

# Chapter 21

## Process Costing

### STUDY OBJECTIVES

After studying this chapter, you should be able to:

- 1 Understand who uses process cost systems.
- 2 Explain the similarities and differences between job order cost and process cost systems.
- 3 Explain the flow of costs in a process cost system.
- 4 Make the journal entries to assign manufacturing costs in a process cost system.
- 5 Compute equivalent units.
- 6 Explain the four steps necessary to prepare a production cost report.
- 7 Prepare a production cost report.
- 8 Explain just-in-time (JIT) processing.
- 9 Explain activity-based costing (ABC).



### The Navigator

Scan <b>Study Objectives</b>	■
Read <b>Feature Story</b>	■
Read <b>Preview</b>	■
Read text and answer <b>DO IT!</b> p. 935 ■ p. 938 ■ p. 944 ■ p. 949 ■	■
Work <b>Comprehensive DO IT!</b> p. 949	■
Review <b>Summary of Study Objectives</b>	■
Answer <b>Self-Study Questions</b>	■
Complete <b>Assignments</b>	■

### Feature Story

#### BEN & JERRY'S TRACKS ITS MIX-UPS

**Ben & Jerry's Homemade, Inc.** ([www.benjerry.com](http://www.benjerry.com)) is one of the "hottest" and "coolest" U.S. companies. Based in Waterbury, Vermont, the ice cream company that started out of a garage in 1978 is now a public company.

Making ice cream is a process—a movement of product from a mixing department to a prepping department to a pint department. The mixing department is where the ice cream is created. In the prep area the production process adds extras such as cherries and walnuts to make plain ice cream into "Cherry Garcia," Ben & Jerry's most popular flavor, or fudge-covered waffle cone pieces and a swirl of caramel for "Stephen Colbert's

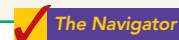


Americone Dream," one of B & J's newest flavors. The pint department is where the ice cream is actually put into containers. As the product is processed from one department to the next, the appropriate materials, labor, and overhead are added to it.

"The incoming ingredients from the shipping and receiving departments are stored in certain locations, either in a freezer or dry warehouse," says Beecher Eurich, staff accountant. "As ingredients get added, so do the costs associated with them." How much ice cream is produced? Running plants around the clock, the company produces 18 million gallons a year.

With the company's process costing system, Eurich can tell you how much a certain batch of ice cream costs to make—its materials, labor, and overhead in each of the production departments. She generates reports for the production department heads, but makes sure not to overdo it. "You can get bogged down in numbers," says Eurich. "If you're generating a report that no one can use, then that's a waste of time."

It's more likely, though, Ben & Jerry's production people want to know how efficient they are. Why? Many own stock in the company.



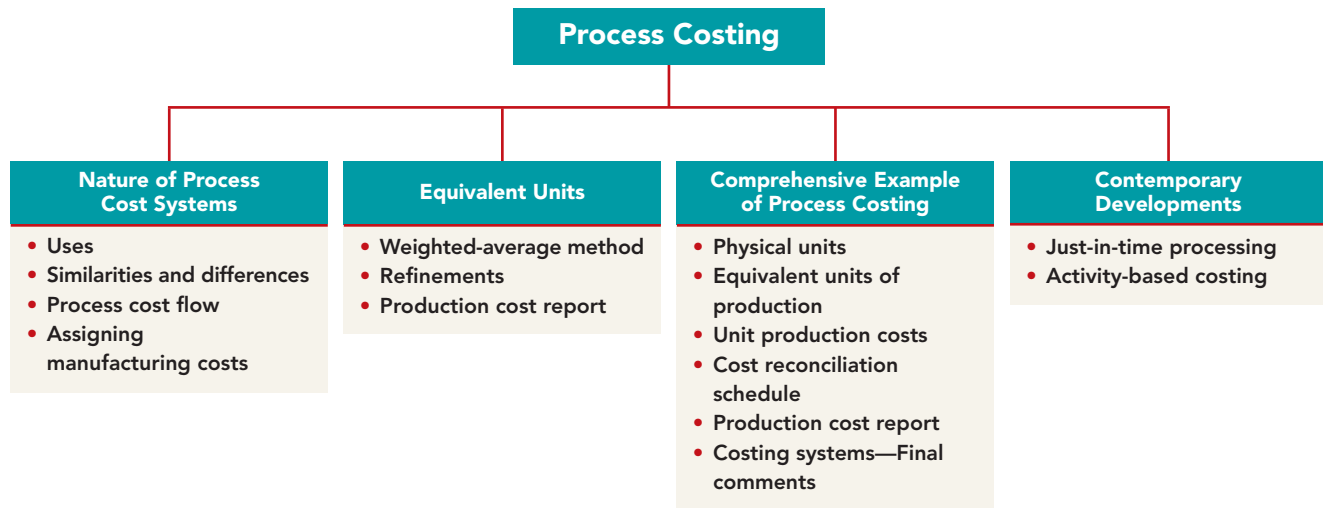
### *Inside Chapter 21...*

- **Choosing a Cost Driver** (p. 935)
- **Keeping Score for the Xbox** (p. 940)

## Preview of Chapter 21

The cost accounting system used by companies such as **Ben & Jerry's** is **process cost accounting**. In contrast to job order cost accounting, which focuses on the individual job, process cost accounting focuses on the *processes* involved in mass-producing products that are identical or very similar in nature. The primary objective of the chapter is to explain and illustrate process costing.

The content and organization of this chapter are as follows.



## THE NATURE OF PROCESS COST SYSTEMS

### STUDY OBJECTIVE 1

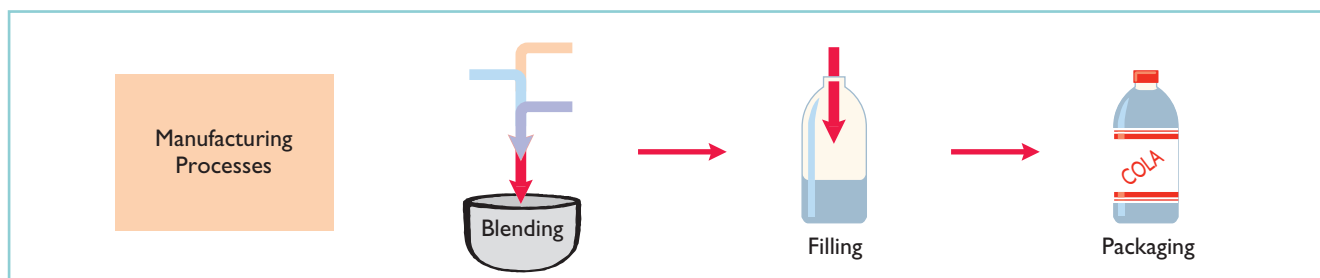
Understand who uses process cost systems.

### Uses of Process Cost Systems

Companies use **process cost systems** to apply costs to similar products that are mass-produced in a continuous fashion. **Ben & Jerry's** uses a process cost system: Production of the ice cream, once it begins, continues until the ice cream emerges, and the processing is the same for the entire run—with precisely the same amount of materials, labor, and overhead. Each finished pint of ice cream is indistinguishable from another.

A company such as **USX** uses process costing in the manufacturing of steel. **Kellogg** and **General Mills** use process costing for cereal production; **ExxonMobil** uses process costing for its oil refining; **Sherwin Williams** uses process costing for its paint products. At a bottling company like **Coca-Cola**, the manufacturing process begins with the blending of ingredients. Next, automated machinery moves the bottles into position and fills them. The production process then caps, packages, and forwards the bottles to the finished goods warehouse. Illustration 21-1 shows this process.

**Illustration 21-1**  
Manufacturing processes











For Coca-Cola, as well as the other companies just mentioned, once the production begins, it continues until the finished product emerges, and each unit of finished product is like every other unit.

In comparison, in a job order cost system companies assign costs to a *specific job*. Examples are the construction of a customized home, the making of a motion picture, or the manufacturing of a specialized machine. Illustration 21-2 provides examples of companies that primarily use either a process cost system or a job order cost system.

**Illustration 21-2**

Process cost and job order cost companies and products

Process Cost System Company	Product	Job Order Cost System Company	Product
Coca-Cola, PepsiCo	Soft drinks 	Young & Rubicam, Omnicom	Advertising 
ExxonMobil, Royal Dutch Shell	Oil 	Walt Disney, Warner Brothers	Motion pictures 
Intel, Advanced Micro Devices	Computer chips 	Center Ice Consultants, Ice Rink Events	Ice rinks 
Dow Chemical, DuPont	Chemicals 	Kaiser Permanente, Mayo Clinic	Patient health care 

Frequently, when we think of service companies, we think of specific, non-routine tasks, such as rebuilding an automobile engine, providing consulting services on a business acquisition, or working on a major lawsuit. However, many service companies specialize in performing repetitive, routine aspects of a particular business. For example, auto-care vendors such as **Jiffy Lube** focus on the routine aspects of car care. **H&R Block** focuses on the routine aspects of basic tax practice, and many large law firms focus on routine legal services, such as uncomplicated divorces. Service companies that provide specific, nonroutine services will probably benefit from using a job order cost system. Those that perform routine, repetitive services will probably be better off with a process cost system.

