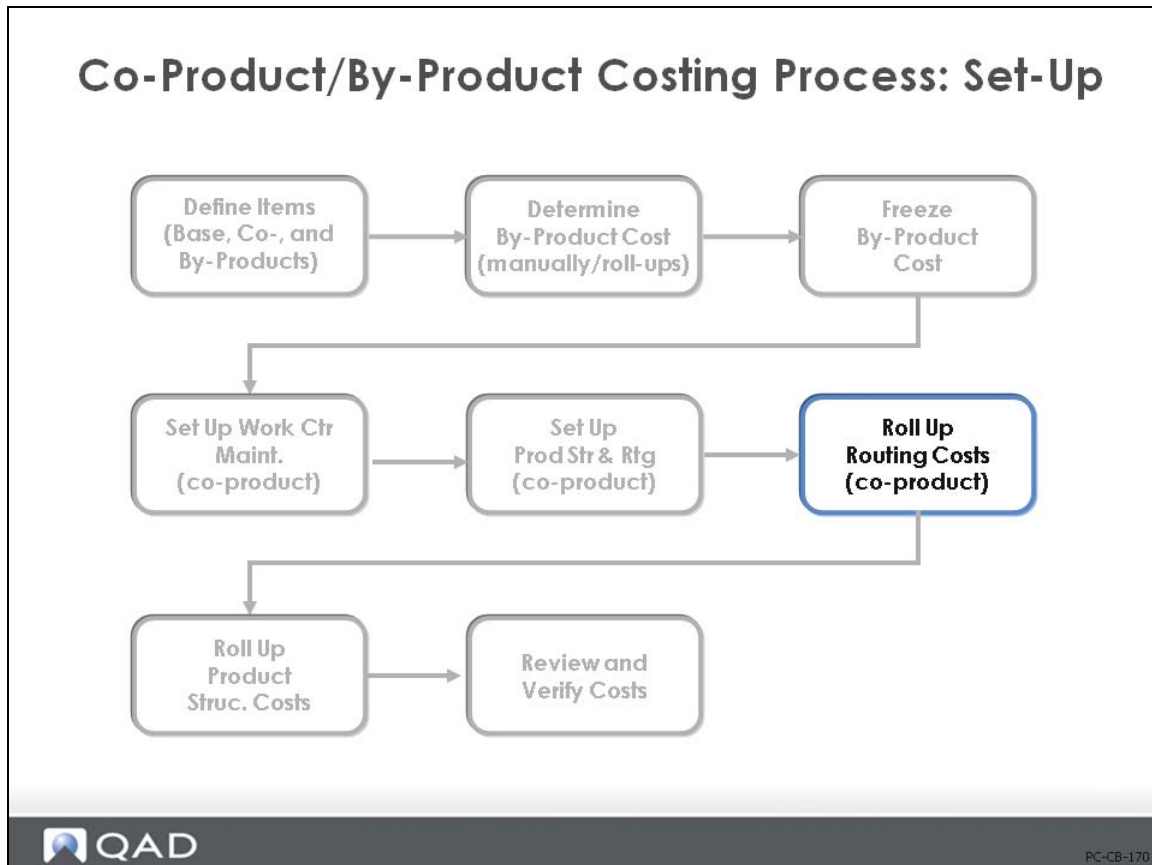
Based on work center/machine costs, the operation times, and the component material costs, the cost roll-up will determine the base process cost and how much is allocated to the co-products.

This inquiry shows the process operations by work center; and the setup 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/ |
|--------------------------|--------------------------|---|-----------|--------------|---------------|-----|
| BOM/Formula: B-70000 | | Base Process | | | | |
| Effective Date: 10/29/10 | | Base Process Fruit Juice | | | | |
| Batch Size: 5,000.0 | | Operations: Yes Components: Yes Co/By-Prod: Yes | | | | |
| Backflush Mthd: 1 | | UM: L | | | | |
| | | 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 | |

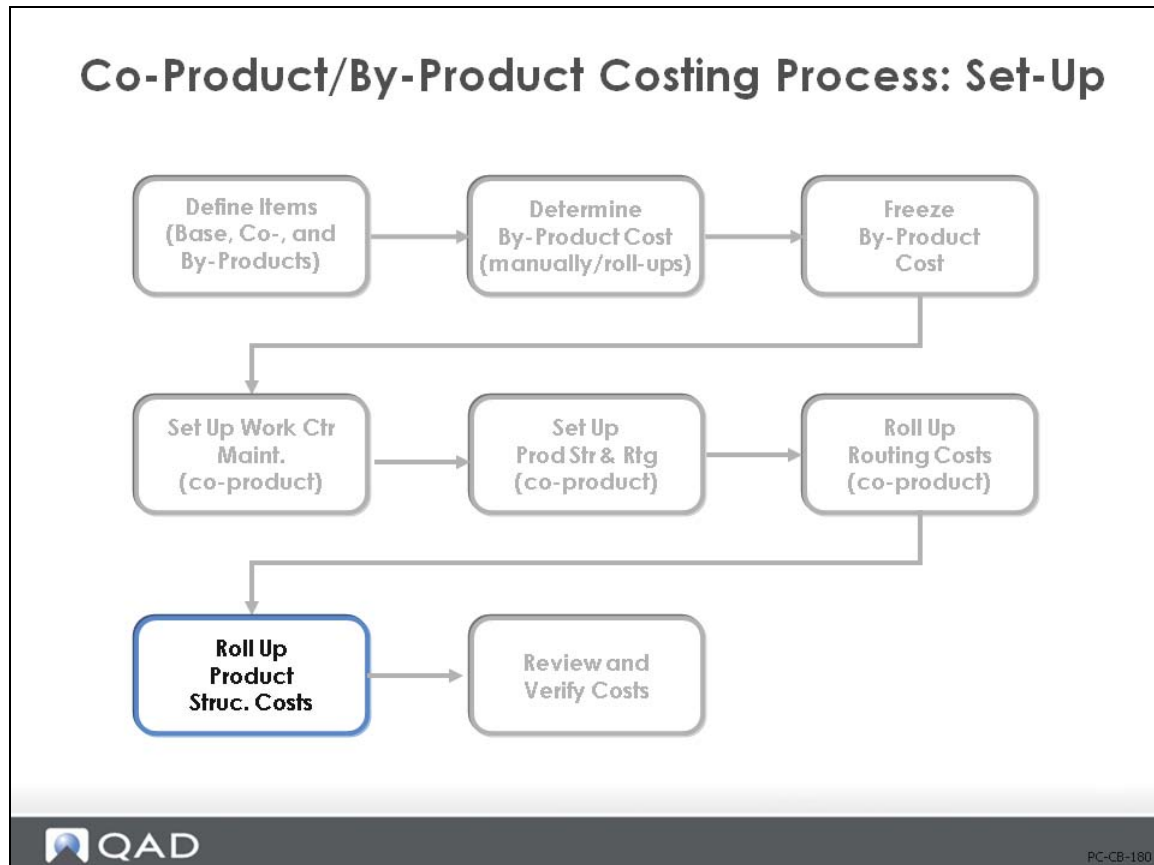
Roll Up Routing Costs



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. Ensure 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. Ensure the range of item numbers selected for the roll up include all components, co/by-products and the base process item.

