Lecture 3: Ch 5 Job Order Costing & Ch 6 Process Approach

IE618 Eng Cost & Production Economics

Spring 2014

Dr. Reggie J. Caudill

Professor of Mechanical and Industrial Engineering

caudill@njit.edu

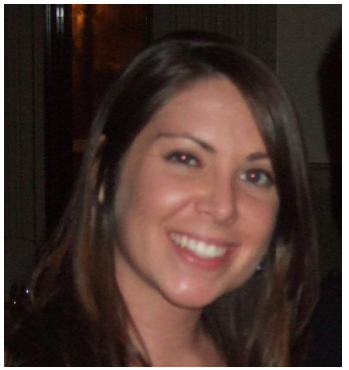
973-596-3331

203 MEC

http://web.njit.edu/~caudill/

TA: Nadi Atalla – na76@njit.edu

Is advertising an asset or an expense?



Accountants record advertising expenditures as expenses when the ads are run. (A prepayment of a future ad would be recorded as an asset until the ad is run.)

The reason advertising is recorded as an expense and not an asset is the problem of measuring the future value of an ad. What amount would the accountant use for recording the advertising expenditure as an asset? (You may recall a very entertaining and memorable ad by an automobile manufacturer during a Super Bowl. Viewers ranked it as one of the best. However, a later analysis showed that the ad did not result in additional sales for the car company.)

Advertising may be valuable—even crucial for some businesses—and will lead to additional assets, but accountants and others are unable to quantify the future economic value necessary for reporting it as an asset. As a result, advertising expenditures will be reported as expenses in the accounting period in which the ads are run.

What is the significance of FOB Shipping Point and FOB Destination? FOB: Free On Board

Accountants report a merchandiser's and a manufacturer's revenues when a sale is made. The term, FOB Shipping Point, indicates that the sale occurred at the shipping point—at the seller's shipping dock. FOB Destination indicates that the sale will occur when it arrives at the destination—at the buyer's receiving dock. Accountants also assume that the cost of transporting the goods corresponds to these terms.

FOB Origin - If the sale occurred at the shipping point (seller's shipping dock), then the buyer should take responsibility for the cost of transporting the goods. (The buyer will record this cost as Freight-In or Transportation-In.)

FOB Destination - If the sale doesn't occur until the goods reach the destination (terms are FOB Destination), then the seller should be responsible for transporting the goods until they reach the buyer's unloading dock. (The seller will record the transportation cost as Freight-Out, Transportation-Out, or Delivery Expense.)

Are transportation-in costs part of the cost of goods sold?

Transportation-in or freight-in costs are part of the cost of goods purchased. The cost of goods (or any asset) includes all costs necessary to get an asset in place and ready for use. Transportation-in costs are allocated to the products purchased and will “cling” to the products. Those products in inventory (items not yet sold), will include their share of the transportation-in costs (as part of the inventory cost). The products that have been sold, will include their share of the transportation-in costs (as part of the cost of goods sold).

Transportation-out or freight-out costs are not product costs and are not inventoriable. Transportation-out costs are costs of *selling* the products and will appear as a selling expense (perhaps as Delivery Expense) in the period in which they occur.

Chapter 5 Objectives

1. Differentiate the cost accounting systems of service and manufacturing firms and of unique and standardized products.
2. Discuss the interrelationship of cost accumulation, cost measurement, and cost assignment.
3. Identify the source documents used in job-order costing, and prepare the journal entries.
4. Describe the cost flows associated with job-order costing, and prepare the journal entries.
5. Explain how activity-based costing is applied to job-order costing.
6. Explain how spoiled units are accounted for in a job-order costing system.

Characteristics of the Production Process

Manufacturing Firms versus Service Firms

- **Manufacturing firms**
  - Combines direct materials, direct labor, and overhead to produce a new product.
- **Service firms**
  - Provide a service.
- So what is a beauty salon? Or a restaurant?
  - Both use tangible products, but both provide a service.
  - There are elements of both.

Objective 1

Characteristics of the Production Process

EXHIBIT 5.1

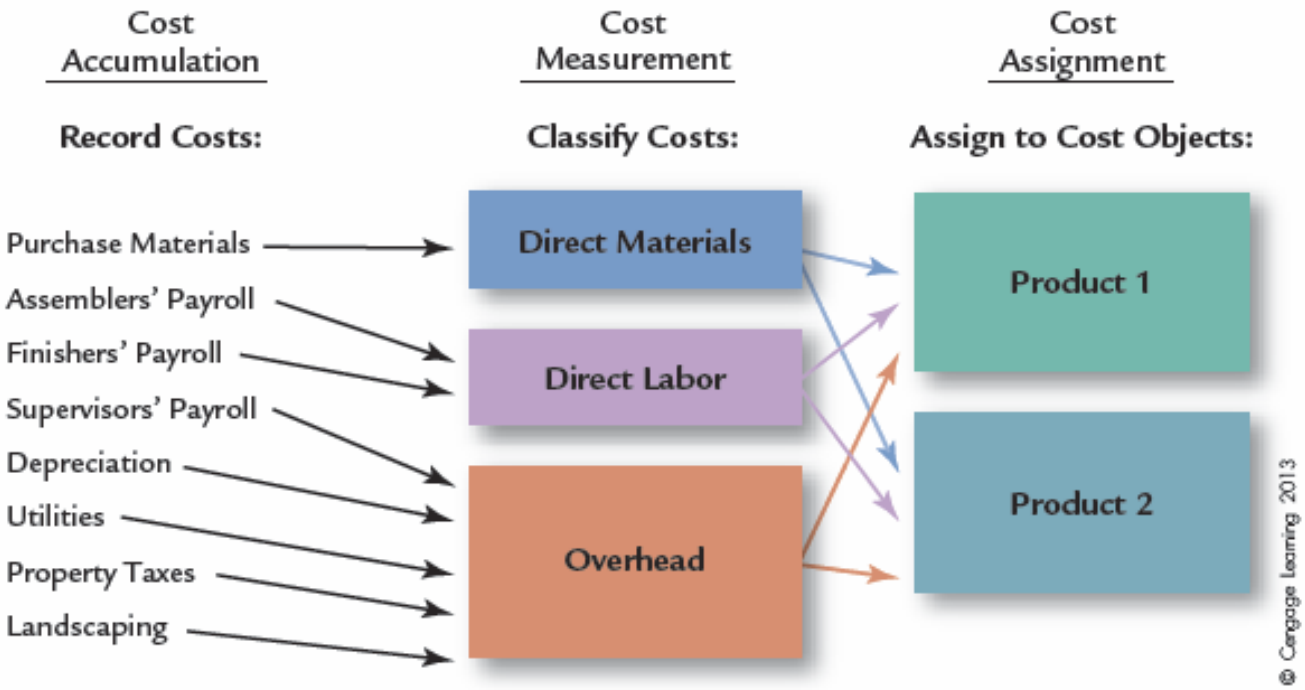
Continuum of Services and Manufactured Products

Objective 1

Setting Up the Cost Accounting System

EXHIBIT 5.3

Relationship of Cost Accumulation, Cost Measurement, and Cost Assignment



Objective 2

Setting Up the Cost Accounting System

Cost Accumulation, Measurement, and Assignment

- **Unit costs** are important to
  - Manufacturers for:
    - valuing inventory,
    - determining income,
    - and many other important decisions.
  - Nonmanufacturing firms for many of the same reasons.
    - Services do not need to value work in process or finished goods, but still need to determine profitability.