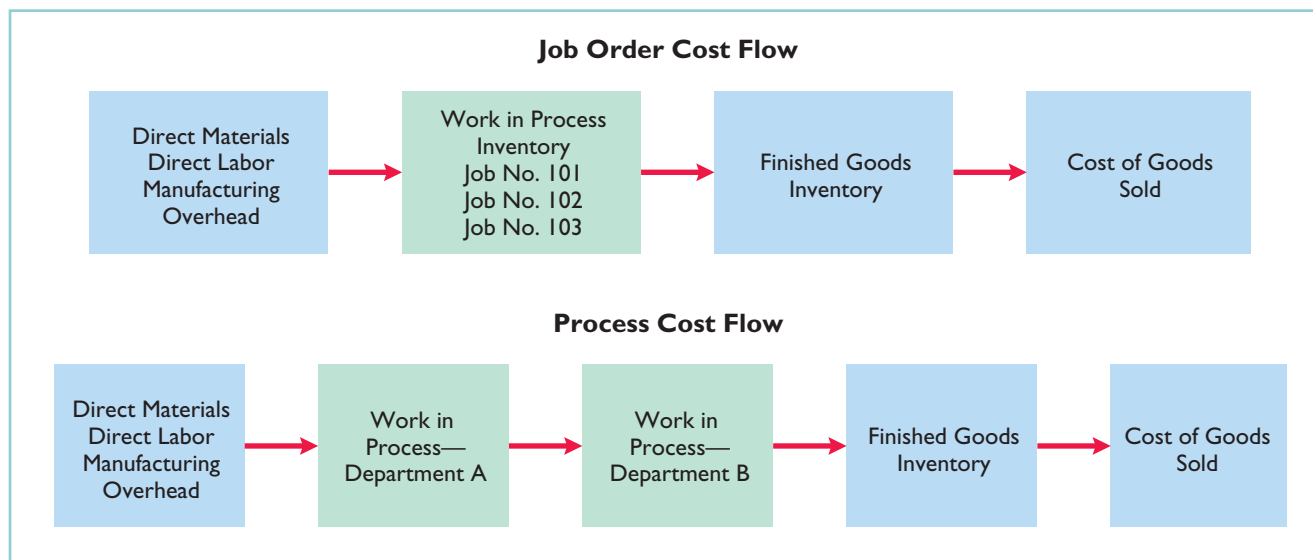
## Similarities and Differences Between Job Order Cost and Process Cost Systems

In a job order cost system, companies assign costs to each job. In a process cost system, companies track costs through a series of connected manufacturing processes or departments, rather than by individual jobs. Thus, companies use process cost systems when they produce a large volume of uniform or relatively homogeneous products. Illustration 21-3 shows the basic flow of costs in these two systems.

Illustration 21-3 (next page) highlights the basic similarities and differences between these two systems.

### STUDY OBJECTIVE 2

Explain the similarities and differences between job order cost and process cost systems.



**Illustration 21-3**  
Job order cost and process  
cost flow

### SIMILARITIES

Job order cost and process cost systems are similar in three ways:

- 1. The manufacturing cost elements.** Both costing systems track three manufacturing cost elements—direct materials, direct labor, and manufacturing overhead.
- 2. The accumulation of the costs of materials, labor, and overhead.** Both costing systems debit raw materials to Raw Materials Inventory; factory labor to Factory Labor; and manufacturing overhead costs to Manufacturing Overhead.
- 3. The flow of costs.** As noted above, both systems accumulate all manufacturing costs by debits to Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. Both systems then assign these costs to the same accounts—Work in Process, Finished Goods Inventory, and Cost of Goods Sold. **The methods of assigning costs, however, differ significantly.** These differences are explained and illustrated later in the chapter.

### DIFFERENCES

The differences between a job order cost and a process cost system are as follows.

- 1. The number of work in process accounts used.** A job order cost system uses only one Work in Process account. A process cost system uses multiple work in process accounts.
- 2. Documents used to track costs.** A job order cost system charges costs to individual jobs and summarizes them in a job cost sheet. A process cost system summarizes costs in a production cost report for each department.
- 3. The point at which costs are totaled.** A job order cost system totals costs when the job is completed. A process cost system totals costs at the end of a period of time.
- 4. Unit cost computations.** In a job order cost system, the unit cost is the total cost per job divided by the units produced. In a process cost system, the unit cost is total manufacturing costs for the period divided by the units produced during the period.

Illustration 21-4 summarizes the major differences between a job order cost and a process cost system.

Features	Job Order Cost System	Process Cost System
<b>Work in process accounts</b>	• One work in process account	• Multiple work in process accounts
<b>Documents used</b>	• Job cost sheets	• Production cost reports
<b>Determination of total manufacturing costs</b>	• Each job	• Each period
<b>Unit-cost computations</b>	• Cost of each job Units produced for the job	• Total manufacturing costs Units produced during the period

**Illustration 21-4**

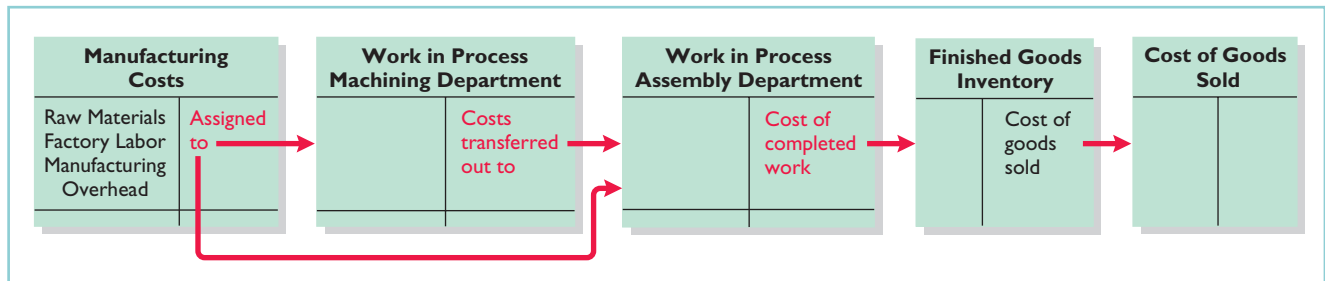
Job order versus process cost systems

## Process Cost Flow

Illustration 21-5 shows the flow of costs in the process cost system for Tyler Company. Tyler Company manufactures automatic can openers that it sells to retail outlets. Manufacturing consists of two processes: machining and assembly. The Machining Department shapes, hones, and drills the raw materials. The Assembly Department assembles and packages the parts.

### STUDY OBJECTIVE 3

Explain the flow of costs in a process cost system.



**Illustration 21-5**

Flow of costs in process cost system

As the flow of costs indicates, the company can add materials, labor, and manufacturing overhead in both the Machining and Assembly departments. When it finishes its work, the Machining Department transfers the partially completed units to the Assembly Department. The Assembly Department finishes the goods and then transfers them to the finished goods inventory. Upon sale, Tyler removes the goods from the finished goods inventory. Within each department, a similar set of activities is performed on each unit processed.

## Assigning Manufacturing Costs—Journal Entries

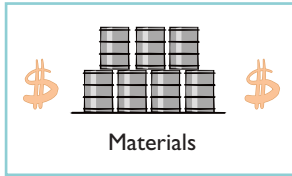
As indicated, the accumulation of the costs of materials, labor, and manufacturing overhead is the same in a process cost system as in a job order cost system. That is, both systems follow these procedures:

### STUDY OBJECTIVE 4

Make the journal entries to assign manufacturing costs in a process cost system.

- Companies debit all raw materials to Raw Materials Inventory at the time of purchase.
- They debit all factory labor to Factory Labor as the labor costs are incurred.
- They debit overhead costs to Manufacturing Overhead as these costs are incurred.

However, the assignment of the three manufacturing cost elements to Work in Process in a process cost system is different from a job order cost system. Here we'll look at how companies assign these manufacturing cost elements in a process cost system.



### MATERIALS COSTS

All raw materials issued for production are a materials cost to the producing department. A process cost system may use materials requisition slips, but **it generally requires fewer requisitions than in a job order cost system, because the materials are used for processes rather than for specific jobs** and therefore typically are for larger quantities.

At the beginning of the first process, a company usually adds most of the materials needed for production. However, other materials may be added at various points. For example, in the manufacture of **Hershey** candy bars, the chocolate and other ingredients are added at the beginning of the first process, and the wrappers and cartons are added at the end of the packaging process. Tyler Company adds materials at the beginning of each process. Tyler makes the following entry to record the materials used:

Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Raw Materials Inventory		XXXX
(To record materials used)		

Ice cream maker **Ben & Jerry's** adds materials in three departments: milk and flavoring in the mixing department; extras such as cherries and walnuts in the prepping department; and cardboard containers in the pinting (packaging) department.

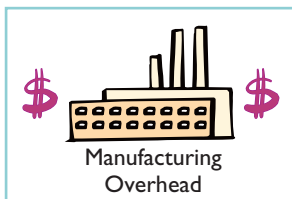


### FACTORY LABOR COSTS

In a process cost system, as in a job order cost system, companies may use time tickets to determine the cost of labor assignable to production departments. Since they assign labor costs to a process rather than a job, they can obtain from the payroll register or departmental payroll summaries the labor cost chargeable to a process.

Labor costs for the Machining Department will include the wages of employees who shape, hone, and drill the raw materials. The entry to assign these costs for Tyler Company is:

Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Factory Labor		XXXX
(To assign factory labor to production)		



### MANUFACTURING OVERHEAD COSTS

The objective in assigning overhead in a process cost system is to allocate the overhead costs to the production departments on an objective and equitable basis. That basis is the activity that “drives” or causes the costs. A primary driver of overhead costs in continuous manufacturing operations is **machine time used**, not direct labor. Thus, companies **widely use machine hours** in allocating manufacturing overhead costs. Tyler’s entry to allocate overhead to the two processes is:

Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Manufacturing Overhead		XXXX
(To assign overhead to production)		



## MANAGEMENT INSIGHT



### Choosing a Cost Driver

In one of its automated cost centers, Caterpillar feeds work into the cost center, where robotic machines process it and transfer the finished job to the next cost center without human intervention. One person tends all of the machines and spends more time maintaining machines than operating them. In such cases, overhead rates based on direct labor hours may be misleading. Surprisingly, some companies continue to assign manufacturing overhead on the basis of direct labor despite the fact that there is no cause-and-effect relationship between labor and overhead.



What is the result if a company uses the wrong “cost driver” to assign manufacturing overhead?

### TRANSFER TO NEXT DEPARTMENT

At the end of the month, Tyler needs an entry to record the cost of the goods transferred out of the department. In this case, the transfer is to the Assembly Department, and Tyler makes the following entry.