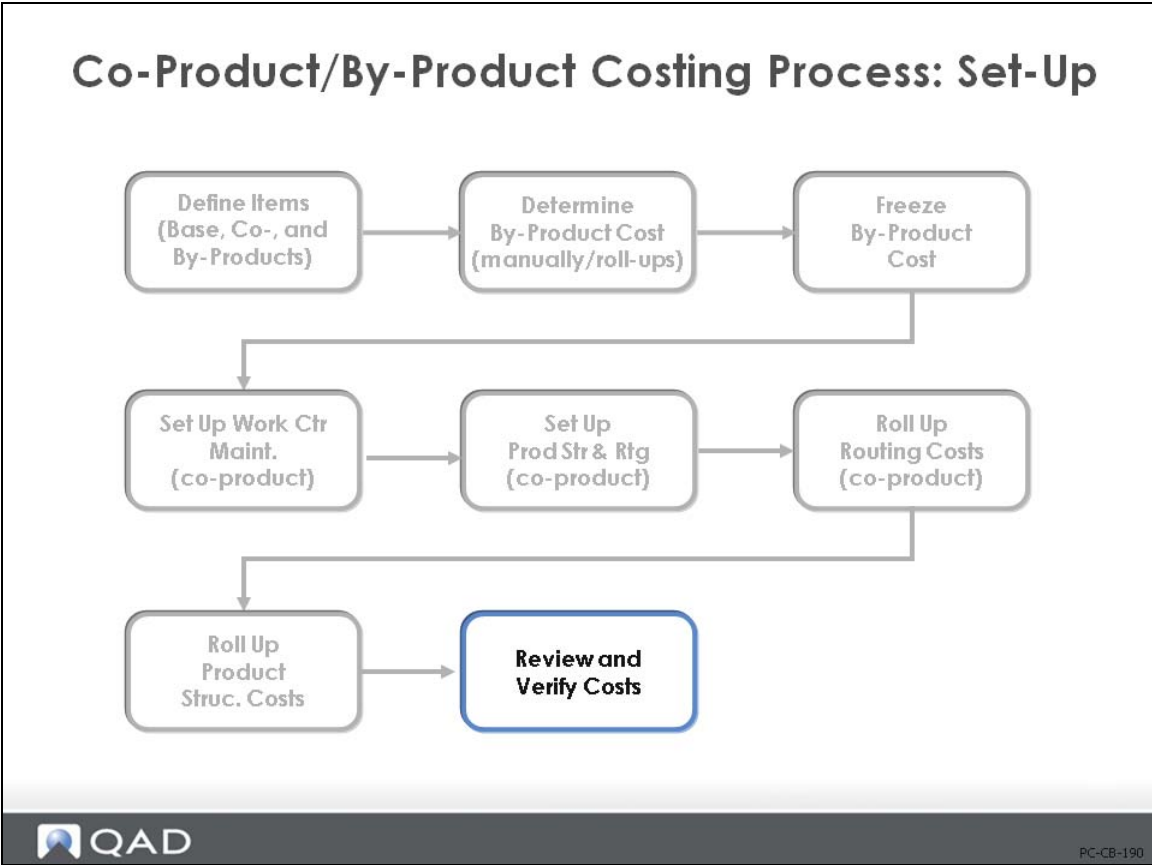
Co-product costs are calculated by Product Structure Cost Roll-Up (13.12.13) by the:

- 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



Co/By-Products Cost Report

| Co/By-Products Cost Report | | | | | | | | | |
|---------------------------------|--------------------------|-------|------------|-----------|------------------------|----------------------|------------|-------------|----------|
| QAD | | 10USA | | | | 10/29/10 14:1 | | | |
| Site: 10-100 Cost Set: Standard | | | | | | Pa | | | |
| 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 | 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 | 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 | | | |

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 to ensure all items in the structure are 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 to ensure all items in the structure are 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 14:3 | | Pa | |
|--------------|--------------------------|----------------------------|-------------------|-----------|-------------|------------------------|-------------|-------------|----------|
| 10USA | | | | | | | | | |
| 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

Cost Calculations

| | | | | |
|------------------------------------|---|-------------------------------|---|------------------------------------|
| Batch Size | × | Base Process Unit Cost | = | Base Process Batch Cost |
| Batch Size | × | By-Product Unit Cost | = | By-Product Batch Cost |
| Base Process Batch Cost | - | By-Product Batch Cost | = | Net Base Process Batch Cost |
| Net Base Process Batch Cost | × | Allocation % | = | Co-Product Batch Cost |
| Co-Product Batch Cost | / | Qty per Batch | = | Co-Product Unit Cost |


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

Cost Development Troubleshooting

Cost Development Troubleshooting

- Co-product allocation percentages must add up to 100%
- Costs for co-products are calculated only for the base process assigned in the co-product's item master
- Co-products must have current effectivity date
- If by-product costs are not frozen, they can be recalculated, but the new cost is not used