Objective 2

Setting Up the Cost Accounting System

Cost Accumulation, Measurement, and Assignment

- **Production of unit cost information**
  - **Actual costing**
    - Actual direct materials, direct labor and manufacturing overhead
      - Actual manufacturing overhead has timing problems.
  - **Normal costing**
    - Actual direct materials and labor
    - Applied overhead based on a predetermined overhead rate.
      - Because the predetermined overhead rate is calculated using budgeted overhead and drivers, the timing issue is eliminated.

Objective 2

Setting Up the Cost Accounting System

Choosing the Activity Level

- **Expected activity level**
  - Is the production level the firm expects to attain for the coming year
- **Normal activity level**
  - Is the average activity usage that a firm experiences in the long term
- **Theoretical activity level**
  - Is the absolute maximum production activity of a manufacturing firm.
- **Practical activity level**
  - Is the maximum output that can be realized if everything operates efficiently.

Objective 2

Unique vs Standardized Products and Services

Job-Order vs Process Production Systems

Firms that produce unique products in small batches that incur different product costs must track the costs of each product or batch separately—job-order production systems.

Some Examples: cabinet makers, home builders, dental & medical services

Some firms produce identical units of the same product. The costs of each unit are also the same—process

Some Examples: chemical, pharmaceutical, food, cement, petroleum

Objective 3

The Job-Order Costing System: General Description

Overview of the Job-Order Costing System

Costs are accumulated by **job** in a job-order costing system.

Once a job is completed, the **unit cost** is determined by dividing the total manufacturing cost by the number of units produced.

We assume that costs are applied based on **normal costing**.

Some Examples: cabinet makers, home builders, dental & medical services

Objective 3

The Job-Order Costing System: General Description

The Job-Order Cost Sheet

The **job-order cost sheet** accumulates each job's manufacturing costs.

Each job-order cost sheet has a **job-order number** that identifies the new job.

The cost sheet corresponds to a record in the **work-in-process** inventory file.

All the job sheets together form a **subsidiary work-in-process inventory ledger**.

A job-order costing system must be able to identify the quantity of ***direct materials, direct labor*** and ***applied manufacturing overhead.***

Objective 3

The Job-Order Costing System: General Description

The Job-Order Cost Sheet

Job Number 16

For Benson Company — Date Ordered April 2, 2013

Item Description Valves — 2013 Date Completed April 24, 2013

Quantity Completed 100 — 2013 Date Shipped April 25, 2013

2013 Direct Materials		Direct Labor				Overhead		
Requisition Number	Amount	Ticket Number	Hours	Rate	Amount	Hours	Rate	Amount
12	$300	68	8	$6	$ 48	8	$10	$ 80
18	450	72	10	7	70	10	10	100
	$750				$118			$180

Cost Summary

Direct Materials	$ 750
Direct Labor	118
Overhead	180
Total Cost	$1,048
Unit Cost	$10.48

Objective 3

The Job-Order Costing System: General Description

Materials Requisitions

Direct materials cost is assigned to each job through the use of a **materials requisition form**.

The form includes the ***description***, ***quantity*** and ***unit cost*** of materials issued to each job.

The form provides essential information for **assigning** direct materials costs to jobs, and also helps maintain **proper control** over a firm's inventory of direct materials.

Objective 3

The Job-Order Costing System: General Description

Materials Requisition Form

Materials Requisition
Number 678

Date April 8, 2013

Department Grinding

Job Number 62

Description	Quantity	Cost/Unit	Total Cost
Casing	100	$3	$300

Authorized Signature Jim Lawson

Objective 3

The Job-Order Costing System: General Description

Job Time Tickets

Direct labor cost is assigned to each job through the use of a **job time ticket**.

The form includes the ***name***, ***wage rate*** and ***hours worked*** on each job. These forms are only used for **direct labor.**

Objective 3

The Job-Order Costing System: General Description

Time Ticket

Time Ticket Number 68

Employee Number 45

Name Ann Wilson

Date April 12, 2013

2013 Start Time	Stop Time	Total Time	Hourly Rate	Amount	Job Number
8:00	10:00	2	$6	$12	16
10:00	11:00	1	6	6	17
11:00	12:00	1	6	6	16
1:00	6:00	5	6	30	16

Approved by Jim Lawson

Department Supervisor

Objective 3

The Job-Order Costing System: General Description

Overhead Application

Jobs are **assigned overhead costs** with a **predetermined overhead rate**.

Typically, direct labor hours are used as the measure to calculate overhead. Sometimes, ***another driver***, such as **machine hours**, are used.

In that case the actual amount of that driver must be collected and posted to the job cost sheets.

Objective 3

The Job-Order Costing System: General Description

Unit Cost Calculation

Once a job is completed, the **total manufacturing cost** is calculated by totaling ***direct materials, direct labor*** and ***applied overhead***.

Then the grand total can be divided by number of units to produce a **unit cost**.

Objective 3

Job-Order Costing: Specific Cost Flow Description

Accounting for Direct Materials

Subsidiary Accounts (Cost Sheets)

Job 101
Direct Materials

Req. No.	Amount
1	$ 300
2	200
3	500
	$1,000

Job 102
Direct Materials

Req. No.	Amount
4	$250
5	250
	$500

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Direct Labor

Work-in-Process Inventory Subsidiary Accounts (Cost Sheets)