Work in Process—Assembly	XXXXX	
Work in Process—Machining		XXXXX
(To record transfer of units to the Assembly Department)		

### TRANSFER TO FINISHED GOODS

When the Assembly Department completes the units, it transfers them to the finished goods warehouse. The entry for this transfer is as follows.

Finished Goods Inventory	XXXXX	
Work in Process—Assembly		XXXXX
(To record transfer of units to finished goods)		

### TRANSFER TO COST OF GOODS SOLD

When Tyler sells the finished goods, it records the cost of goods sold as follows.

Cost of Goods Sold	XXXXX	
Finished Goods Inventory		XXXXX
(To record cost of units sold)		

## DO IT!

Ruth Company manufactures ZEBO through two processes: blending and bottling. In June, raw materials used were Blending \$18,000 and Bottling \$4,000. Factory labor costs were Blending \$12,000 and Bottling \$5,000. Manufacturing overhead costs were Blending \$6,000 and Bottling \$2,500. The company transfers units completed at a cost of \$19,000 in the Blending Department to the Bottling Department. The Bottling Department transfers units completed at a cost of \$11,000 to Finished Goods. Journalize the assignment of these costs to the two processes and the transfer of units as appropriate.

### MANUFACTURING COSTS IN PROCESS COSTING



**action plan**

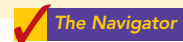
- ✓ In process cost accounting, keep separate work in process accounts for each process.
- ✓ When the costs are assigned to production, debit the separate work in process accounts.
- ✓ Transfer cost of completed units to the next process or to Finished Goods.

**Solution**

The entries are:

Work in Process—Blending	18,000		
Work in Process—Bottling	4,000		
Raw Materials Inventory			22,000
(To record materials used)			
Work in Process—Blending	12,000		
Work in Process—Bottling	5,000		
Factory Labor			17,000
(To assign factory labor to production)			
Work in Process—Blending	6,000		
Work in Process—Bottling	2,500		
Manufacturing Overhead			8,500
(To assign overhead to production)			
Work in Process—Bottling	19,000		
Work in Process—Blending			19,000
(To record transfer of units to the Bottling Department)			
Finished Goods Inventory	11,000		
Work in Process—Bottling			11,000
(To record transfer of units to finished goods)			

Related exercise material: BE21-1, BE21-2, BE21-3, E21-2, E21-4, and **DO IT!** 21-1.



**EQUIVALENT UNITS**

**STUDY OBJECTIVE 5**  
Compute equivalent units.

Suppose you have a work-study job in the office of your college’s president, and she asks you to compute the cost of instruction per full-time equivalent student at your college. The college’s vice president for finance provides the following information.

**Illustration 21-6**  
Information for full-time student example

Costs:		
Total cost of instruction	\$9,000,000	
Student population:		
Full-time students	900	
Part-time students	1,000	

Part-time students take 60% of the classes of a full-time student during the year. To compute the number of full-time equivalent students per year, you would make the following computation.

**Illustration 21-7**  
Full-time equivalent unit computation

<b>Full-time Students</b>	+	<b>Equivalent Units of Part-time Students</b>	=	<b>Full-time Equivalent Students</b>
900	+	(60% × 1,000)	=	<b>1,500</b>

The cost of instruction per full-time equivalent student is therefore the total cost of instruction (\$9,000,000) divided by the number of full-time equivalent students (1,500), which is \$6,000 (\$9,000,000 ÷ 1,500).

A process cost system uses the same idea, called equivalent units of production. **Equivalent units of production** measure the work done during the period, expressed in fully completed units. Companies use this measure to determine the cost per unit of completed product.

## Weighted-Average Method

The formula to compute equivalent units of production is as follows.

Units Completed and Transferred Out	+	Equivalent Units of Ending Work in Process	=	Equivalent Units of Production
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**Illustration 21-8**  
Equivalent units of  
production formula

To better understand this concept of equivalent units, consider the following two separate examples.

**Example 1:** In a specific period the entire output of Sullivan Company’s Blending Department consists of ending work in process of 4,000 units which are 60% complete as to materials, labor, and overhead. The equivalent units of production for the Blending Department are therefore 2,400 units ( $4,000 \times 60\%$ ).

**Example 2:** The output of Kori Company’s Packaging Department during the period consists of 10,000 units completed and transferred out, and 5,000 units in ending work in process which are 70% completed. The equivalent units of production are therefore 13,500 [ $10,000 + (5,000 \times 70\%)$ ].

This method of computing equivalent units is referred to as the **weighted-average method**. It considers the degree of completion (weighting) of the units completed and transferred out and the ending work in process. *Use the weighted-average method to compute equivalent units in the homework.*

## Refinements on the Weighted-Average Method

**Kellogg Company** has produced Eggo<sup>®</sup> Waffles since 1970. Three departments produce these waffles: Mixing, Baking, and Freezing/Packaging. The Mixing Department combines dry ingredients, including flour, salt, and baking powder, with liquid ingredients, including eggs and vegetable oil, to make waffle batter. Illustration 21-9 provides information related to the Mixing Department at the end of June.

MIXING DEPARTMENT			
	Physical Units	Percentage Complete	
		Materials	Conversion Costs
Work in process, June 1	100,000	100%	70%
Started into production	<u>800,000</u>		
Total units	<u>900,000</u>		
Units transferred out	700,000		
Work in process, June 30	<u>200,000</u>	100%	60%
Total units	<u>900,000</u>		

**Illustration 21-9**  
Information for Mixing  
Department

Illustration 21-9 indicates that the beginning work in process is 100% complete as to materials cost and 70% complete as to conversion costs. **Conversion costs are the sum of labor costs and overhead costs.** In other words, Kellogg adds both the dry

938 Chapter 21 Process Costing

and liquid ingredients (materials) at the beginning of the waffle-making process. The conversion costs (labor and overhead) related to the mixing of these ingredients are incurred uniformly and are 70% complete. The ending work in process is 100% complete as to materials cost and 60% complete as to conversion costs.

We then use the Mixing Department information to determine equivalent units. **In computing equivalent units, the beginning work in process is not part of the equivalent-units-of-production formula.** The units transferred out to the Baking Department are fully complete as to both materials and conversion costs. The ending work in process is fully complete as to materials, but only 60% complete as to conversion costs. We therefore need to make **two equivalent unit computations**: one for materials, and the other for conversion costs. Illustration 21-10 shows these computations.

**Illustration 21-10**  
Computation of equivalent units—Mixing Department

MIXING DEPARTMENT		
	Equivalent Units	
	Materials	Conversion Costs
Units transferred out	700,000	700,000
Work in process, June 30		
$200,000 \times 100\%$	200,000	
$200,000 \times 60\%$		120,000
Total equivalent units	900,000	820,000

We can refine the earlier formula used to compute equivalent units of production (Illustration 21-8) (page 937) to show the computations for materials and for conversion costs, as follows.

**Illustration 21-11**  
Refined equivalent units of production formula

<b>Units Completed and Transferred Out—Materials</b>	<b>+</b>	<b>Equivalent Units of Ending Work in Process—Materials</b>	<b>=</b>	<b>Equivalent Units of Production—Materials</b>
<b>Units Completed and Transferred Out—Conversion Costs</b>	<b>+</b>	<b>Equivalent Units of Ending Work in Process—Conversion Costs</b>	<b>=</b>	<b>Equivalent Units of Production—Conversion Costs</b>

**DO IT!**

**EQUIVALENT UNITS**

The fabricating department has the following production and cost data for the current month.

Beginning Work in Process	Units Transferred Out	Ending Work in Process
—0—	15,000	10,000

Materials are entered at the beginning of the process. The ending work in process units are 30% complete as to conversion costs. Compute the equivalent units of production for (a) materials and (b) conversion costs.

**Solution**

- (a) Since materials are entered at the beginning of the process, the equivalent units of ending work in process are 10,000. Thus, 15,000 units + 10,000 units = 25,000 equivalent units of production for materials.
- (b) Since ending work in process is only 30% complete as to conversion costs, the equivalent units of ending work in process are 3,000 ( $30\% \times 10,000$  units). Thus, 15,000 units + 3,000 units = 18,000 equivalent units of production for conversion costs.

Related exercise material: BE21-5, BE21-10, E21-5, E21-6, E21-7, E21-8, E21-9, E21-10, E21-11, E21-13, and **DO IT!** 21-2.

**action plan**

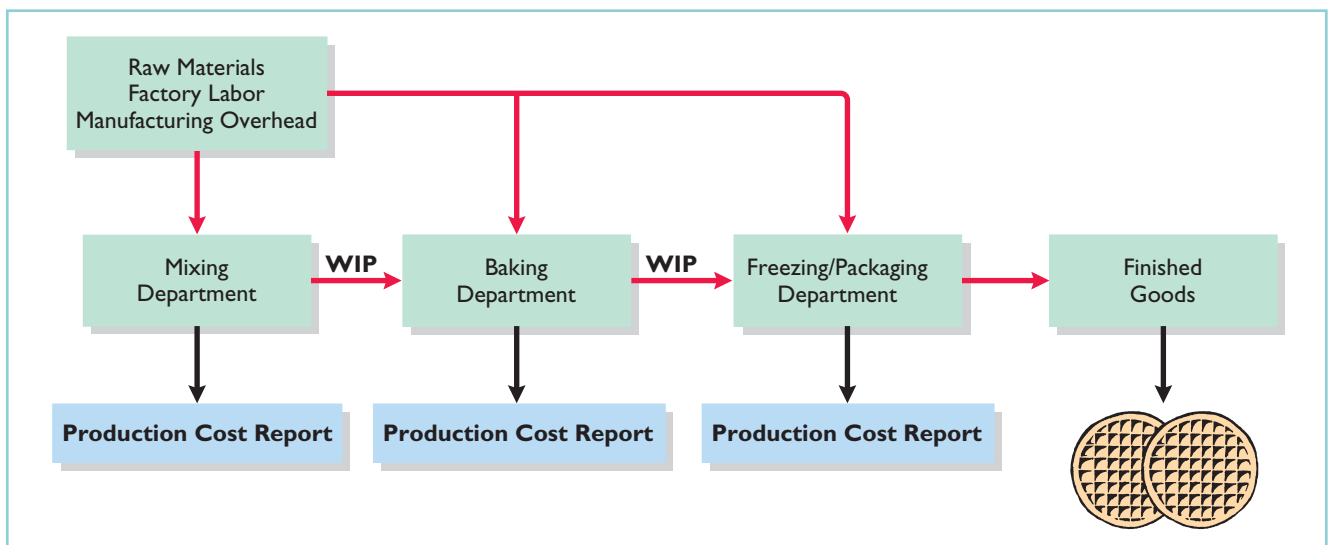
- ✓ To measure the work done during the period, expressed in fully completed units, compute equivalent units of production.
- ✓ Use the appropriate formula: Units completed and transferred out + Equivalent units of ending work in process = Equivalent units of production.