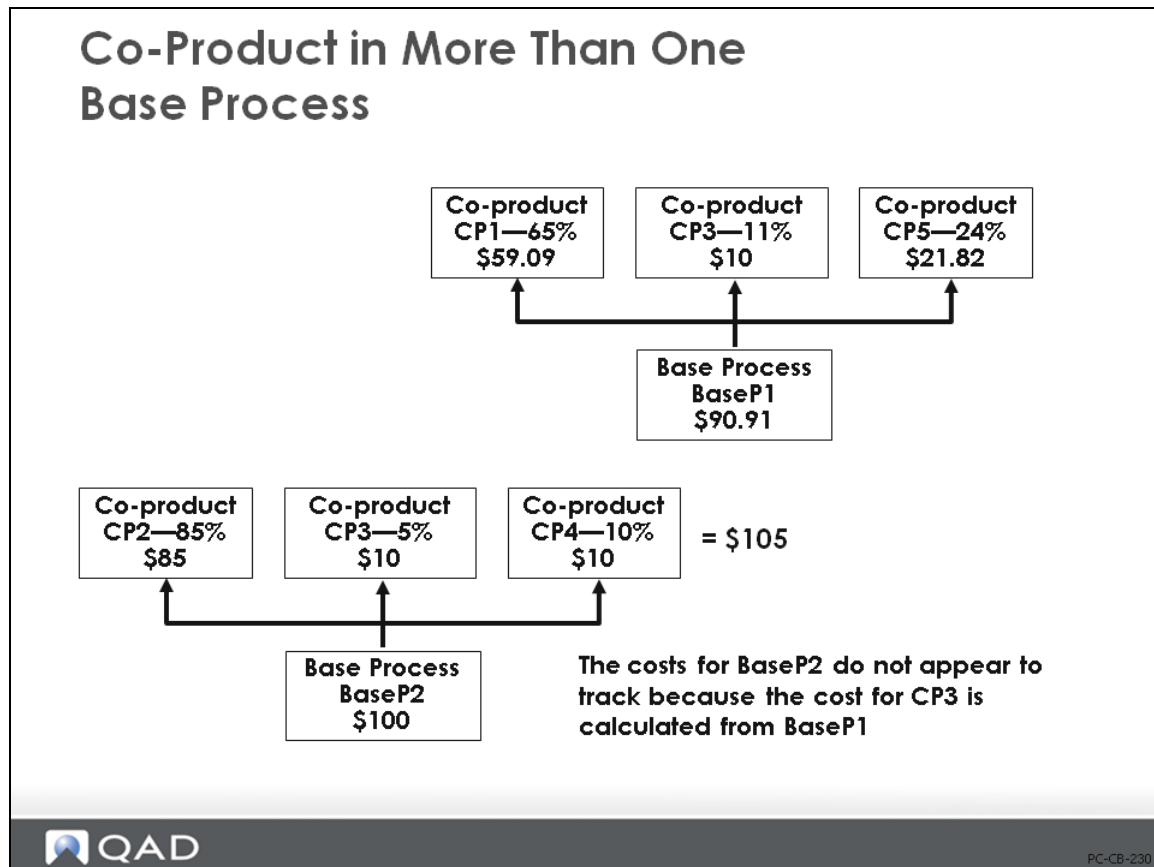
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Co-product Costs

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.

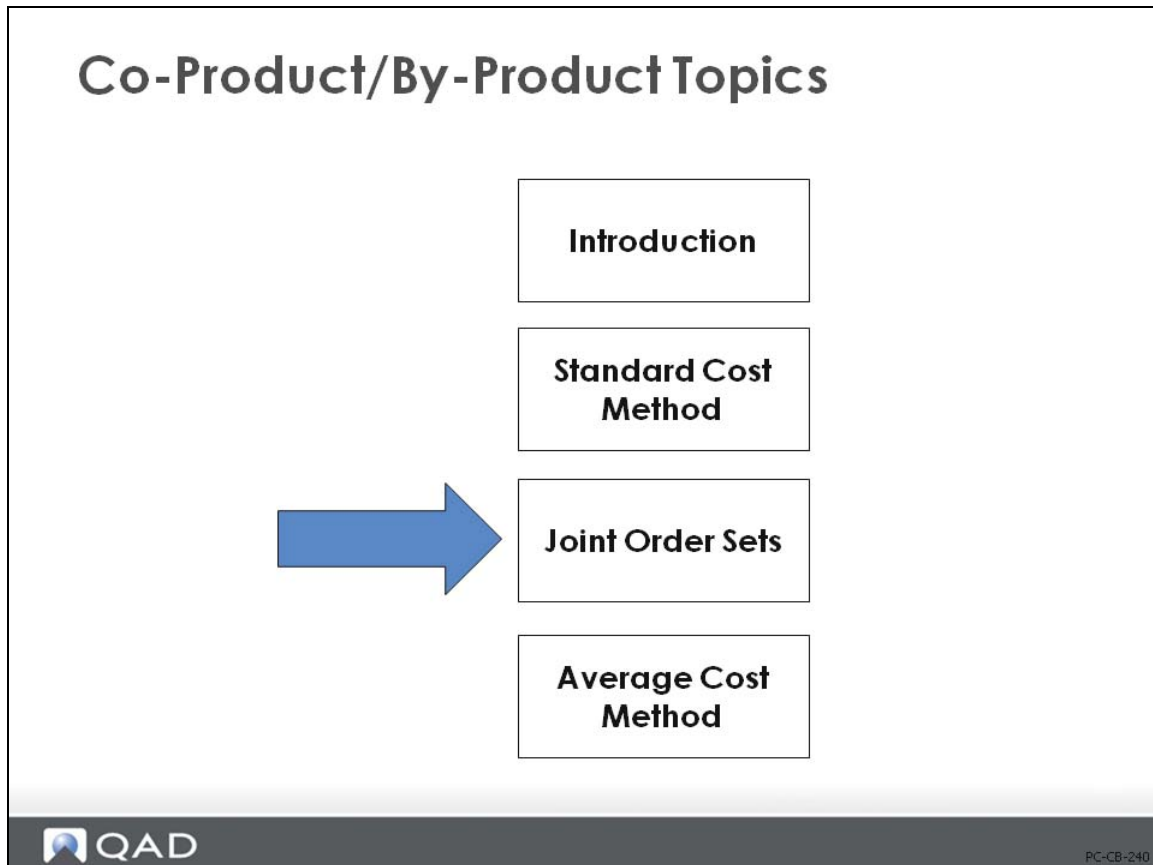
Co-product in More Than One Base Process



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



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

Introduction

Joint Order Set Access


Work Order: 1000 ID: 2287245 Item Number: B-70000 Site: 10-100

Work Order: 1000 BOM/Formula Code: B-70000
 WO Stat: F Qty Ordered: 5000 L Standard Batch: 5000 L

Co/By-Product Work Orders

| 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 |

All costs are accumulated on the work order for the base process. Upon work order receipt and/or accounting close, these costs are allocated to the products produced.