Job 101
Labor

Ticket	Hours	Rate	Amount
1	15	$10	$150
2	20	10	200
3	25	10	250
	60		$600

Job 102
Labor

Ticket	Hours	Rate	Amount
4	15	$10	$150
5	10	10	100
	25		$250

Objective 4

Job-Order Costing: Specific Cost Flow Description

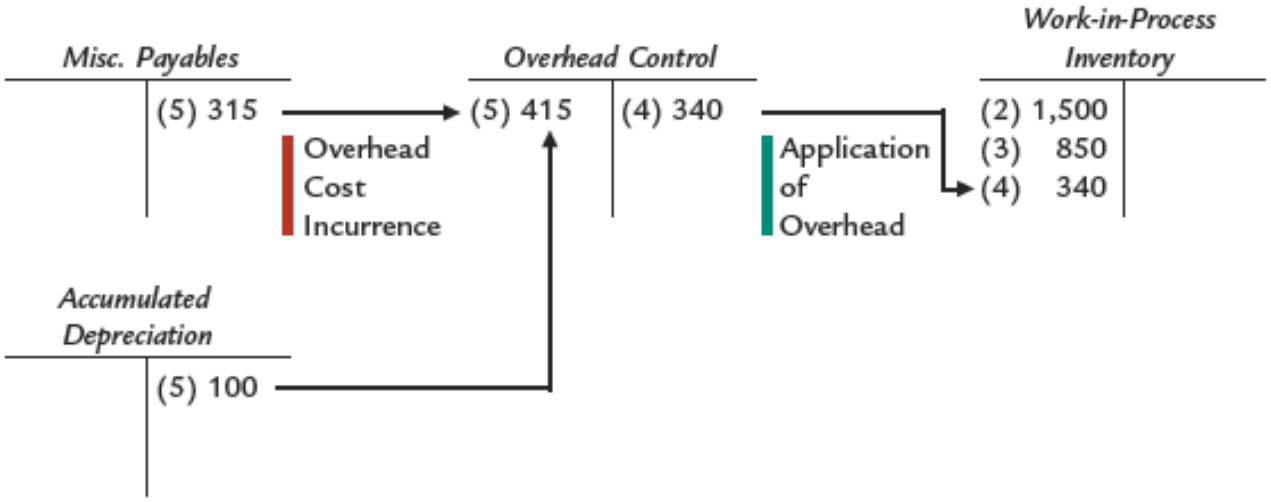
Accounting for Overhead

- **Applied Overhead**
  - Flows into Work-in-Process inventory through use of the **predetermined overhead rate**.
  - Multiply the **actual driver units** used by the **predetermined overhead rate** to get **Applied Manufacturing Overhead.**
  - Applied overhead is debited to **Work-in-Process** and credited to **Overhead Control.**
- **Actual Overhead**
  - Actual overhead is **debited** to the **Overhead Control** account as it is incurred.

Objective 4

Job-Order Costing: Specific Cost Flow Description

Summary of Overhead Cost Flows



Work-in-Process Inventory Subsidiary Accounts (Cost Sheets)

Job 101
Applied Overhead

Hours	Rate	Amount
60	$4	$240

Job 102
Applied Overhead

Hours	Rate	Amount
25	$4	$100

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Finished Goods Inventory

- **Total job cost**
  - Direct materials, direct labor, and applied manufacturing overhead are totaled for completed jobs.
  - The cost of a completed job is **credited** to Work-in-process and **debited** to **Finished Goods Inventory.**
- **Schedule of cost of goods manufactured**
  - A schedule summarizing the cost flows through the production activity is prepared.
  - Finished goods inventory is carried at **normal cost**.

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Finished Goods Inventory

Objective 4

Job-Order Costing: Specific Cost Flow Description

EXHIBIT 5.13

Statement of Cost of Goods Manufactured

All Signs Company Statement of Cost of Goods Manufactured For the Month Ended January 31, 2013		
2013 Direct materials:		
Beginning direct materials inventory	$ 0	
Add: Purchases of direct materials	2,500	
Total direct materials available	$2,500	
Less: Ending direct materials	1,000	
Direct materials used		$1,500
Direct labor		850
Manufacturing overhead:		
Lease	$ 200	
Utilities	50	
Depreciation	100	
Indirect labor	65	
	$ 415	
Less: Underapplied overhead	75	
Overhead applied		340
Current manufacturing costs		$2,690
Add: Beginning work-in-process inventory		0
Less: Ending work-in-process inventory		(850)
Cost of goods manufactured		$1,840

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Cost of Goods Sold

- **When the job is shipped**
  - To the customer, the cost of the finished job becomes a cost of goods sold.
  - The cost of a completed job is **credited** to finished goods inventory and **debited** to **Cost of Goods Sold.**
- **Overhead variances**
  - Cost of goods sold **before** adjustment includes the cost of the finished jobs that have been sold only.
  - There is usually an immaterial **overhead variance** which must be closed to the cost of goods sold account.
  - After that adjustment takes place, the result is called the ***adjusted cost of goods sold.***

Objective 4

Job-Order Costing: Specific Cost Flow Description

EXHIBIT 5.14

Statement of Cost of Goods Sold

All Signs Company
Statement of Cost of Goods Sold
For the Month Ended January 31, 2013

Beginning finished goods inventory	$ 0
Cost of goods manufactured	1,840
Goods available for sale	$1,840
Less: Ending finished goods inventory	0
Normal cost of goods sold	$1,840
Add: Underapplied overhead	75
Adjusted cost of goods sold	$1,915

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Cost of Goods Sold

- **Closing the overhead variance account**
  - Usually done once a year.
  - Variances occur because of non-uniform production and overhead costs.
  - Over time these costs should largely offset each other.
  - If the end of year, variance is immaterial debit or credit the overhead control account to zero it out. The other half of the journal entry goes to cost of goods sold.

Objective 4

Job-Order Costing: Specific Cost Flow Description

Summary of Manufacturing Cost Flows

Materials Inventory			
(1)	2,500	(2)	1,500

Wages Payable			
		(3)	850

Overhead Control			
(5)	415	(4)	340
		(8)	75

Work-in-Process Inventory			
(2)	1,500	(6)	1,840
(3)	850		
(4)	340		

Finished Goods Inventory			
(6)	1,840	(7a)	1,840

Cost of Goods Sold			
(7a)	1,840		
(8)	75		

(1)	Purchase of direct materials	$2,500
(2)	Issue of direct materials	1,500
(3)	Incurrence of direct labor cost	850
(4)	Application of overhead	340
(5)	Incurrence of actual overhead cost	415
(6)	Transfer of Job 101 to finished goods	1,840
(7a)	Cost of goods sold of Job 101	1,840
(8)	Closing out underapplied overhead	75

Objective 4

Job-Order Costing: Specific Cost Flow Description

Accounting for Nonmanufacturing Costs

- **Selling and general administrative expenses**
  - These costs are period costs and never assigned to inventory accounts.
  - These costs flow to the income statement for the period.

Objective 4

Job-Order Costing with Activity Based Costing

- **Activity-Based Costing**
  - A single rate based on direct labor hours may result in inaccurate cost assignments.
  - Departmental overhead rates and activity-based costing can be used with job-order costing.

Objective 5

Job-Order Costing: Specific Cost Flow Description

EXHIBIT 5.16

Income Statement

All Signs Company
Income Statement
For the Month Ended January 31, 2013

Sales		$2,760
Less: Cost of goods sold		1,915
Gross margin		$ 845
Less selling and administrative expenses:		
Selling expenses	$200	
Administrative expenses	550	750
Operating income		$ 95

Objective 4

Single versus Multiple Overhead Rates

	Labor Intensive Department A	Machine Intensive Department B	Total
Overhead costs	$ 60,000	$ 180,000	$ 240,000
DL hours	15,000	5,000	20,000
Machine hours	5,000	15,000	20,000

- Single (plantwide) rate

  $240,000 ÷ 20,000 DLHr = $12 per DL hour

Data for Jobs 23 and 24

	Job 23		
	Department A	Department B	Total
Prime costs	$5,000	$0	$5,000
Direct labor hours	500	0	500
Machine hours	1	0	1
Units produced	1,000	0	1,000

	Job 24		
	Department A	Department B	Total
Prime costs	$0	$5,000	$5,000
Direct labor hours	0	1	1
Machine hours	0	500	500
Units produced	0	1,000	1,000