## Production Cost Report

As mentioned earlier, companies prepare a production cost report for each department. A **production cost report** is the key document that management uses to understand the activities in a department; it shows the production quantity and cost data related to that department. For example, in producing Eggo<sup>®</sup> Waffles, Kellogg Company uses three production cost reports: Mixing, Baking, and Freezing/Packaging. Illustration 21-12 shows the flow of costs to make an Eggo<sup>®</sup> Waffle and the related production cost reports for each department.

**Illustration 21-12**  
Flow of costs in making Eggo<sup>®</sup> Waffles



In order to complete a production cost report, the company must perform four steps, which as a whole, make up the process costing system.

1. Compute the physical unit flow.
2. Compute the equivalent units of production.
3. Compute unit production costs.
4. Prepare a cost reconciliation schedule.

### STUDY OBJECTIVE 6

Explain the four steps necessary to prepare a production cost report.

The next section explores these steps in an extended example.

## MANAGEMENT INSIGHT

**Keeping Score for the Xbox**

When you are as big and as profitable as **Microsoft**, you get to a point where continued rapid growth is very difficult. For example, many believe it is unlikely that Microsoft will see much growth in software sales. As a result, the company is looking for new markets, such as the video game market with its Xbox player.

Profitability in the video-game hardware market has been elusive. Microsoft has struggled to control the costs of both manufacturing and distribution. One analyst predicted that Microsoft's "snowballing" costs in the next period could exceed budget by \$2.4 billion. Microsoft's Chief Financial Officer blamed the high costs on unexpectedly high volumes, saying, "We pushed market volumes very high in the Xbox business. As a result of that we incurred some costs in the supply chain." Given these issues and, despite its incredible success as a software company, some observers question whether Microsoft will be able to make the changes that are required to become a successful hardware manufacturer.

**Source:** Rober A. Guth, "Microsoft Net Rises 16%, but Costs Damp Results," *Wall Street Journal Online*, April 28, 2006.



In what ways has cost accounting probably become more critical for Microsoft in recent years?

## COMPREHENSIVE EXAMPLE OF PROCESS COSTING

Illustration 21-13 shows assumed data for the Mixing Department at **Kellogg Company** for the month of June. We will use this information to complete a production cost report for the Mixing Department.

**Illustration 21-13**  
Unit and cost data—Mixing  
Department

## MIXING DEPARTMENT

**Units**

Work in process, June 1	100,000
Direct materials: 100% complete	
Conversion costs: 70% complete	
Units started into production during June	800,000
Units completed and transferred out to Baking Department	700,000
Work in process, June 30	200,000
Direct materials: 100% complete	
Conversion costs: 60% complete	

**Costs**

Work in process, June 1	
Direct materials: 100% complete	\$ 50,000
Conversion costs: 70% complete	35,000
Cost of work in process, June 1	<u>\$ 85,000</u>
Costs incurred during production in June	
Direct materials	\$400,000
Conversion costs	170,000
Costs incurred in June	<u><u>\$570,000</u></u>

## Compute the Physical Unit Flow (Step 1)

**Physical units** are the actual units to be accounted for during a period, irrespective of any work performed. To keep track of these units, add the units started (or transferred) into production during the period to the units in process at the beginning of the period. This amount is referred to as the **total units to be accounted for**.

The total units then are accounted for by the output of the period. The output consists of units transferred out during the period and any units in process at the end of the period. This amount is referred to as the **total units accounted for**. Illustration 21-14 shows the flow of physical units for Kellogg's Mixing Department for the month of June.

MIXING DEPARTMENT	
	<u>Physical Units</u>
Units to be accounted for	
Work in process, June 1	100,000
Started (transferred) into production	<u>800,000</u>
Total units	<u><b>900,000</b></u>
Units accounted for	
Completed and transferred out	700,000
Work in process, June 30	<u>200,000</u>
Total units	<u><b>900,000</b></u>

**Illustration 21-14**  
Physical unit flow—Mixing Department

The records indicate that the Mixing Department must account for 900,000 units. Of this sum, 700,000 units were transferred to the Baking Department and 200,000 units were still in process.

## Compute Equivalent Units of Production (Step 2)

Once the physical flow of the units is established, Kellogg must measure the Mixing Department's productivity in terms of equivalent units of production. The Mixing Department adds materials at the beginning of the process, and incurs conversion costs uniformly during the process. Thus, we need two computations of equivalent units: one for materials and one for conversion costs. The equivalent unit computation is as follows.

	<u>Equivalent Units</u>	
	<u>Materials</u>	<u>Conversion Costs</u>
Units transferred out	700,000	700,000
Work in process, June 30		
200,000 × 100%	200,000	
200,000 × 60%		<u>120,000</u>
Total equivalent units	<u><b>900,000</b></u>	<u><b>820,000</b></u>

**HELPFUL HINT**

Materials are not always added at the beginning of the process. For example, materials are sometimes added uniformly during the process.

**Illustration 21-15**  
Computation of equivalent units—Mixing Department

**HELPFUL HINT**

Remember that we ignore the beginning work in process in this computation.

### Compute Unit Production Costs (Step 3)

Armed with the knowledge of the equivalent units of production, we can now compute the unit production costs. **Unit production costs** are costs expressed in terms of equivalent units of production. When equivalent units of production are different for materials and conversion costs, we compute three unit costs: (1) materials, (2) conversion, and (3) total manufacturing.

The computation of total materials cost related to Eggo<sup>®</sup> Waffles is as follows.

**Illustration 21-16**  
Total materials cost computation

Work in process, June 1	
Direct materials cost	\$ 50,000
Costs added to production during June	
Direct materials cost	<u>400,000</u>
Total materials cost	<u><b>\$450,000</b></u>

The computation of unit materials cost is as follows.

**Illustration 21-17**  
Unit materials cost computation

<b>Total Materials Cost</b>	÷	<b>Equivalent Units of Materials</b>	=	<b>Unit Materials Cost</b>
\$450,000	÷	900,000	=	<b>\$0.50</b>

Illustration 21-18 shows the computation of total conversion costs.

**Illustration 21-18**  
Total conversion costs computation

Work in process, June 1	
Conversion costs	\$ 35,000
Costs added to production during June	
Conversion costs	<u>170,000</u>
Total conversion costs	<u><b>\$205,000</b></u>

The computation of unit conversion cost is as follows.

**Illustration 21-19**  
Unit conversion cost computation

<b>Total Conversion Costs</b>	÷	<b>Equivalent Units of Conversion Costs</b>	=	<b>Unit Conversion Cost</b>
\$205,000	÷	820,000	=	<b>\$0.25</b>

Total manufacturing cost per unit is therefore computed as shown in Illustration 21-20 on the next page.



Unit Materials Cost	+	Unit Conversion Cost	=	Total Manufacturing Cost per Unit
\$0.50	+	\$0.25	=	\$0.75

**Illustration 21-20**  
Total manufacturing cost per unit

## Prepare a Cost Reconciliation Schedule (Step 4)

We are now ready to determine the cost of goods transferred out of the Mixing Department to the Baking Department and the costs in ending work in process. Kellogg charged total costs of \$655,000 to the Mixing Department in June, calculated as follows.

Costs to be accounted for	
Work in process, June 1	\$ 85,000
Started into production	570,000
Total costs	<u>\$655,000</u>

**Illustration 21-21**  
Costs charged to Mixing Department

The company then prepares a cost reconciliation schedule to assign these costs to (a) units transferred out to the Baking Department and (b) ending work in process.

MIXING DEPARTMENT		
Cost Reconciliation Schedule		
Costs accounted for		
Transferred out (700,000 × \$0.75)		\$ 525,000
Work in process, June 30		
Materials (200,000 × \$0.50)	\$100,000	
Conversion costs (120,000 × \$0.25)	<u>30,000</u>	<u>130,000</u>
Total costs		<u>\$655,000</u>

**Illustration 21-22**  
Cost reconciliation schedule—Mixing Department

Kellogg uses the total manufacturing cost per unit, \$0.75, in costing the **units completed** and transferred to the Baking Department. In contrast, the unit cost of materials and the unit cost of conversion are needed in costing **units in process**. The **cost reconciliation schedule** shows that the **total costs accounted for** (Illustration 21-22) equal the **total costs to be accounted for** (see Illustration 21-21).

## Preparing the Production Cost Report

At this point, Kellogg is ready to prepare the production cost report for the Mixing Department. As indicated earlier, this report is an internal document for management that shows production quantity and cost data for a production department.

There are four steps in preparing a production cost report. They are:

- (1) Prepare a physical unit schedule.
- (2) Compute equivalent units.
- (3) Compute unit costs.
- (4) Prepare a cost reconciliation schedule.

**STUDY OBJECTIVE 7**  
Prepare a production cost report.

944 Chapter 21 Process Costing

Illustration 21-23 shows the production cost report for the Mixing Department. The report identifies the four steps.