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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

Accounting for Joint Orders

- Review the cost activity for a joint order set using any of the following reports for the base process order:
 - Work Order Cost Report (16.3.4)
 - Work Order WIP Cost Report (16.3.5)
 - Work Order History Report (16.3.6)
- Shop Floor Control Transactions are processed using the base process order of the joint order set



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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

Work Order Receipts

- Use Work Order Receipt (16.11), or Work Order Receipt Backflush (16.12)
- If the work order is closed at WO receipt, WIP is relieved and GL transactions are written
- Work Order Accounting Close clears remaining WIP dollars



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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 Regulatory Attributes (Compliance) module control (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

- Work Order Accounting Close clears remaining WIP dollars
- Calculates variances—mix, usage, method
- Updates current average and last costs
- Updates GL average costs for co/by-products



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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.

| Work Order: 1000 | | ID: 2287245 | Item Number: B-70000 | Site: 10-100 | | |
|---------------------------|---------------------------|-------------|----------------------|--------------|---------|----|
| Work Order: 1000 | BOM/Formula Code: B-70000 | | | | | |
| WO Stat: F | Qty Ordered: | 5000 L | Standard Batch: | 5000 L | | |
| Co/By-Product Work Orders | | | | | | |
| 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 picklist, 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 15:10 | |
|--------------------|---------|-------------------------------------|-------------------|--------------------|-----------------|----------------|-------------------------|
| 10USA | | Project: | | | | Pag | |
| Account: 1550 Mech | | | | | | | |
| Work Order Batch | ID | Item Number | Material Labor | Burden Subcontract | Qty Finish Open | Avg Unit Cost | Completed Cost WIP Cost |
| 1000 | 2287245 | B-70000 Base Process Fruit Juice | 7,911.31 0.00 | 0.00 0.00 | | | |
| | | Co/By-Products: | | | | | |
| 1000 | 2287246 | 70040 Fruit Juice (unpackaged) | | | 5,000.0 0.0 | 1.259506536 | 6,297.53268 0.00 |
| 1000 | 2287247 | 70041 Fruit Pulp | | | 50.0 0.0 | 31.4876634 | 1,574.38317 0.00 |
| 1000 | 2287248 | 70042 Fruit Seeds | | | 5.0 0.0 | 0.50 | 2.50 0.00 |
| 1000 | 2287249 | 70043 Fruit Peel | | | 5.0 0.0 | 0.50 | 2.50 0.00 |
| | | | | | | WI | 34.40 |
| | | Project Total: | 15,817.62 0.00 | -0.0041665 0.00 | | | 7,876.91585 34.40 |
| | | Cost Ctr Total: | 15,817.62 0.00 | -0.0041665 0.00 | | | 7,876.91585 34.40 |
| | | Sub-Acct Mech Total: | 15,817.62 0.00 | -0.0041665 0.00 | | | 7,876.91585 34.40 |
| | | Account 1550 Total: | 15,817.62 0.00 | -0.0041665 0.00 | | | 7,876.91585 34.40 |
| | | Report Total: | 15,817.62 0.00 | -0.0041665 0.00 | | | 7,876.91585 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 Variance

Work Order: 1000 ID: 2287245 Item Number: B-70000 Site: 10-100

Work Order: 1000 BOM/Formula Code: B-70000
 WO Stat: F Qty Ordered: 1000 L Standard Batch: 1000 L

Co/By-Product Work Orders

| Item Number | Description | Qty Ordered | UM | Process | ID | CT |
|-------------|--------------------------|-------------|----|---------|---------|----|
| B-70000 | Base Process Fruit Juic | 1,000.0 | L | | 2287245 | P |
| 70040 | Fruit Juice (unpackaged) | 1,000.0 | L | | 2287246 | C |
| 70041 | Fruit Pulp | 25.0 | KG | | 2287247 | C |
| 80054 | Fruit Seeds | 0.5 | KG | | 2287248 | B |
| 80055 | Fruit Peel | 0.5 | KG | | 2287249 | B |

Work Order: 1000 ID: 2287245 Site: UM:

Receipt Data Review

| Item Number | Site | Location | Lot/Serial | Reference | Quantity |
|-------------|--------|----------|------------|-----------|----------|
| 70040 | 10-100 | 020 | | | 1,000.0 |
| 70041 | 10-100 | | | | 23.0 |
| 80054 | 10-100 | | | | 0.5 |
| 80055 | 10-100 | | | | 0.5 |

Mix variance occurs when quantity received is different than quantity expected

Mix variance results if the quantity of co/by-product received to stock differs from quantity expected.

$$[\text{Order Qty} - (\text{Rec Qty} + \text{Scrap Qty})] * \text{Unit Cost}$$

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:

$$\text{Mix Variance} = [\text{Order Quantity} - (\text{Receipt Quantity} + \text{Scrap Quantity})] * \text{GL Unit Cost}$$