Single versus Multiple Overhead Rates

Using single "Plant Wide" overhead application rate:

	Job #23		Job #24	
Prime Costs		$ 5,000		$ 5,000
Applied overhead:				
DL hours	500		1	
Single rate	$ 12.00	6,000	$ 12.00	12
Total costs		$ 11,000		$ 5,012
Units produced		1,000		1,000
Unit cost		$ 11.000		$ 5.012

Single versus Multiple Overhead Rates

	Department A	Department B	Total
Overhead costs	$ 60,000	$ 180,000	$ 240,000
DL hours	15,000	5,000	20,000
Machine hours	5,000	15,000	20,000

- Single (plantwide) rate

  $240,000 ÷ 20,000 DLHr = $12 per DL hour

- Multiple (departmental) rates
  - Department A *labor-intensive*

    $60,000 ÷ 15,000 DLHr = $4 per DL hour
  - Department B *machine-intensive*

    $180,000 ÷ 15,000 MHr = $12 per M hour

Single versus Multiple Overhead Rates

Using multiple overhead application rates:

	Job 23		
	Department A	Department B	Total
Prime costs	$5,000	$0	$5,000
Direct labor hours	500	0	500
Machine hours	1	0	1
Units produced	1,000	0	1,000

	Job 24		
	Department A	Department B	Total
Prime costs	$0	$5,000	$5,000
Direct labor hours	0	1	1
Machine hours	0	500	500
Units produced	0	1,000	1,000

Single versus Multiple Overhead Rates

Using multiple overhead application rates:

	Job #23		Job #24	
Prime Costs		$ 5,000		$ 5,000
Applied overhead:				
Dept A:				
DL Hours	500		-	
Rate	$ 4.00	2,000	$ 4.00	-
Dept B:				
Machine hours	-		500	
Rate	$ 12.00	-	$ 12.00	6,000
Total costs		$ 7,000		$ 11,000
Units produced		1,000		1,000
Unit cost		$ 7.000		$ 11.000

Accounting for Spoiled Units in a Traditional Job-Order Costing System

- **Normal Spoilage**
  - Is expected waste due to the nature of the production process.
    - This is subsumed in the overhead rate and spread among all jobs.
- **Abnormal Spoilage**
  - Is due to the exacting nature of a particular job.
    - This is charged to the particular job.

Objective 6

Chapter 6

Process System Approach

Chapter 6 Objectives

1. Describe the basic characteristics of process costing, including cost flows, journal entries, and the cost of production report.
2. Describe process costing for settings without work-in-process inventories.
3. Describe process costing for settings with ending work-in-process inventories.
4. Prepare a departmental production report using the FIFO method.
5. Prepare a departmental production report using the weighted average method.
6. Prepare a departmental production report with transferred-in goods and changes in output measures.
7. Describe the basic features of operation costing.
8. Explain how spoilage is treated in a process-costing system.

Basic Operational and Cost Concepts

- A process system is characterized by a large number of homogeneous products passing through a series of processes
  - Each process is responsible for one or more operations that bring a product one step closer to completion
    - A process is a series of activities that are linked to perform a specific objective
  - In each process, materials labor and overhead inputs may be needed and upon completion of that process are transferred to another process until complete, when they are transferred to finished goods.

Objective 1

Basic Operational and Cost Concepts

EXHIBIT 6.1

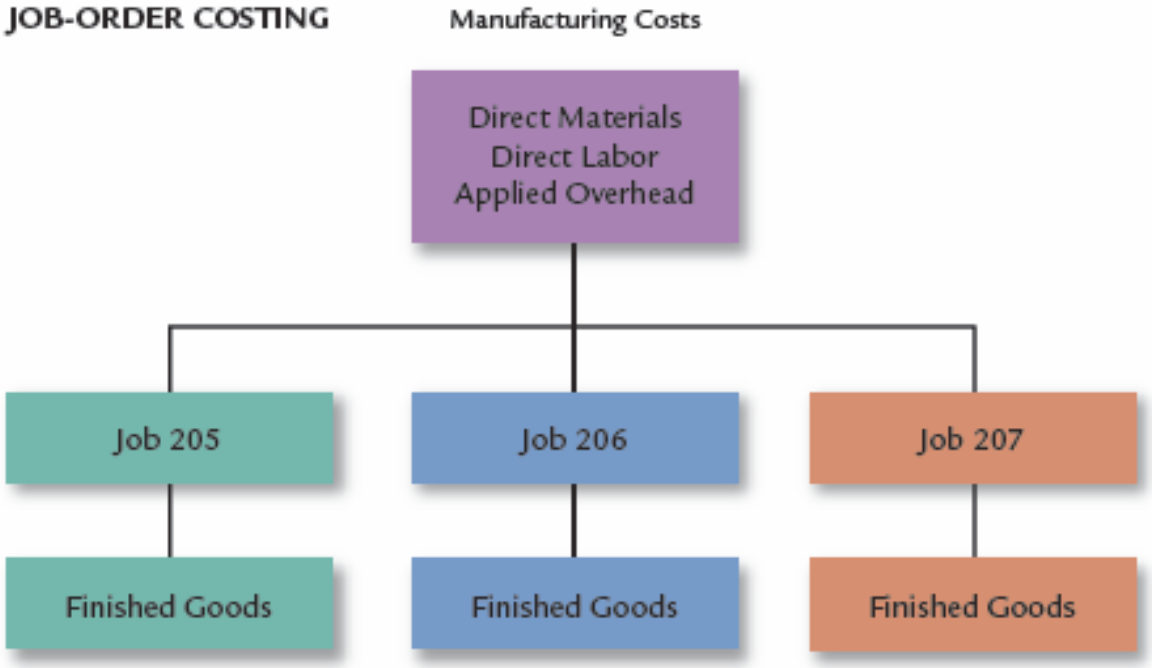
An Operational Process System: Antihistamine Manufacturing