Illustration 21-23  
Production cost report

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						
8			100,000			
9			800,000			
10			900,000			
11						
12			700,000	700,000	700,000	
13			200,000	200,000	120,000	(200,000 × 60%)
14			900,000	900,000	820,000	
15						
16			(a)	\$450,000	\$205,000	\$655,000
17			(b)	900,000	820,000	
18				\$0.50	\$0.25	\$0.75
19						
20						\$85,000
21						570,000
22						\$655,000
23						
24						
25						\$525,000
26						
27					\$100,000	
28					30,000	130,000
29						\$655,000

Production cost reports provide a basis for evaluating the productivity of a department. In addition, managers can use the cost data to assess whether unit costs and total costs are reasonable. By comparing the quantity and cost data with pre-determined goals, top management can also judge whether current performance is meeting planned objectives.

**Solution**

(a) 0 (work in process, March 1) + 12,800 (started into production) = 12,800 units

(b) Equivalent units of production:

	<u>Materials</u>	<u>Conversion</u>
Units transferred out	12,000	12,000
Work in process, March 31	<u>800</u>	<u>200 (800 × 25%)</u>
Total	12,800	12,200

(c) Cost reconciliation schedule:

Costs accounted for		
Transferred out (12,000 × \$15)		\$180,000
Work in process, March 31		
Materials (800 × \$6)	\$4,800	
Conversion costs (200 × \$9)	<u>1,800</u>	<u>6,600</u>
Total costs		<u>\$186,600</u>

Related exercise material: BE21-4, BE21-5, BE21-6, BE21-7, BE21-8, BE21-9, BE21-10, E21-5, E21-6, E21-8, E21-9, E21-10, E21-11, E21-12, E21-14, and **DO IT!** 21-3.

**action plan**

- ✓ To find units to be accounted for, add the units started into production during the month to the units in process at the beginning of the month.
- ✓ Realize that equivalent units of production for materials will differ from equivalent units of production for conversion costs. The units in ending work in process are 100% complete as to materials but only 25% complete as to conversion costs.
- ✓ Assign the total manufacturing cost of \$15 per unit to the 12,000 units transferred out.
- ✓ Assign the materials cost and conversion costs based on equivalent units of production to units in process.



## Costing Systems—Final Comments

Companies often use a combination of a process cost and a job order cost system. Called **operations costing**, this hybrid system is similar to process costing in its assumption that standardized methods are used to manufacture the product. At the same time, the product may have some customized, individual features that require the use of a job order cost system.

Consider, for example, the automobile manufacturer **Ford Motor Company**. Each vehicle at a given plant goes through the same assembly line, but Ford uses different materials (such as seat coverings, paint, and tinted glass) for different vehicles. Similarly, **Kellogg's** Pop-Tarts Toaster Pastries<sup>®</sup> go through numerous standardized processes—mixing, filling, baking, frosting, and packaging. The pastry dough, though, comes in different flavors—plain, chocolate, and graham—and fillings include Smucker's<sup>®</sup> real fruit, chocolate fudge, vanilla creme, brown sugar cinnamon, and S'mores.

A cost-benefit tradeoff occurs as a company decides which costing system to use. A job order system, for example, provides detailed information related to the cost of the product. Because each job has its own distinguishing characteristics, the system can provide an accurate cost per job. This information is useful in controlling costs and pricing products. However, the cost of implementing a job order cost system is often expensive because of the accounting costs involved.

On the other hand, for a company like **Intel**, which makes computer chips, is there a benefit in knowing whether the cost of the one hundredth chip produced is different from the one thousandth chip produced? Probably not. An average cost of the product will suffice for control and pricing purposes.

In summary, when deciding to use one of these systems, or a combination system, a company must weigh the costs of implementing the system against the benefits from the additional information provided.

## CONTEMPORARY DEVELOPMENTS

As indicated in Chapter 19, two contemporary developments in managerial accounting are just-in-time processing and activity-based costing. We explain these innovations in the following sections.

### Just-In-Time Processing

#### STUDY OBJECTIVE 8

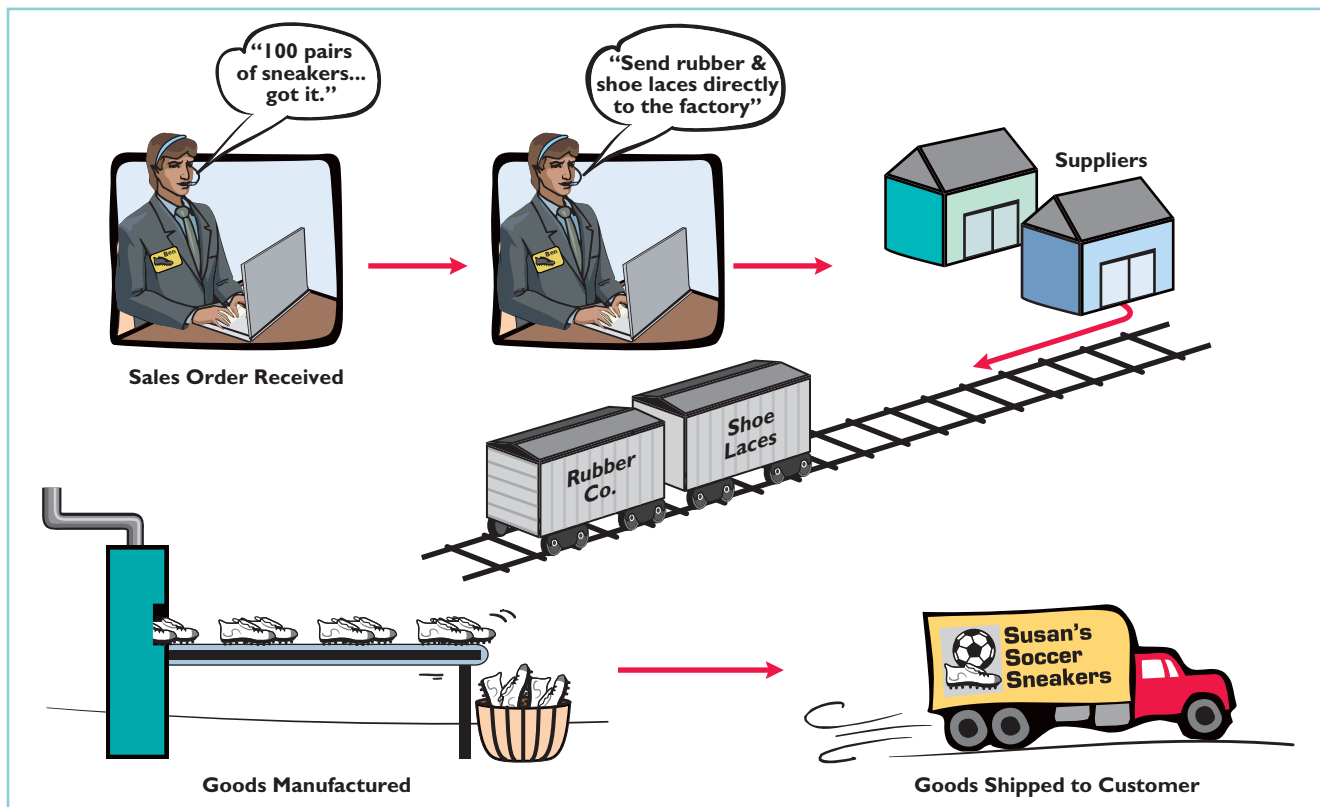
Explain just-in-time (JIT) processing.

Traditionally, continuous process manufacturing has been based on a **just-in-case** philosophy: Companies hold inventories of raw materials *just in case* some items are of poor quality or a key supplier is shut down by a strike. They manufacture and store subassembly parts *just in case* these parts are needed later in the manufacturing process. Companies complete and store finished goods *just in case* they receive unexpected and rush customer orders. This philosophy often results in a **“push approach”**: Raw materials and subassembly parts are pushed through each process. Traditional processing often results in the buildup of extensive manufacturing inventories.

Primarily in response to foreign competition, many U.S. firms have switched to **just-in-time (JIT) processing**. JIT manufacturing is dedicated to having the right amount of materials, parts, or products just as they are needed. JIT first hit the United States in the early 1980s when automobile companies adopted it to compete with foreign automakers. Many companies, including **Dell**, **Caterpillar**, and **Harley-Davidson** now successfully use JIT. Under JIT processing, companies receive raw materials *just in time* for use in production, they complete subassembly parts *just in time* for use in finished goods, and they complete finished goods *just in time* to be sold. Illustration 21-24 shows the sequence of activities in just-in-time processing.

Illustration 21-24

Just-in-time processing



## OBJECTIVE OF JIT PROCESSING

A primary objective of JIT is to eliminate all manufacturing inventories. Inventories have an adverse effect on net income because they tie up funds and storage space that could be put to more productive uses. JIT strives to eliminate inventories by using a “**pull approach**” in manufacturing. This approach begins with the customer placing an order with the company, which starts the process of pulling the product through the manufacturing process. A computer at the final work station sends a signal to the preceding work station. This signal indicates the exact materials (parts and subassemblies) needed to complete the production of a specified product for a specified time period, such as an eight-hour shift. The next preceding process, in turn, sends its signal to other processes back up the line. The goal is a smooth continuous flow in the manufacturing process and no buildup of inventories at any point.

## ELEMENTS OF JIT PROCESSING

There are three important elements in JIT processing:

1. **Dependable suppliers.** Suppliers must be willing to deliver on short notice exact quantities of raw materials according to precise quality specifications (even including multiple deliveries within the same day). Suppliers must also be willing to deliver the raw materials at specified work stations rather than at a central receiving department. This type of purchasing requires constant and direct communication. Such communication is facilitated by an online computer linkage between the company and its suppliers.
2. A **multiskilled workforce.** Under JIT, machines are often strategically grouped around work cells or work stations. Much of the work is automated. As a result, one worker may have the responsibility to operate and maintain several different types of machines.
3. A **total quality control system.** The company must establish total quality control throughout the manufacturing operations. Total quality control means **no defects**. Since the **pull approach** signals only required quantities, any defects at any work station will shut down operations at subsequent work stations. Total quality control requires continuous monitoring by both employees and supervisors at each work station.