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

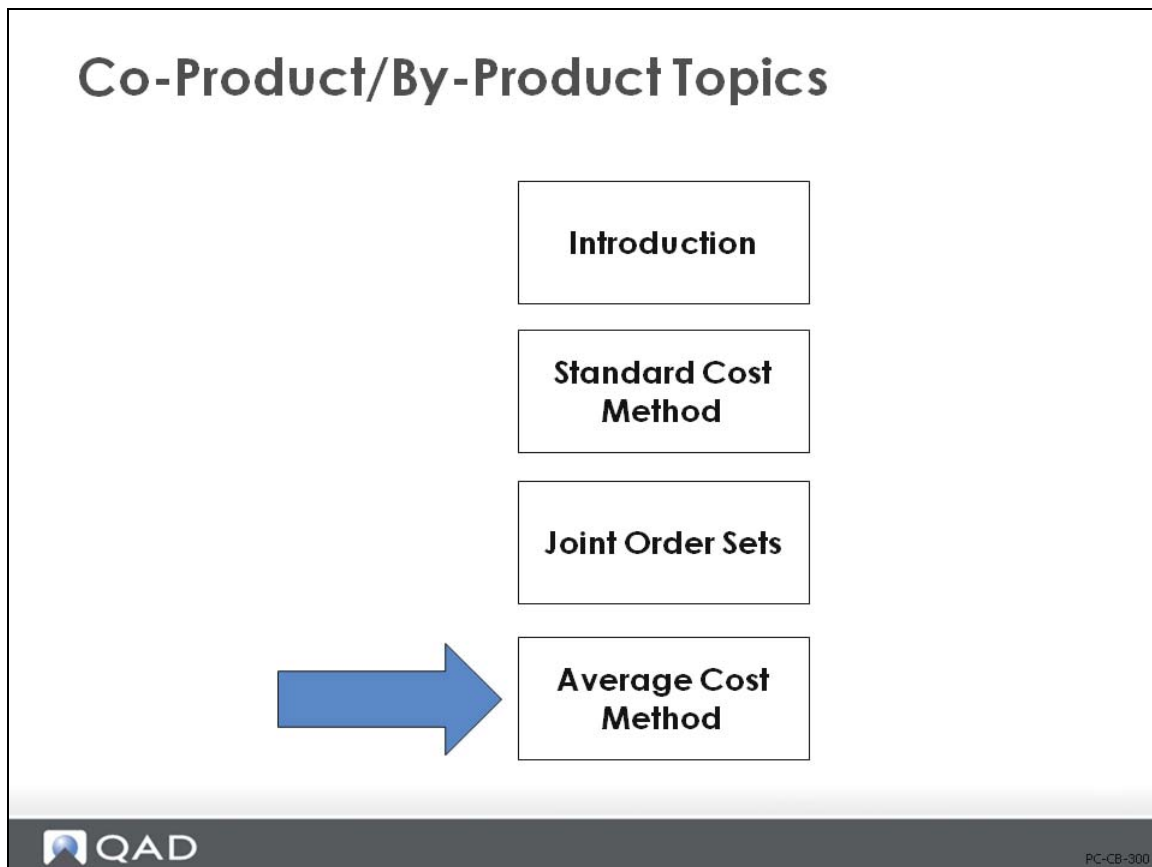
You cannot see a mix variance if you changed the quantity ordered to the quantity expected. (You can change the quantity ordered only when the work order status is [A]llocated, [E]xploded, or [R]eleased.) The quantity expected, then, is the work order quantity at the time of receipt to stock, not the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

Unexpected Receipts

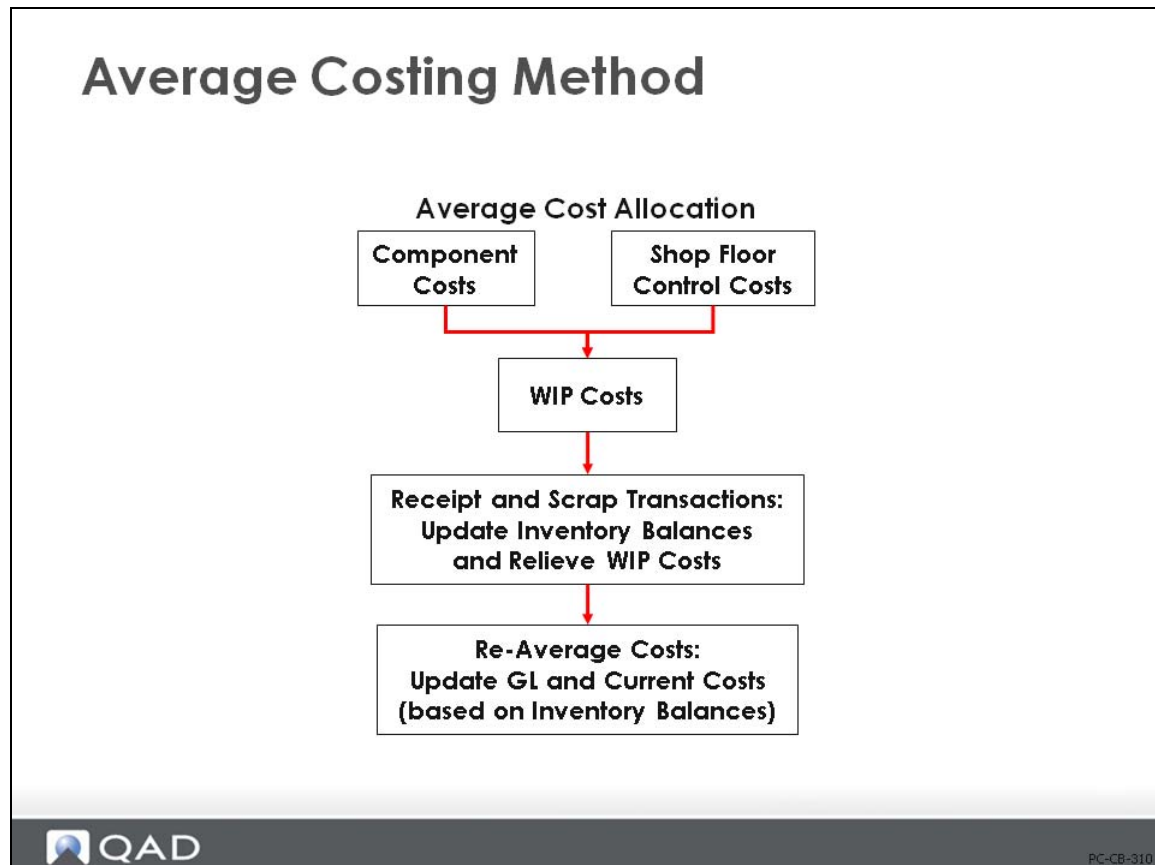
Unexpected joint order receipts are receipts of items against a joint order set that do not exist on any order in the set. This is different than receiving a valid substitute item. An unexpected receipt always has a mix variance. A work order is added to the set for the unexpected item. The order quantity 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

Allocation Methods

Enter a method to allocate costs from a base process to its co-products

- Receipt Quantity (physical measure) = wocsal01.p
- Price (value) = wocsal02.p
- Receipt Quantity and Price (physical measure and price) = wocsal03.p
- Can create allocation algorithm
- Validated against predefined values entered in Generalized Codes Maintenance (36.2.13) for field; acm.method