Objective 1

Basic Operational and Cost Concepts

EXHIBIT 6.2

Comparison of Cost Accumulation Methods

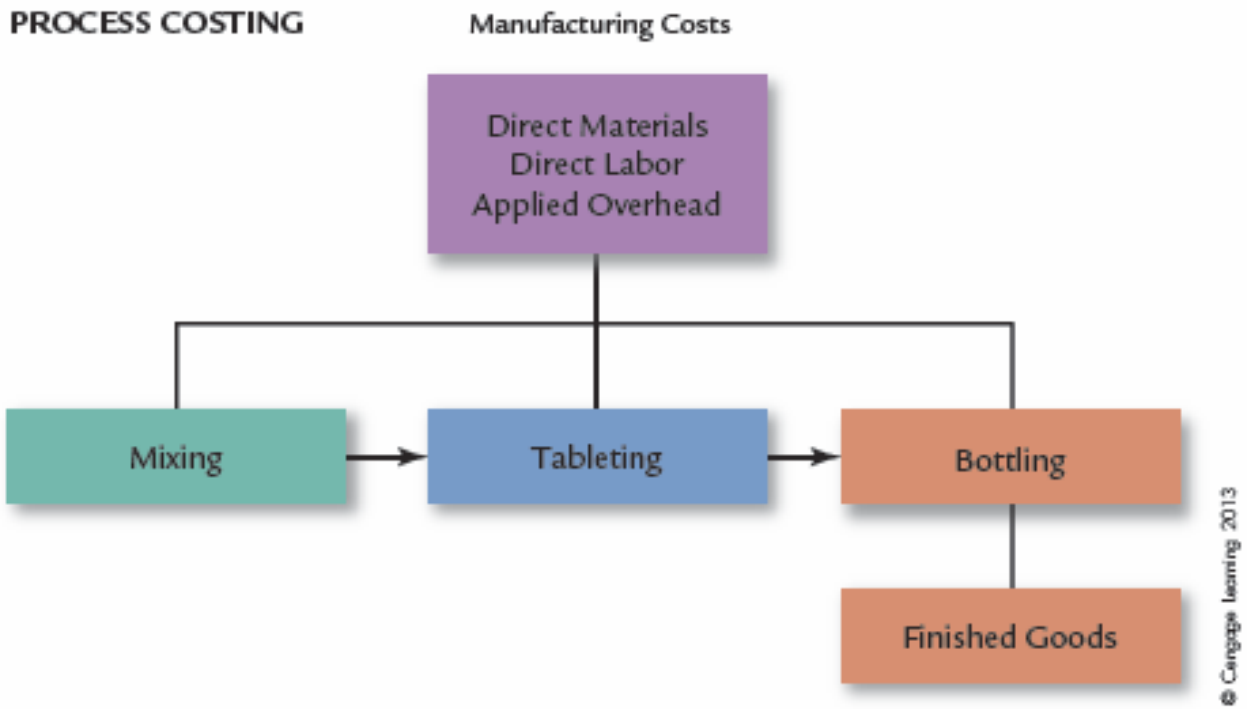


Objective 1

Basic Operational and Cost Concepts

EXHIBIT 6.2

Comparison of Cost Accumulation Methods

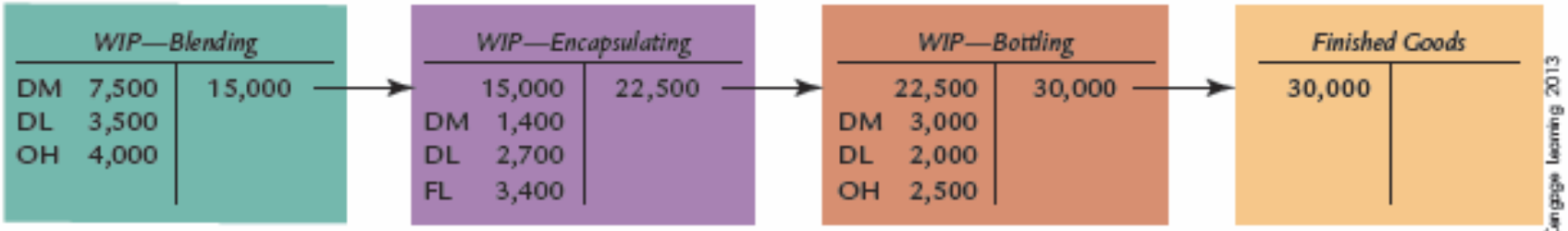


Objective 1

Basic Operational and Cost Concepts

EXHIBIT 6.3

Process Cost Flows Illustrated Using T-Accounts: No Ending WIP



Note: DM = direct materials; DL = direct labor; OH = overhead

A cost transferred from a prior process to a subsequent process is a transferred-in cost

- These are a type of direct material

Objective 1

Basic Operational and Cost Concepts

- The production report is the document that summarizes the manufacturing activity that takes place in a process department for a given period of time

Unit Information	Cost Information
1. Units to account for	1. Costs to account for
2. Units accounted for	2. Costs accounted for

Objective 1

Basic Operational and Cost Concepts

EXHIBIT 6.4

Basic Features of a Process-Costing System

1. Homogeneous units pass through a series of similar processes.
2. Each unit in each process receives a similar dose of manufacturing costs.
3. Manufacturing costs are accumulated by a process for a given period of time.
4. There is a work-in-process account for each process.
5. Manufacturing cost flows and the associated journal entries are generally similar to job-order costing.
6. The departmental production report is the key document for tracking manufacturing activity and costs.
7. Unit costs are computed by dividing the departmental costs of the period by the output of the period.

Objective 1

Process Costing with No Beginning or Ending Work-In-Process Inventories:

Services that are homogeneous and repetitively produced can use the process-costing approach.

Examples: check processing in a bank, changing oil, dental cleaning, surgical procedures

JIT manufacturing firms minimize inventories and strive to reduce work-in-process inventories to insignificant levels.

It emphasizes continuous improvement, the elimination of waste, and supply product/parts when it is needed and in the quantity needed.

Objective 2

Process Costing with Ending Work-In-Process Inventories

Equivalent units of output:

the complete units that could have been produced given the total amount of productive effort expended for the period under consideration

Objective 3

Process Costing With Ending Work-in-Process Inventories

PSA Production Dept Report for January

Unit Information	
Units to account for:	
Units in beginning work in process	0
Units started	24,000
Total units to account for	24,000
	Physical Flow
Units accounted for:	
Units completed	20,000
Units in ending work in process (25% complete)	4,000
Units accounted for	24,000
Work completed	

Process Costing With Ending Work-in-Process Inventories

PSA Production Dept Report for January

Unit Information		
Units to account for:		
Units in beginning work in process	0	
Units started	24,000	
Total units to account for	24,000	
	Physical Flow	*Equivalent Units*
Units accounted for:		
Units completed	20,000	20,000
Units in ending work in process (25% complete)	4,000	1,000
Units accounted for	24,000	
Work completed		21,000

Process Costing With Ending Work-in-Process Inventories

PSA Production Dept Report for January

Cost Information	
Costs to account for:	
Beginning work in process	$ 0
Incurred during the period	168,000
Total costs to account for	$168,000
Divided by equivalent units	÷ 21,000
Cost per equivalent unit	$ 8
Costs accounted for:	
Goods transferred out ($8 × 20,000)	$160,000
Ending work in process ($8 × 1,000)	8,000
Total costs accounted for	$168,000

Process Costing with No Work-In-Process Inventories

Cost of Production Report

1) Analysis of the flow of physical units
2) Calculation of equivalent units
3) Computation of unit costs
4) Valuation of inventories (goods transferred out and ending work in process)
5) Cost reconciliation

Objective 3

Process Costing With Ending Work-in-Process Inventories

Non-uniform application of productive inputs

Units	Direct Materials	Conversion Costs
Units completed	20,000	20,000
Units, ending work in process		
4,000 × 100%	4,000	
4,000 × 25%		1,000
Equivalent units of output	24,000	21,000

	Costs	Direct Materials		Conversion Costs	Total
	Total cost	$ 126,000		$ 42,000	$ 168,000
÷	Equivalent units	24,000	÷	21,000	
	Unit Cost	$ 5.25		$ 2.00	$ 7.25

FIFO Costing Method

Under the FIFO costing method, the equivalent units and manufacturing costs in beginning work in process are excluded from the current period unit cost calculation. Thus, FIFO recognizes that the work and costs carried over from the prior period legitimately belong to that period.