## BENEFITS OF JIT PROCESSING

The major benefits of JIT processing are:

1. Significant reduction or elimination of manufacturing inventories.
2. Enhanced product quality.
3. Reduction or elimination of rework costs and inventory storage costs.
4. Production cost savings from the improved flow of goods through the processes.

The effects in many cases have been dramatic. For example, after using JIT for two years, a major division of **Hewlett-Packard** found that work in process inventories (in dollars) were down 82%, scrap/rework costs were down 30%, space utilization improved by 40%, and labor efficiency improved 50%. As indicated, JIT not only reduces inventory but also enables a manufacturer to produce a better product faster and with less waste.

One of the major accounting benefits of JIT is the elimination of raw materials and work in process inventory accounts. In place of these accounts is **one account**, Raw and In-Process Inventory. All materials and conversion costs are charged to this account. The reduction (or elimination) of in-process inventories results in a simplified computation of equivalent units of production.

## Activity-Based Costing

### STUDY OBJECTIVE 9

Explain activity-based costing (ABC).

**Activity-based costing** focuses on the activities performed in producing a product. An ABC system is similar to conventional costing systems in accounting for direct materials and direct labor, but it differs in regard to manufacturing overhead.

A conventional cost system uses a **single unit-level** basis to allocate overhead costs to products. The basis may be direct labor or machine hours used to manufacture the product. The assumption in this approach is that as volume of units produced increases, so does the cost of overhead. However, in recent years the amount of direct labor used in many industries has greatly *decreased*, and total overhead costs resulting from depreciation on expensive equipment and machinery, utilities, repairs, and maintenance have significantly *increased*.

In ABC costing, the cost of a product is equal to the sum of the costs of all activities performed to manufacture it. ABC recognizes that to have accurate and meaningful cost data, **more than one basis** of allocating activity costs to products is needed.

In selecting the allocation basis, ABC seeks to identify the **cost drivers** that measure the activities performed on the product. A **cost driver** may be any factor or activity that has a direct cause–effect relationship with the resources consumed. Examples of activities and possible cost drivers are as follows.

#### Illustration 21-25

Activities and cost drivers in ABC

Activity	Cost Driver
Ordering raw materials	Ordering hours; number of orders
Receiving raw materials	Receiving hours; number of shipments
Materials handling	Number of requisitions; weight of materials; handling hours
Production scheduling	Number of orders
Machine setups	Setup hours; number of setups
Machining (fabricating, assembling, etc.)	Machine hours
Quality control inspections	Number of inspections
Factory supervision	Number of employees

Two important assumptions must be met in order to obtain accurate product costs under ABC:

1. All overhead costs related to the activity must be driven by the cost driver used to assign costs to products.
2. All overhead costs related to the activity should respond proportionally to changes in the activity level of the cost driver.

For example, if there is little or no correlation between changes in the cost driver and consumption of the overhead cost, inaccurate product costs are inevitable. An example of the use of ABC is illustrated in the appendix at the end of this chapter.

Activity-based costing may be used with either a job order or a process cost accounting system. The primary benefit of ABC is more accurate and meaningful product costing. Also, improved cost data about an activity can lead to reduced costs for the activity. In sum, ABC makes managers realize that it is *activities*, and not products, that determine the profitability of a company—a realization that should lead to better management decisions.

**DO IT!**

Indicate whether each of the following statements is true or false.

1. Continuous process manufacturing often results in a reduction of inventory.
2. Companies that use just-in-time processing complete and store finished goods all the time to meet rush orders from customers.
3. A major benefit of just-in-time processing is production cost savings from the improved flow of goods through the processes.
4. An ABC system is similar to traditional costing systems in accounting for manufacturing costs but differs in regard to period costs.
5. The primary benefit of ABC is more accurate and meaningful costs.
6. In recent years, the amount of direct labor used in many industries has greatly increased and total overhead costs have significantly decreased.

JIT AND ABC

**action plan**

- ✓ JIT manufacturing is dedicated to having the right amounts of materials, parts, or products just as they are needed.
- ✓ ABC focuses on the activities performed in producing a product. It recognizes that to have accurate and meaningful cost data, more than one basis of allocating costs to products is needed.

**Solution**

1. False.    2. False.    3. True.    4. False.    5. True.    6. False.

Related exercise material: BE21-11 and **DO IT!** 21-4.



**Comprehensive**

**DO IT!**



Essence Company manufactures a high-end after-shave lotion, called Eternity, in 10-ounce plastic bottles. Because the market for after-shave lotion is highly competitive, the company is very concerned about keeping its costs under control. Eternity is manufactured through three processes: mixing, filling, and corking. Materials are added at the beginning of each of the processes, and labor and overhead are incurred uniformly throughout each process. The company uses a weighted-average method to cost its product. A partially completed production cost report for the month of May for the Mixing Department is shown below.

**ESSENCE COMPANY**

Mixing Department  
Production Cost Report  
For the Month Ended May 31, 2010

QUANTITIES	Physical Units	Equivalent Units	
		Materials	Conversion Costs
Units to be accounted for	Step 1	Step 2	
Work in process, May 1	1,000		
Started into production	2,000		
Total units	3,000		
Units accounted for			
Transferred out	2,200	?	?
Work in process, May 31	800	?	?
Total units	3,000	?	?



950 Chapter 21 Process Costing

<u>COSTS</u>		<u>Materials</u>	<u>Conversion Costs</u>	<u>Total</u>
Unit costs <span style="border: 1px solid black; padding: 2px;">Step 3</span>				
Costs in May	(a)	<u>?</u>	<u>?</u>	<u>?</u>
Equivalent units	(b)	<u>?</u>	<u>?</u>	
Unit costs [(a) ÷ (b)]		<u>?</u>	<u>?</u>	<u>?</u>
Costs to be accounted for				
Work in process, May 1				\$ 56,300
Started into production				<u>119,320</u>
Total costs				<u><u>\$175,620</u></u>

COST RECONCILIATION SCHEDULE Step 4

Costs accounted for				
Transferred out				?
Work in process, May 31				
Materials			?	
Conversion costs			<u>?</u>	<u>?</u>
Total costs				<u>?</u>
Additional information:				
Work in process, May 1, 1000 units				
Materials cost, 1,000 units (100% complete)		\$49,100		
Conversion costs, 1,000 units (70% complete)		<u>7,200</u>		\$56,300
Materials cost for May, 2,000 units				\$100,000
Conversion costs for May				\$19,320
Work in process, May 31, 800 units, 100% complete as to materials and 50% complete as to conversion costs.				

**Instructions**

- (a) Prepare a production cost report for the Mixing Department for the month of May.
- (b) Prepare the journal entry to record the transfer of goods from the Mixing Department to the Filling Department.
- (c) Explain why Essence Company is using a process cost system to account for its costs.

**action plan**

- ✓ Compute the physical unit flow—that is, the total units to be accounted for.
- ✓ Compute the equivalent units of production.
- ✓ Compute the unit production costs, expressed in terms of equivalent units of production.
- ✓ Prepare a cost reconciliation schedule, which shows that the total costs accounted for equal the total costs to be accounted for.

**Solution to Comprehensive** DO IT!

- (a) A completed production cost report for the Mixing Department is shown below. Computations to support the amounts reported follow the report.

**ESSENCE COMPANY**  
 Mixing Department  
 Production Cost Report  
 For the Month Ended May 31, 2010

<u>QUANTITIES</u>	<u>Physical Units</u>	<u>Equivalent Units</u>	
		<u>Materials</u>	<u>Conversion Costs</u>
Units to be accounted for	<span style="border: 1px solid black; padding: 2px;">Step 1</span>	<span style="border: 1px solid black; padding: 2px;">Step 2</span>	
Work in process, May 1	1,000		
Started into production	<u>2,000</u>		
Total units	<u><u>3,000</u></u>		

QUANTITIES	Physical Units	Equivalent Units		
		Materials	Conversion Costs	
Units accounted for				
Transferred out	2,200	2,200	2,200	
Work in process, May 31	800	800	400 (800 × 50%)	
Total units	<u>3,000</u>	<u>3,000</u>	<u>2,600</u>	
<b>COSTS</b>				
Unit costs <span style="border: 1px solid black; padding: 2px;">Step 3</span>		<b>Materials</b>	<b>Conversion Costs</b>	<b>Total</b>
Costs in May	(a)	<u>\$149,100</u>	<u>\$26,520</u>	<u>\$175,620</u>
Equivalent units	(b)	<u>3,000</u>	<u>2,600</u>	
Unit costs [(a) ÷ (b)]		<u>\$49.70</u>	<u>\$10.20</u>	<u>\$59.90</u>
Costs to be accounted for				
Work in process, May 1				\$ 56,300
Started into production				<u>119,320</u>
Total costs				<u>\$175,620</u>
<b>COST RECONCILIATION SCHEDULE <span style="border: 1px solid black; padding: 2px;">Step 4</span></b>				
Costs accounted for				
Transferred out (2,200 × \$59.90)				\$131,780
Work in process, May 31				
Materials (800 × \$49.70)			\$39,760	
Conversion costs (400 × \$10.20)			4,080	43,840
Total costs				<u>\$175,620</u>
Additional computations to support production cost report data:				
Materials cost—\$49,100 + \$100,000				
Conversion costs—\$7,200 + \$19,320 (\$119,320 – \$100,000)				
<b>(b) Work in Process—Filling</b>		131,780		
Work in Process—Mixing			131,780	
<b>(c) Companies use process cost systems to apply costs to similar products that are mass-produced in a continuous fashion. Essence Company uses a process cost system because production of the after-shave lotion, once it begins, continues until the after-shave lotion emerges. The processing is the same for the entire run—with precisely the same amount of materials, labor, and overhead. Each bottle of Eternity after-shave lotion is indistinguishable from another.</b>				



## SUMMARY OF STUDY OBJECTIVES



- 1 Understand who uses process cost systems.** Companies that mass-produce similar products in a continuous fashion use process cost systems. Once production begins, it continues until the finished product emerges. Each unit of finished product is indistinguishable from every other unit.
- 2 Explain the similarities and differences between job order cost and process cost systems.** Job order cost systems are similar to process cost systems in three ways: (1) Both systems track the same cost elements—direct materials, direct labor, and manufacturing overhead.