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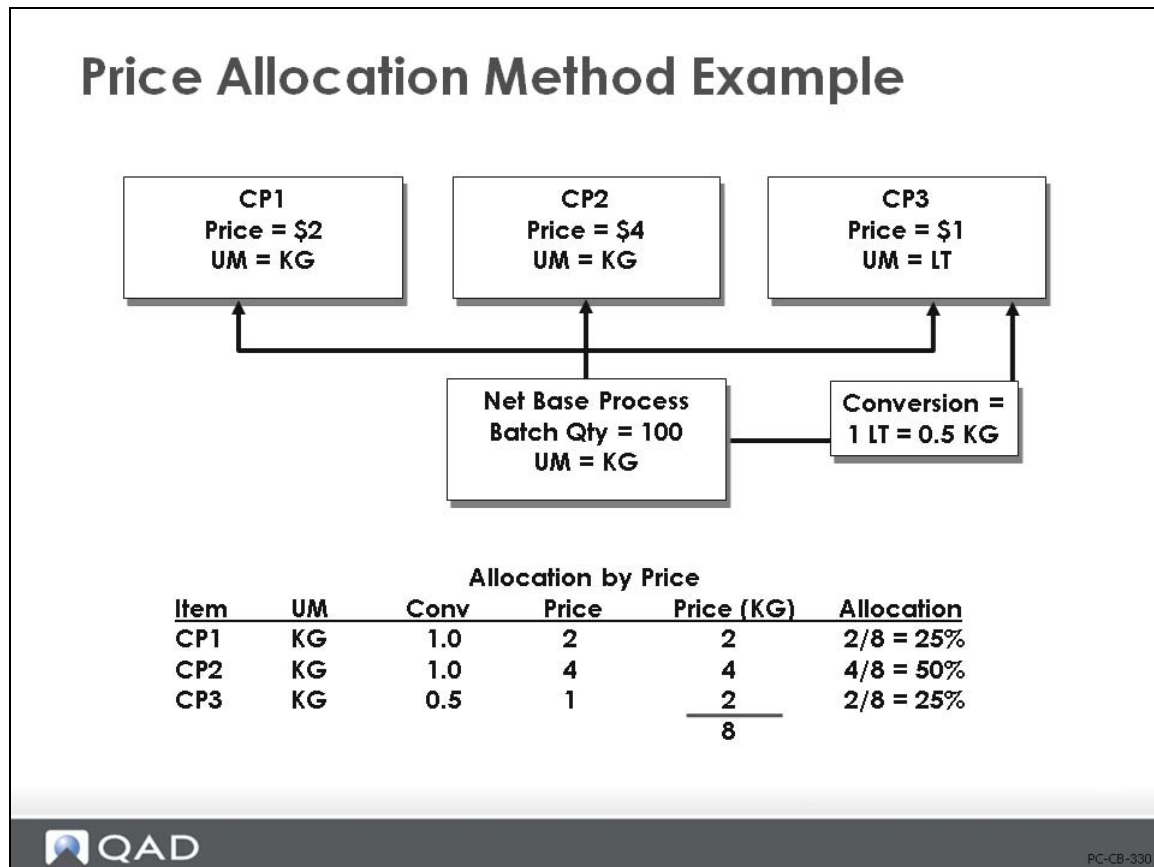
Define the average cost allocation method using Average Cost Method Maintenance (15.12.5). The system provides three methods for allocating costs from a joint order set to co-products:

- 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%.

$$\text{CP2's allocation percentage} = \$4 / \$8 = 50\%$$

$$\text{CP3's allocation percentage} = \$2 / \$8 = 25\%$$

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:

$$CP1 = 50 \text{ kg} / (50 \text{ kg} + 30 \text{ kg} + 20 \text{ kg}) = 50\%$$

$$CP2 = 30 \text{ kg} / (50 \text{ kg} + 30 \text{ kg} + 20 \text{ kg}) = 30\%$$

$$CP3 = 20 \text{ kg} / (50 \text{ kg} + 30 \text{ kg} + 20 \text{ kg}) = 20\%$$

| 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:

$$CP1 = 50 \text{ kg} \times \$2/\text{kg} = \$100$$

$$CP2 = 30 \text{ kg} \times \$4/\text{kg} = \$120$$

$$CP3 = 20 \text{ kg} \times \$2/\text{kg} = \$40$$

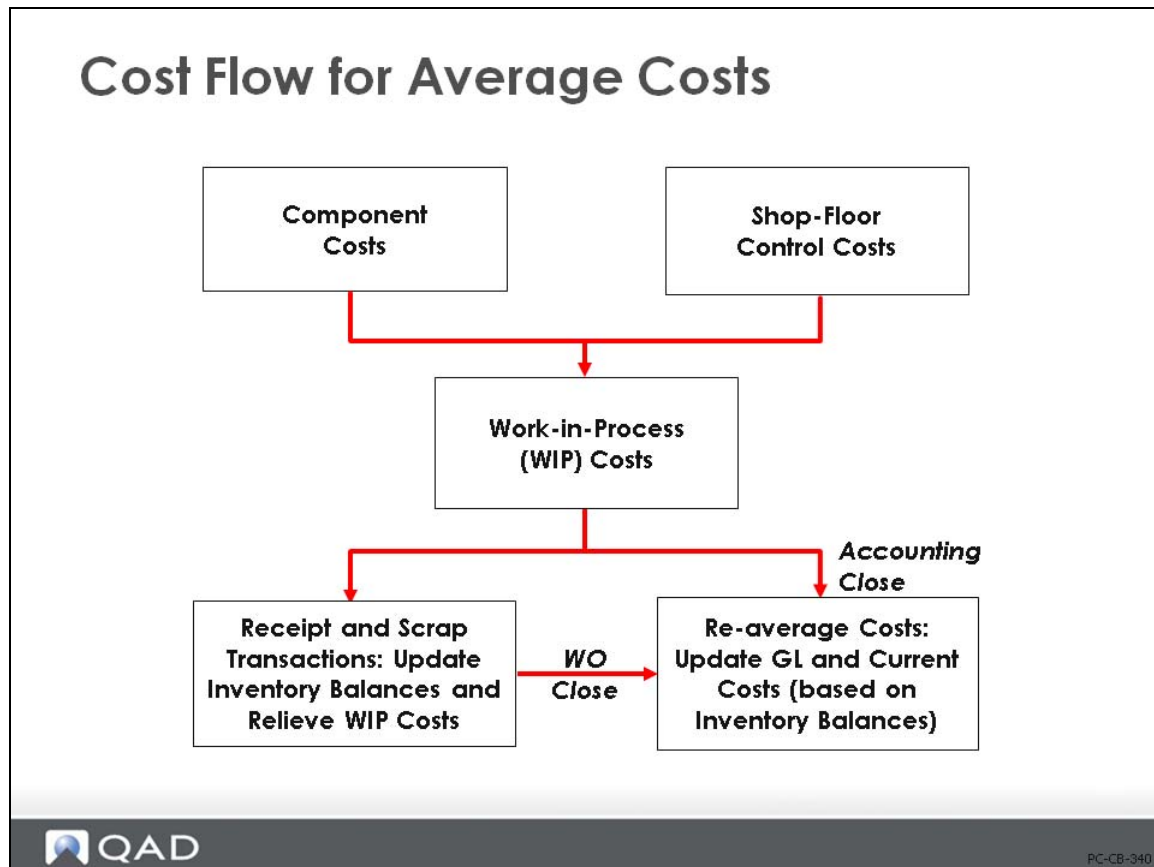
$$CP1 = \$100 / (\$100 + \$120 + \$40) = 38.46\%$$