Objective 4

FIFO Costing Method

Mixing Dept Production & Cost Data: October

Production:	
Units in process, October 1, 70% complete*	10,000
Units completed and transferred out	60,000
Units in process, October 31, 40% complete*	20,000
Costs:	
Work in process, October 1:	
Direct materials	$ 1,000
Conversion costs	350
Total work in process	$ 1,350
Current costs:	
Direct materials	$12,600
Conversion costs	3,050
Total current costs	$15,650

Units Started = Units Completed + EWIP - BWIP

Physical Flows

Balance Flows

Input = Output + Net Accumulation

Units Started = Units Completed + EWIP – BWIP

= 60,000 + 20,000 – 10,000

= 70,000

FIFO Costing Method

Step 1: Physical Flow Analysis (trace flow of units)

Mixing Dept Physical Flow Schedule: October

Units to account for:		
Units, beginning work in process		10,000
Units started during October		70,000
Total units to account for		80,000
Units accounted for:		
Units completed and transferred out:		
Started and completed	50,000	
From beginning work in process	10,000	60,000
Units in ending work in process (40% complete)		20,000
Total units accounted for		80,000

Units to Account For = Units Accounted For

Started + BWIP = Completed + EWIP

Started & Completed = Completed – BWIP = 60,000 – 10,000

Started = Started & Completed + EWIP

FIFO Costing Method

Step 2: Calculation of Equivalent Units

	Direct Materials	Conversion Costs
Units started and completed	50,000	50,000
Add: Units in beginning work in process		
× Percentage to complete:		
10,000 × 0% direct materials	—	
10,000 × 30% conversion costs		3,000
Add: Units in ending work in process		
× Percentage complete:		
20,000 × 100% direct materials	20,000	—
20,000 × 40% conversion costs	—	8,000
Equivalent units of output	70,000	61,000

FIFO Costing Method

Step 3: Computation of Unit Cost

Unit direct materials cost = $12,600 ÷ 70,000
= $0.18

Unit conversion cost = $3,050 ÷ 61,000
= $0.05

Unit cost = Unit direct materials + Unit conversion cost
= $0.18 + $0.05
= $0.23 per ounce

FIFO Costing Method

Step 4: Valuation of Inventories

Cost of ending work in process:		
Direct materials ($0.18 x 20,000)	$ 3,600	
Conversion costs ($0.05 × 8,000)	400	$ 4,000
Cost of goods completed:		
Units started and completed ($0.23 × 50,000)		$ 11,500
Units, beginning work in process:		
Prior-period costs	$ 1,350	
Costs to finish ($0.05 × 3,000)	150	$ 1,500
Total		$ 13,000

FIFO Costing Method

Step 5: Cost Reconciliation

Costs to account for:		
Beginning work in process		$1,350
Incurred during the period:		
Direct materials	$12,600	
Conversion costs	3,050	15,650
Total costs to account for		$17,000
Costs accounted for:		
Goods transferred out		
Units, beginning work in process		$1,500
Units started and completed		11,500
Goods in ending work in process		4,000
Total costs accounted for		$17,000

FIFO Costing Method

Mixing Department
Production Report for October
(FIFO Method)

Unit Information

Units to account for:		Units accounted for:	
Units, beginning work in process	10,000	Units completed	60,000
Units started	70,000	Units, ending work in process	20,000
Total units to account for	80,000	Total units accounted for	80,000

	Equivalent Units	
	Direct Materials	*Conversion Costs*
Units started and completed	50,000	50,000
Units, beginning work in process	—	3,000
Units, ending work in process	20,000	8,000
Equivalent units of output	70,000	61,000

FIFO Costing Method

Mixing Department
Production Report for October
(FIFO Method)
Cost Information

	Direct Materials	*Conversion Costs*	*Total*
Costs to account for:			
Beginning work in process	$ 1,000	$ 350	$ 1,350
Incurred during the period	12,600	3,050	15,650
Total costs to account for	$ 13,600	$ 3,400	$17,000
Cost per equivalent unit:			
Current costs	$ 12,600	$ 3,050	
Divided by equivalent units	÷ 70,000	÷61,000	
Cost per equivalent unit	$ 0.18	$ 0.05	$ 0.23
Costs accounted for:			
Units transferred out:			
Units, beginning work in process:			
From prior period		$ 1,350	
From current period ($0.05 × 3,000)		150	
Units started and completed ($0.23 × 50,000)		11,500	$13,000
Ending work in process:			
Direct materials (20,000 × $0.18)		$ 3,600	
Conversion costs (8,000 × $0.05)		400	4,000
Total costs accounted for			$17,000

FIFO Costing Method

EXHIBIT 6.5

Production Report: Blending Department

Bienestar Company, Wichita Plant
Blending Department
Production Report for May
(FIFO Method)

UNIT INFORMATION

Units to account for:		Units accounted for:	
Units, beginning work in process	15,000	Units completed	90,000
Units started	105,000	Units, ending work in process	30,000
Total units to account for	120,000	Total units accounted for	120,000

	Equivalent Units	
	Direct Materials	Conversion Costs
Units started and completed	75,000	75,000
Units, beginning work in process	—	4,500
Units, ending work in process	30,000	12,000
Equivalent units of output	105,000	91,500

(continued)

Objective 4

Weighted Average Costing Method

The weighted average costing method picks up beginning inventory costs and the accompanying equivalent output and treats them as if they belong to the current period. Prior period output and manufacturing costs found in beginning work in process are merged with the current period output and manufacturing costs.

Objective 5

Weighted Average Costing Method

Step 1: Physical Flow Analysis (same as FIFO)

Mixing Dept Physical Flow Schedule: October

Units to account for:		
Units, beginning work in process		10,000
Units started during October		70,000
Total units to account for		80,000
Units accounted for:		
Units completed and transferred out:		
Started and completed	50,000	
From beginning work in process	10,000	60,000
Units, ending work in process (40% complete)		20,000
Total units accounted for		80,000

Weighted Average Costing Method

Step 2: Calculation of Equivalent Units

	Direct Materials	Conversion Costs
Units completed	60,000	60,000
Add: Units in ending work in process		
× Percentage complete:		
20,000 × 100%	20,000	—
20,000 × 40%	—	8,000
Equivalent units of output	80,000	68,000

FIFO 70,000 61,000

Weighted Average Costing Method

Step 3: Computation of Unit Cost

FIFO

Unit direct materials cost = ($1,000 + $12,600) ÷ 80,000

= $0.17

$0.18

Unit conversion cost = ($350 + $3,050) ÷ 68,000

= $0.05

$ 0.05

Unit cost = Unit direct materials + Unit conversion cost

= $0.17 + $0.05

= $0.22 per completed unit

$ 0.23

Weighted Average Costing Method

Step 4: Valuation of Inventories

Cost of goods transferred out =
$0.22 × 60,000

= $13,200

Direct materials: $0.17 × 20,000	$3,400	**Ending WIP**
Conversion costs: $0.05 × 8,000	400	
Total cost	$3,800	