(2) Both accumulate costs in the same accounts—Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. (3) Both assign accumulated costs to the same accounts—Work in Process, Finished Goods Inventory, and Cost of Goods Sold. However, the method of assigning costs differs significantly.

There are four main differences between the two cost systems: (1) A process cost system uses separate accounts for each department or manufacturing process, rather than only one work in process account used in a job order cost system.

## 952 Chapter 21 Process Costing

(2) A process cost system summarizes costs in a production cost report for each department. A job cost system charges costs to individual jobs and summarizes them in a job cost sheet. (3) Costs are totaled at the end of a time period in a process cost system, but at the completion of a job in a job cost system. (4) A process cost system calculates unit cost as: Total manufacturing costs for the period  $\div$  Units produced during the period. A job cost system calculates unit cost as: Total cost per job  $\div$  Units produced.

- 3 Explain the flow of costs in a process cost system.** A process cost system assigns manufacturing costs for raw materials, labor, and overhead to work in process accounts for various departments or manufacturing processes. It transfers the costs of units completed from one department to another as those units move through the manufacturing process. The system transfers the costs of completed work to Finished Goods Inventory. Finally, when inventory is sold, the system transfers costs to Cost of Goods Sold.
- 4 Make the journal entries to assign manufacturing costs in a process cost system.** Entries to assign the costs of raw materials, labor, and overhead consist of a credit to Raw Materials Inventory, Factory Labor, and Manufacturing Overhead, and a debit to Work in Process for each department. Entries to record the cost of goods transferred to another department are a credit to Work in Process for the department whose work is finished and a debit to the department to which the goods are transferred. The entry to record units completed and transferred to the warehouse is a credit for the department whose work is finished and a debit to Finished Goods Inventory. The entry to record the sale of goods is a credit to Finished Goods Inventory and a debit to Cost of Goods Sold.

- 5 Compute equivalent units.** Equivalent units of production measure work done during a period, expressed in fully completed units. Companies use this measure to determine the cost per unit of completed product. Equivalent units are the sum of units completed and transferred out plus equivalent units of ending work in process.
- 6 Explain the four steps necessary to prepare a production cost report.** The four steps to complete a production cost report are: (1) Compute the physical unit flow—that is, the total units to be accounted for. (2) Compute the equivalent units of production. (3) Compute the unit production costs, expressed in terms of equivalent units of production. (4) Prepare a cost reconciliation schedule, which shows that the total costs accounted for equal the total costs to be accounted for.
- 7 Prepare a production cost report.** The production cost report contains both quantity and cost data for a production department. There are four sections in the report: (1) number of physical units, (2) equivalent units determination, (3) unit costs, and (4) cost reconciliation schedule.
- 8 Explain just-in-time (JIT) processing.** JIT is a manufacturing technique dedicated to producing the right products at the right time as needed. One of the principal accounting effects is that a Raw and In-Process Inventory account replaces both the raw materials and work in process inventory accounts.
- 9 Explain activity-based costing (ABC).** ABC is a method of product costing that focuses on the activities performed to produce products. It assigns the cost of the activities to products by using cost drivers that measure the activities performed. The primary objective of ABC is accurate and meaningful product costs.



## GLOSSARY

**Activity-based costing** A cost accounting system that focuses on the activities performed in manufacturing a specific product. (p. 948).

**Conversion costs** The sum of labor costs and overhead costs. (p. 937).

**Cost driver** Any factor or activity that has a direct cause-effect relationship with the resources consumed. (p. 948).

**Cost reconciliation schedule** A schedule that shows that the total costs accounted for equal the total costs to be accounted for. (p. 943).

**Equivalent units of production** A measure of the work done during the period, expressed in fully completed units. (p. 937).

**Just-in-time processing** A processing system dedicated to producing the right products (or parts) as they are needed. (p. 946).

**Operations costing** A combination of a process cost and a job order cost system, in which products are manufactured primarily by standardized methods, with some customization. (p. 945).

**Physical units** Actual units to be accounted for during a period, irrespective of any work performed. (p. 941).

**Process cost systems** An accounting system used to apply costs to similar products that are mass-produced in a continuous fashion. (p. 930).

**Production cost report** An internal report for management that shows both production quantity and cost data for a production department. (p. 939).

**Total units (costs) accounted for** The sum of the units (costs) transferred out during the period plus the units (costs) in process at the end of the period. (pp. 941, 943).

**Total units (costs) to be accounted for** The sum of the units (costs) started (or transferred) into production during the period plus the units (costs) in process at the beginning of the period. (pp. 941, 943).

**Unit production costs** Costs expressed in terms of equivalent units of production. (p. 942).

**Weighted-average method** Method used to compute equivalent units of production which considers the degree of completion (weighting) of the units completed and transferred out and the ending work in process. (p. 937).



# APPENDIX Example of Traditional Costing versus Activity-Based Costing

## Production and Cost Data

In this appendix we present an example that compares activity-based costing to traditional costing. Assume that Atlas Company produces two products, The Boot and The Club. The Boot is a high-volume item totaling 25,000 units annually. The Club is a low-volume item totaling only 5,000 units per year. Each product requires one hour of direct labor for completion. Therefore, total annual direct labor hours are 30,000 (25,000 + 5,000). Expected annual manufacturing overhead costs are \$900,000. The predetermined overhead rate is \$30 ( $\$900,000 \div 30,000$ ) per direct labor hour.

The direct materials cost per unit is \$40 for The Boot and \$30 for The Club. The direct labor cost is \$12 per unit for each product.

### STUDY OBJECTIVE 10

Apply activity-based costing to specific company data.

## Unit Costs Under Traditional Costing

Illustration 21A-1 shows the unit cost for each product under traditional costing.

Manufacturing Costs	Product	
	The Boot	The Club
Direct materials	\$40	\$30
Direct labor	12	12
Overhead	30*	30*
Total unit cost	<b>\$82</b>	<b>\$72</b>

\*Predetermined overhead rate  $\times$  Direct labor hours ( $\$30 \times 1 \text{ hr} = \$30$ )

Illustration 21A-1  
Units costs—traditional costing

## Unit Costs Under ABC

Let's now calculate unit costs under ABC, in order to compare activity-based costing with a traditional costing system. The first step is to determine overhead rates under ABC.

### DETERMINING OVERHEAD RATES UNDER ABC

Analysis reveals that Atlas Company's expected annual overhead costs of \$900,000 relate to three activities—machine setups, machining, and inspections. Illustration 21A-2 shows the cost driver and overhead rate for each activity.

Activity	Cost Driver	Total Expected Overhead Cost	Total Expected Use of Driver	Activity Based Overhead Rate
Machine setups	Number of setups	\$300,000	1,500	<b>\$200</b> per setup
Machining	Machine hours	500,000	50,000	<b>\$10</b> per machine hour
Inspections	Number of inspections	100,000	2,000	<b>\$50</b> per inspection

Illustration 21A-2  
Computing overhead rates—ABC

### ASSIGNING OVERHEAD COSTS TO PRODUCTS UNDER ABC

In assigning costs, it is necessary to know the expected number of cost drivers for each product. Because of its low volume, The Club requires more setups and inspections than The Boot. The expected number of cost drivers for each product is as follows.

**954 Chapter 21 Process Costing**

**Illustration 21A-3**

Expected number of cost drivers

Cost Driver	Product		Total Usage
	The Boot	The Club	
Number of machine setups	500	1,000	1,500
Machine hours	30,000	20,000	50,000
Number of inspections	500	1,500	2,000

Using these data, Atlas can assign the expected annual overhead cost to each product as follows.

**Illustration 21A-4**

Assignment of overhead costs to products

Activity	The Boot		The Club		Total Cost
	Number	Cost	Number	Cost	
Machine setups (\$200)	500	\$100,000	1,000	\$200,000	\$300,000
Machining (\$10)	30,000	300,000	20,000	200,000	500,000
Inspections (\$50)	500	25,000	1,500	75,000	100,000
Total assigned costs (a)		<u>\$425,000</u>		<u>\$475,000</u>	<u>\$900,000</u>
Units produced (b)		<u>25,000</u>		<u>5,000</u>	
Overhead cost per unit [(a) ÷ (b)]		<u><b>\$17</b></u>		<u><b>\$95</b></u>	

These data show that under ABC, overhead costs are shifted from the high-volume product (The Boot) to the low-volume product (The Club). This shift results in more accurate costing for two reasons:

1. Low-volume products often require more special handling, such as more machine setups and inspections, than high-volume products. This is true for Atlas Company. Thus, the low-volume product frequently is responsible for more overhead costs per unit than a high-volume product.
2. Assigning overhead using ABC will usually increase the cost per unit for low-volume products as compared to a traditional overhead allocation. Therefore, traditional cost drivers such as direct labor hours are usually not appropriate for assigning overhead costs to low-volume products.

**Comparing Unit Costs**

A comparison of unit manufacturing costs under traditional costing and ABC shows the following significant differences.