$$CP2 = \$120 / (\$100 + \$120 + \$40) = 46.15\%$$

$$CP3 = \$40 / (\$100 + \$120 + \$40) = 15.39\%$$

| 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

| Variance | Calculation Method |
|---|--|
| <p>Purchase Price</p> <p>Calculated at:</p> <p> PO Receipts (5.13.1)</p> <p>Reports:</p> <p> Transaction Receipts Report (5.9.14)</p> <p> Transactions Detail Inquiry (3.21.1)</p> | $[\text{PO Unit Cost} - (\text{GL Unit Cost} - \text{OH})] * \text{PO Qty Received}$ |
| <p>AP Rate</p> <p>Calculated at:</p> <p> Supplier Invoice Create (28.1.1.1)</p> <p>Reports:</p> <p> Matching Variance Report (28.2.7)</p> <p> Transactions Detail Inquiry (3.21.1)</p> | $(\text{Invoice Unit Cost} - \text{PO Unit Cost}) * \text{Invoice Qty}$ |
| <p>AP Usage</p> <p>Calculated at:</p> <p> Supplier Invoice Create (28.1.1.1)</p> <p>Reports:</p> <p> Matching Variance Report (28.2.7)</p> <p> Transactions Detail Inquiry (3.21.1)</p> | $(\text{Invoice Qty} - \text{PO Receipt Qty}) * \text{PO Unit Cost}$ |

Manufacturing-Related Variances

| Variance | Calculation Method |
|--|--|
| <p>Material Rate</p> <p>Calculated at:</p> <ul style="list-style-type: none"> WO Component Issue (16.10) WO Receipt Backflush (16.12) Repetitive Backflush (18.22.13) <p>Reports:</p> <ul style="list-style-type: none"> Work Order Cost Report (16.3.4) Transactions Detail Inquiry (3.21.1) | $\text{(WO BOM Unit Cost at Issue - GL Unit Cost) * Actual Qty Issued}$ |
| <p>Material Usage</p> <p>Calculated at:</p> <ul style="list-style-type: none"> WO Accounting Close (16.21) Cumulative Order Close (18.22.10) Post Accumulated Usage Variances (18.22.9) <p>Reports:</p> <ul style="list-style-type: none"> Work Order Cost Report (16.3.4) Transactions Detail Inquiry (3.21.1) Rep Operations Accounting Report (18.22.4.9) | $\{ \text{Actual Qty Issued} - [\text{qty per} * (\text{qty completed} + \text{qty rejected})] \} * \text{GL Unit Cost}$ |
| <p>Labor Rate</p> <p>Calculated at:</p> <ul style="list-style-type: none"> SFC Feedback (16.20.1), (16.20.2), (16.20.3) <p>Can be deferred until:</p> <ul style="list-style-type: none"> WO Receipt (16.11), (16.12) Repetitive Backflush (18.22.13) <p>Reports:</p> <ul style="list-style-type: none"> Work Order Cost Report (16.3.4) Operations Accounting Report (16.20.13.10) Rep Operations Accounting Report (18.22.4.9) | <p>Per Operation:</p> $[(\text{Actual Setup Rate} - \text{Std Setup Rate}) * \text{Actual Setup Hrs}] + [(\text{Actual Run Rate} - \text{Std Run Rate}) * \text{Actual Run Hrs}]$ <p>Setup 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.</p> <p>No variances if no labor reporting</p> |
| <p>Labor Usage</p> <p>Calculated at:</p> <ul style="list-style-type: none"> SFC Feedback (16.20.1), (16.20.2), (16.20.3) <p>Can be deferred until:</p> <ul style="list-style-type: none"> WO Receipt (16.11), (16.12) Post Accumulated Usage Variances (18.22.9) Cumulative Accounting Close (18.22.10) <p>Reports:</p> <ul style="list-style-type: none"> WO Cost Report (16.3.4) Operations Accounting Report (16.20.13.10) Rep Operations Accounting Report (18.22.4.9) | <p>Per Operation:</p> $[(\text{Actual Setup Hrs} - \text{Std Setup Hrs}) * \text{Std Setup Rate}] + [(\text{Actual Run Hrs} - \text{Std Run Hrs}) * \text{Std Run Rate}]$ <p>Std Run Hrs = $\text{Std Run Hrs} * (\text{Qty Completed} + \text{Qty Rejected})$</p> |