Weighted Average Costing Method

Step 5: Cost Reconciliation

Costs to account for:	
Beginning work in process	$ 1,350
Incurred during the period	15,650
Total costs to account for	$ 17,000
Costs accounted for:	
Goods transferred out	$ 13,200
Ending work in process	3,800
Total costs accounted for	$ 17,000

Weighted Average Costing Method

Mixing Department
Production Report for October
(Weighted Average Method)

Unit Information

Units to account for:		Units accounted for:	
Units, beginning work in process	10,000	Units completed	60,000
Units started	70,000	Units, ending work in process	20,000
Total units to account for	80,000	Total units accounted for	80,000

	Equivalent Units	
	Direct Materials	*Conversion Costs*
Units completed	60,000	60,000
Units, ending work in process	20,000	8,000
Equivalent units of output	80,000	68,000

FIFO only accounted for 70k and 61k

Weighted Average Costing Method

Mixing Department
Production Report for October
(Weighted Average Method)
Cost Information

Costs to account for:

	Direct Materials	*Conversion Costs*	*Total*
Beginning work in process	$ 1,000	$ 350	$ 1,350
Incurred during the period	12,600	3,050	15,650
Total costs to account for	$ 13,600	$ 3,400	$17,000
Divided by equivalent units	÷ 80,000	÷68,000	
Cost per equivalent unit	$ 0.17	$ 0.05	$ 0.22

Costs accounted for:		
Units transferred out (60,000 × $0.22)		$13,200
Ending work in process:		
Direct materials (20,000 × $0.17)	$ 3,400	
Conversion costs (8,000 × $0.05)	400	3,800
Total costs accounted for		$17,000

Weighted Average Costing Method

FIFO compared with Weighted Average

	FIFO		Weighted Average	
	Direct Materials	*Conversion Costs*	*Direct Materials*	*Conversion Costs*
Costs	$12,600	$3,050	$13,600	$3,400
Output (units)	70,000	61,000	80,000	68,000
Unit cost	$0.18	$0.05	$0.17	$0.05

- **The two methods use different total costs and different measures of output.**
- **Weighted average merges cost in beginning WIP with current period and is less accurate but simpler to apply.**
- **FIFO separates period costs and is more accurate.**

Weighted Average Costing Method

- FIFO and Weighted Average differ on two key dimensions:
  - How output is computed
  - What costs are used for calculating the period's unit cost

Objective 5

Treatment of Transferred-In Goods

- Transferred in costs:
  - The cost of this material is the cost of the goods transferred out computed in the prior department
  - The units started in the subsequent department correspond to the units transferred out from the prior department, assuming that there is a one-to-one relationship between the output measures of both departments
  - The units of the transferring department may be measured differently than the units of the receiving department

Objective 6

Treatment of Transferred-In Goods

Step 1: Physical Flow Analysis

Units to account for:		
Units, beginning work in process		16,000
Units transferred in during October		264,000
Total units to account for		280,000
Units accounted for:		
Units completed and transferred out:		
Started and completed	234,000	
From beginning work in process	16,000	250,000
Units, ending work in process		30,000
Total units accounted for		280,000

*60,000 × 4.4 (converts transferred-in units from ounces to tablets)

Treatment of Transferred-In Goods

Step 2: Calculation of Equivalent Units-Wt Avg Method

	Transferred-In Materials	Direct Materials Added	Conversion Costs
Units completed	250,000	250,000	250,000
Add: Units in ending work in process × Percentage complete:			
30,000 × 100%	30,000	—	—
30,000 × 100%	—	30,000	—
30,000 × 30%	—	—	9,000
Equivalent units of output	280,000	280,000	259,000

Treatment of Transferred-In Goods

Step 3: Computation of Unit Cost

Unit transferred-in cost = ($800 + $13,200) ÷ 280,000
= $0.05

Unit direct material cost = ($300 + $2,500) ÷ 280,000
= $0.01

Unit conversion costs = ($180 + $5,000) ÷ 259,000
= $0.02

Unit cost = $0.05 + $0.01 + $0.02
= $0.08

Treatment of Transferred-In Goods

Step 4: Valuation of Inventories

Cost of goods transferred out =
$0.08 × 250,000

= $20,000

Transferred-in materials:	$0.05 × 30,000	$1,500
Direct materials:	$0.01 × 30,000	300
Conversion costs:	$0.02 × 9,000	180
Total cost		$1,980

Ending WIP

Treatment of Transferred-In Goods

Tableting Department
Production Report for October
(Weighted Average Method)

Unit Information

Units to account for:		Units accounted for:	
Units, beginning work in process	16,000	Units completed	250,000
Units started	264,000	Units, ending work in process	30,000
Total units to account for	280,000	Total units accounted for	280,000

	Equivalent Units		
	Transferred-In Materials	*Direct Materials*	*Conversion Costs*
Units completed	250,000	250,000	250,000
Units, ending work in process	30,000	30,000	9,000
Total Equivalent units	280,000	280,000	259,000

Treatment of Transferred-In Goods

Tableting Department
Production Report for October
(Weighted Average Method)
Cost Information

Costs to account for:

	Transferred-In Materials	*Direct Materials*	*Conversion Costs*	*Total*
Beginning work in process	$ 800	$ 300	$ 180	$ 1,280
Incurred during the period	13,200	2,500	5,000	20,700
Total costs to account for	$ 14,000	$ 2,800	$ 5,180	$21,980
Divided by equivalent units	÷280,000	÷280,000	÷259,000	
Cost per equivalent unit	$ 0.05	$ 0.01	$ 0.02	$ 0.08

Costs accounted for:		
Units transferred out (250,000 × $0.08)		$20,000
Ending work in process:		
Transferred in materials ($0.05 × 30,000)	$1,500	
Direct materials (30,000 × $0.01)	300	
Conversion costs (9,000 × $0.02)	180	1,980
Total costs accounted for		$21,980

Treatment of Transferred-In Goods

EXHIBIT 6.7

Production and Cost Data: Encapsulating Department

Bienestar Company, Wichita Plant
Encapsulating Department
Production and Cost Data for May

Production:	
Units in process, May 1, 80% complete[a]	24,000 (capsules)
Units completed and transferred out	375,000
Units in process, May 31, 30% complete[a]	45,000
Costs:	
Work in process, May 1:	
Transferred-in costs	$ 1,200
Direct materials (gelatin capsules)	450
Conversion costs	270
Total work in process	$ 1,920
Current costs:	
Transferred-in costs	$ 19,800
Direct materials (gelatin capsules)[b]	3,750
Conversion costs	7,500
Total current costs	$ 31,050

[a] With respect to conversion costs. Direct materials are 100 percent complete because they are added at the beginning of the process.
[b] The cost of capsule coating materials is insignificant and therefore added to the conversion costs category.