| Variance | Calculation Method |
|---|---|
| <p>Burden Rate</p> <p>Calculated at:</p> <ul style="list-style-type: none"> SFC Feedback (16.20.1), (16.20.2), (16.20.3) WO Receipt (16.11), (16.12) Repetitive Backflush (18.22.13) <p>Reports:</p> <ul style="list-style-type: none"> WO Cost Report (16.3.4) Operations Accounting Report (16.20.13.10) Rep Operations Accounting Report (18.22.4.9) | <p>Per Operation:</p> <p>$[(\text{Actual Setup Bdn} - \text{Std Setup Bdn}) * \text{Actual Setup Hrs}] + [(\text{Actual Run Bdn} - \text{Std Run Bdn}) * \text{Actual Run Hrs}]$</p> <p>$\text{Actual Setup Bdn} = (\text{Actual Setup Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + (\text{Mach Bdn Rate} * \text{Mach/Op})$</p> <p>$\text{Std Setup Bdn} = (\text{Std Setup Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + (\text{Mach Bdn Rate} * \text{Mach/Op})$</p> <p>$\text{Actual Run Bdn} = (\text{Actual Run Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + \text{Mach Bdn Rate}$</p> <p>$\text{Std Run Bdn} = (\text{Std Run Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + \text{Mach Bdn Rate}$</p> |
| <p>Burden Usage</p> <p>Calculated at:</p> <ul style="list-style-type: none"> SFC Feedback (16.20.1), (16.20.2), (16.20.3) <p>Can be deferred until:</p> <ul style="list-style-type: none"> WO Receipt (16.11), (16.12) Post Accumulated Usage Variance (18.22.9) Cumulative Order Close (18.22.10) <p>Reports:</p> <ul style="list-style-type: none"> WO Cost Report (16.3.4) Operations Accounting Report (16.20.13.10) Rep Operations Accounting Report (18.22.4.9) | <p>Per Operation:</p> <p>$[(\text{Act Setup Hrs} - \text{Std Setup Hrs}) * \text{Std Setup Bdn}] + [(\text{Act Run Hrs} - \text{Std Run Hrs}) * \text{Std Run Bdn}]$</p> <p>$\text{Std Setup Bdn} = (\text{Std Setup Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + (\text{Mach Bdn Rate} * \text{Mach/Op})$</p> <p>$\text{Std Run Bdn} = (\text{Std Run Rate} * \text{Lbr Bdn}\%) + \text{Lbr Bdn Rate} + \text{Mach Bdn Rate}$</p> |
| <p>Subcontract Rate</p> <p>Calculated at:</p> <ul style="list-style-type: none"> PO Receipt (5.13.1) | <p>$(\text{Subcontract PO Unit Cost} - \text{Subcontract Unit Cost from Routing}) * \text{Qty Received}$</p> |
| <p>Subcontract Usage</p> <p>Calculated at:</p> <ul style="list-style-type: none"> WO Accounting Close (16.21) Post Accumulated Usage Variance (18.22.9) Cumulative Order Close (18.22.10) | <p>$[\text{Qty Received} - (\text{Op Qty Completed} + \text{Op Qty Rejected})] * \text{Subcontract Unit Cost from Routing}$</p> |
| <p>Method</p> <p>Calculated at:</p> <ul style="list-style-type: none"> WO Accounting Close (16.21) Cumulative Accounting Close (18.22.10) | <p>Balance of WO/ID value remaining</p> |
| <p>Mix (Co/By-Products)</p> <p>Calculated at:</p> <ul style="list-style-type: none"> WO Accounting Close (16.21) | <p>$[\text{Order Qty} - (\text{Receipt Qty} + \text{Scrap Qty})] * \text{GL Unit Cost}$</p> |

Variations by Transaction Flow

| Variations by Transaction Flow |
|---|
| <p>PO Receipts</p> <p>Purchase Price Variance $[PO \text{ Unit Cost} - (GL \text{ Unit Cost} - OH)] * PO \text{ Qty Received}$</p> <p>Subcontract Rate Variance $(Subcontract \text{ PO Unit Cost} - Subcontract \text{ Unit Cost from Routing}) * Qty \text{ Received}$</p> |
| <p>Receiver Matching</p> <p>Accounts Payable Rate Variance $(Invoice \text{ Unit Cost} - PO \text{ Unit Cost}) * Invoice \text{ Quantity}$</p> <p>Accounts Payable Usage Variance $(Invoice \text{ Qty} - PO \text{ Receipt Qty}) * PO \text{ Unit Cost}$</p> |
| <p>Work Order Component Issue</p> <p>Material Rate Variance $(WO \text{ BOM Unit Cost at Issue} - GL \text{ Unit Cost}) * Actual \text{ Qty Issued}$</p> |
| <p>Labor Feedback</p> <p>Labor Rate Variance $[(Actual \text{ Setup Rate} - Std \text{ Setup Rate}) * Actual \text{ Setup Hrs}] + [(Actual \text{ Run Rate} - Std \text{ Run Rate}) * Actual \text{ Run Hrs}]$</p> <p>Labor Usage Variance $[(Actual \text{ Setup Hrs} - Std \text{ Setup Hrs}) * Std \text{ Setup Rate}] + [(Actual \text{ Run Hrs} - Std \text{ Run Hrs}) * Std \text{ Run Rate}]$ $* Std \text{ Run Hrs} = Std \text{ Run Hrs} * (Qty \text{ Completed} + Qty \text{ Rejected})$</p> <p>Burden Rate Variance $[(Actual \text{ Setup Bdn} - Std \text{ Setup Bdn}) * Actual \text{ Setup Hrs}] + [(Actual \text{ Run Bdn} - Std \text{ Run Bdn}) * Actual \text{ Run Hrs}]$</p> <p>Burden Usage Variance $[(Act \text{ Setup Hrs} - Std \text{ Setup Hrs}) * Setup \text{ Bdn}] + [(Act \text{ Run Hrs} - Std \text{ Run Hrs}) * Run \text{ Bdn}]$</p> |
| <p>Work Order Accounting Close</p> <p>Subcontract Usage Variance $[Qty \text{ Received} - (Op \text{ Qty Completed} + Op \text{ Qty Rejected})] * Subcontract \text{ Unit Cost from Routing}$</p> <p>Material Usage Variance $\{Actual \text{ Qty Issued} - [qty \text{ per} * (qty \text{ completed} + qty \text{ rejected})]\} * GL \text{ Unit Cost}$</p> <p>Method Variance</p> |

Components of Item Cost

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

Product Information Resources

QAD offers a number of online resources to help you get more information about using QAD products.

[QAD Forums \(community.qad.com\)](http://community.qad.com)

Ask questions and share information with other members of the user community, including QAD experts.

[QAD Knowledgebase \(knowledgebase.qad.com\)*](http://knowledgebase.qad.com)

Search for answers, tips, or solutions related to any QAD product or topic.

[QAD Document Library \(www.qad.com/documentlibrary\)](http://www.qad.com/documentlibrary)

Get browser-based access to user guides, release notes, training guides, and so on; use powerful search features to find the document you want, then read online, or download and print PDF.

[QAD Learning Center \(learning.qad.com\)*](http://learning.qad.com)

Visit QAD's one-stop destination for all courses and training materials.

*Log-in required