Units Transferred In = Units Completed & Transferred Out + EWIP - BWIP

Objective 6

Operation Costing

- Operation costing: a blend of job-order and process-costing procedures applied to batches of homogeneous products.
  - Uses job-order procedures to assign direct materials costs to batches
  - Uses process procedures to assign conversion costs

- Applied to homogeneous product manufacturing
  - Clothes
  - Textiles
  - Shoes
  - Food

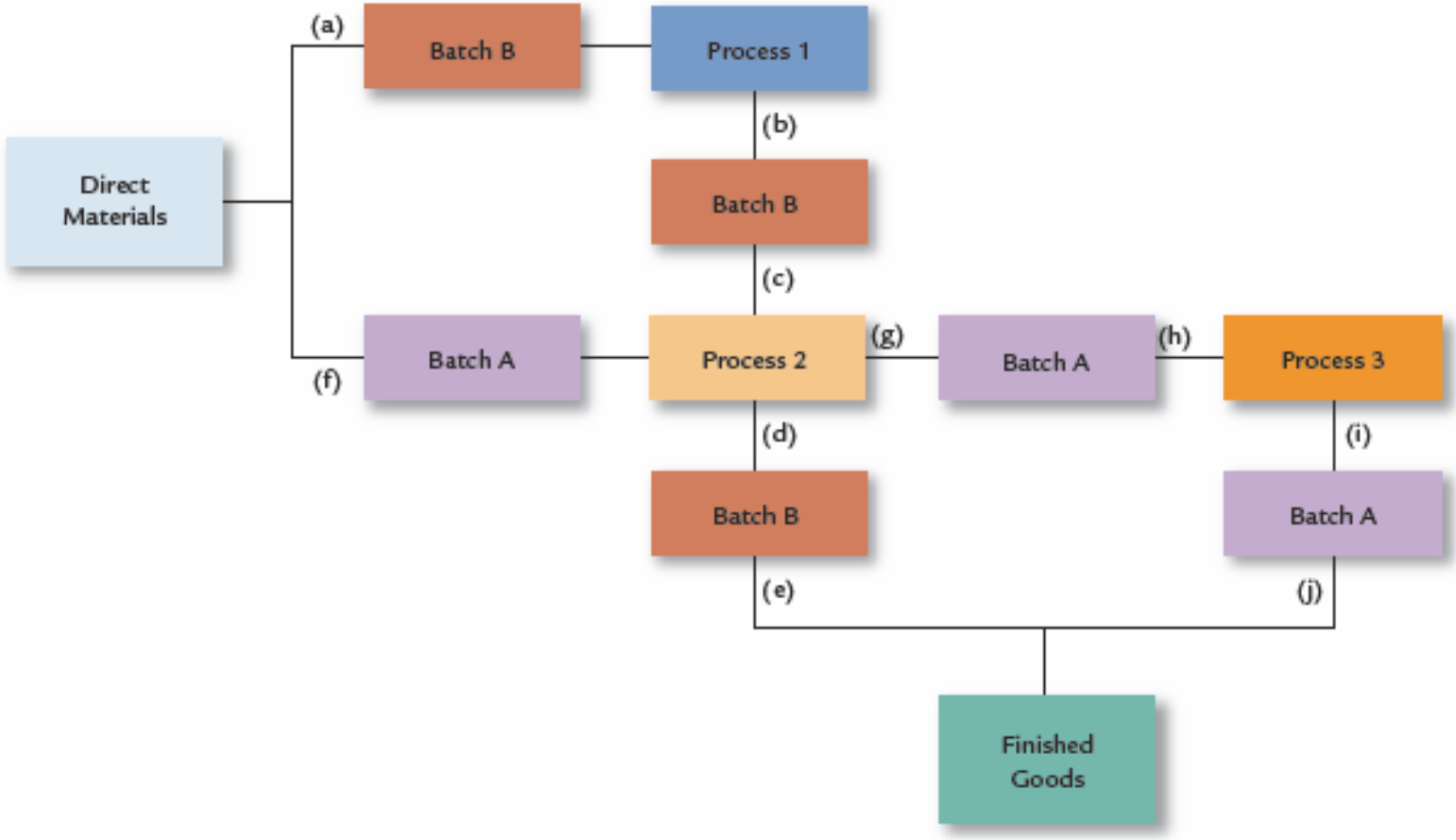
Objective 7

Operation Costing

EXHIBIT 6.10

Basic Features of Operation Costing

Panel A: Physical Flows



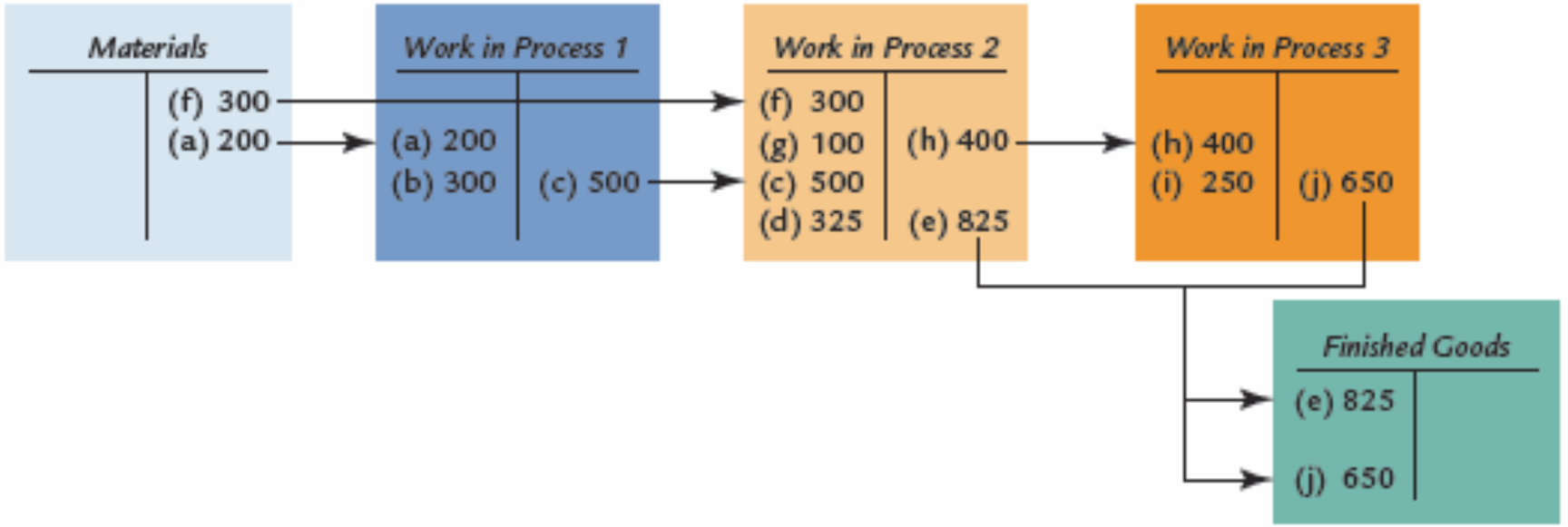
Objective 7

Operation Costing

EXHIBIT 6.10

Basic Features of Operation Costing

Panel B: Cost Flows (shown by letter in Panel A and in dollars below)



Objective 7

End of Chapter 6