**Illustration 21A-5**

Comparison of unit product costs

Manufacturing Costs	The Boot		The Club	
	Traditional Costing	ABC	Traditional Costing	ABC
Direct materials	\$40	\$40	\$30	\$30
Direct labor	12	12	12	12
Overhead	30	17	30	95
Total cost per unit	<u><b>\$82</b></u>	<u><b>\$69</b></u>	<u><b>\$72</b></u>	<u><b>\$137</b></u>
	<b>Overstated</b>		<b>Understated</b>	
	<b>\$13</b>		<b>\$65</b>	

The comparison shows that unit costs under traditional costing have been significantly distorted. The cost of The Boot has been overstated \$13 per unit (\$82–\$69). The cost of The Club has been understated \$65 per unit (\$137–\$72). The differences are attributable to how Atlas Company assigns manufacturing overhead. A likely consequence of the differences is that Atlas has been overpricing The Boot and possibly losing market share to competitors. It also has been sacrificing profitability by underpricing The Club.

As illustrated in the above case, ABC involves the following steps.

1. Identify the major activities that pertain to the manufacture of specific products.
2. Accumulate manufacturing overhead costs by activities.
3. Identify the cost driver(s) that accurately measure(s) each activity's contribution to the finished product.
4. Assign manufacturing overhead costs for each activity to products, using the cost driver(s).

## Benefits and Limitations of Activity-Based Costing

We have already seen that a primary benefit of ABC is more accurate product costing. In addition, ABC offers the following other benefits:

1. **Enhanced control over overhead costs.** Under ABC, companies can trace many overhead costs directly to activities—allowing some indirect costs to be identified as direct costs. Thus, managers have become more aware of their responsibility to control the activities that generate the costs.
2. **Better management decisions.** More accurate product costing should contribute to setting selling prices that can help achieve desired product profitability levels. In addition, more accurate cost data could be helpful in deciding whether to make or buy a component, and sometimes even whether to discontinue or expand a product.

The principal disadvantages of ABC generally focus on two factors. First, **the expense of obtaining the cost data** required by the system is relatively high. ABC requires data that are not normally generated within a company. Examples of such data are the number of setups, inspections, orders placed, and orders received. In addition, many computations are involved in assigning overhead costs to individual products.

Second, **ABC does not eliminate arbitrary assignments** of overhead. For example, plant-wide overhead costs such as depreciation, insurance, and property taxes on the factory building should be allocated to the activity centers in determining the cost of a product. With ABC, these allocations may be more difficult to do accurately because of the increased number of activity centers. As a result, accuracy of product costs could be adversely affected.

## SUMMARY OF STUDY OBJECTIVE FOR APPENDIX



### 10. Apply activity-based costing to specific company data.

In applying ABC, it is necessary to compute the overhead rate for each activity by dividing total expected overhead by

the total expected usage of the cost driver. The overhead cost for each activity is then assigned to products on the basis of each product's use of the cost driver.

\*Note: All **asterisked** Questions, Exercises, and Problems relate to material contained in the appendix to the chapter.





## SELF-STUDY QUESTIONS

Answers are at the end of the chapter.

- (SO 1) 1. Which of the following items is *not* characteristic of a process cost system?
- Once production begins, it continues until the finished product emerges.
  - The products produced are heterogeneous in nature.
  - The focus is on continually producing homogeneous products.
  - When the finished product emerges, all units have precisely the same amount of materials, labor, and overhead.
- (SO 2) 2. Indicate which of the following statements is *not* correct.
- Both a job order and a process cost system track the same three manufacturing cost elements—direct materials, direct labor, and manufacturing overhead.
  - A job order cost system uses only one work in process account, whereas a process cost system uses multiple work in process accounts.
  - Manufacturing costs are accumulated the same way in a job order and in a process cost system.
  - Manufacturing costs are assigned the same way in a job order and in a process cost system.
- (SO 3) 3. In a process cost system, costs are assigned only:
- to one work in process account.
  - to work in process and finished goods inventory.
  - to work in process, finished goods, and cost of goods sold.
  - to work in process accounts.
- (SO 4) 4. In making the journal entry to assign raw materials costs, a company:
- debits Finished Goods Inventory.
  - often debits two or more work in process accounts.
  - generally credits two or more work in process accounts.
  - credits Finished Goods Inventory.
- (SO 4) 5. In a process cost system, manufacturing overhead:
- is assigned to finished goods at the end of each accounting period.
  - is assigned to a work in process account for each job as the job is completed.
  - is assigned to a work in process account for each production department on the basis of a predetermined overhead rate.
  - is assigned to a work in process account for each production department as overhead costs are incurred.
- (SO 5) 6. Conversion costs are the sum of:
- fixed and variable overhead costs.
  - labor costs and overhead costs.
  - direct material costs and overhead costs.
  - direct labor and indirect labor costs.
- (SO 5) 7. The Mixing Department's output during the period consists of 20,000 units completed and transferred out, and 5,000 units in ending work in process 60% complete as to materials and conversion costs. Beginning inventory is 1,000 units, 40% complete as to materials and conversion costs. The equivalent units of production are:
- 22,600.
  - 23,000.
  - 24,000.
  - 25,000.
8. In RYZ Company, there are zero units in beginning work in process, 7,000 units started into production, and 500 units in ending work in process 20% completed. The physical units to be accounted for are:
- 7,000.
  - 7,360.
  - 7,600.
  - 7,340.
9. Stock Company has 2,000 units in beginning work in process, 20% complete as to conversion costs, 23,000 units transferred out to finished goods, and 3,000 units in ending work in process 33 $\frac{1}{3}$ % complete as to conversion costs. The beginning and ending inventory is fully complete as to materials costs. Equivalent units for materials and conversion costs are, respectively:
- 22,000, 24,000.
  - 24,000, 26,000.
  - 26,000, 24,000.
  - 26,000, 26,000.
10. Fortner Company has no beginning work in process; 9,000 units are transferred out and 3,000 units in ending work in process are one-third finished as to conversion costs and fully complete as to materials cost. If total materials cost is \$60,000, the unit materials cost is:
- \$5.00.
  - \$5.45 rounded.
  - \$6.00.
  - No correct answer is given.
11. Largo Company has unit costs of \$10 for materials and \$30 for conversion costs. If there are 2,500 units in ending work in process, 40% complete as to conversion costs, and fully complete as to materials cost, the total cost assignable to the ending work in process inventory is:
- \$45,000.
  - \$55,000.
  - \$75,000.
  - \$100,000.
12. A production cost report
- is an external report.
  - shows costs charged to a department and costs accounted for.
  - shows equivalent units of production but not physical units.
  - contains six sections.
13. In a production cost report, units to be accounted for are calculated as:
- Units started into production + Units in ending work in process.
  - Units started into production – Units in beginning work in process.
  - Units transferred out + Units in beginning work in process.
  - Units started into production + Units in beginning work in process.
14. Just-in-time processing (JIT):
- strives to eliminate inventories.
  - uses a pull approach in manufacturing.
  - Neither of the above.
  - Both (a) and (b).



- (SO 8) 15. The sequence of activities in just-in-time processing begins when the manufacturer:
- orders raw materials from a supplier.
  - issues raw materials to work in process inventory.
  - receives a sales order from a customer.
  - calculates its predetermined overhead rates.
- (SO 9) 16. Activity-based costing:
- assumes that the cost of a product is equal to the sum of the costs of all activities performed to manufacture it.
  - has become more widespread as overhead costs have been decreasing relative to materials and labor costs.
  - is similar to a conventional cost accounting system in accounting for direct labor and manufacturing overhead but differs in regard to direct materials.
  - uses a single unit-level basis to allocate overhead costs to products.
17. Activity-based costing (ABC):
- can be used only in a process cost system.
  - focuses on units of production.
  - focuses on activities performed to produce a product.
  - uses only a single basis of allocation.
- \*18. The overhead rate for Machine Setups is \$100 per setup. Products A and B have 80 and 60 setups, respectively. The overhead assigned to each product is:
- Product A \$8,000, Product B \$8,000.
  - Product A \$8,000, Product B \$6,000.
  - Product A \$6,000, Product B \$6,000.
  - Product A \$6,000, Product B \$8,000.

Go to the book's companion website,  
[www.wiley.com/college/weygandt](http://www.wiley.com/college/weygandt),  
 for additional Self-Study Questions.



## QUESTIONS

- Identify which costing system—job order or process cost—the following companies would primarily use: (a) **Quaker Oats**, (b) **Ford Motor Company**, (c) **Kinko's Print Shop**, and (d) **Warner Bros. Motion Pictures**.
- Contrast the primary focus of job order cost accounting and of process cost accounting.
- What are the similarities between a job order and a process cost system?
- Your roommate is confused about the features of process cost accounting. Identify and explain the distinctive features for your roommate.
- Mel Storrer believes there are no significant differences in the flow of costs between job order cost accounting and process cost accounting. Is Storrer correct? Explain.
- (a) What source documents are used in assigning (1) materials and (2) labor to production in a process cost system?  
 (b) What criterion and basis are commonly used in allocating overhead to processes?
- At Ace Company, overhead is assigned to production departments at the rate of \$5 per machine hour. In July, machine hours were 3,000 in the Machining Department and 2,400 in the Assembly Department. Prepare the entry to assign overhead to production.
- Gary Weiss is uncertain about the steps used to prepare a production cost report. State the procedures that are required in the sequence in which they are performed.
- Rich Mordica is confused about computing physical units. Explain to Rich how physical units to be accounted for and physical units accounted for are determined.
- What is meant by the term "equivalent units of production"?
- How are equivalent units of production computed?
- Mason Company had zero units of beginning work in process. During the period, 9,000 units were completed, and there were 600 units of ending work in process. What were the units started into production?
- Mendle Co. had zero units of beginning work in process. During the period 12,000 units were completed, and there were 800 units of ending work in process one-fifth complete as to conversion cost and 100% complete as to materials cost. What were the equivalent units of production for (a) materials and (b) conversion costs?
- Reyes Co. started 3,000 units in the period. Its beginning inventory is 500 units one-fourth complete as to conversion costs and 100% complete as to materials cost. Its ending inventory is 200 units one-fifth complete as to conversion cost and 100% complete as to materials costs. How many units were transferred out this period?
- Kiner Company transfers out 14,000 units and has 2,000 units of ending work in process that are 25% complete. Materials are entered at the beginning of the process and there is no beginning work in process. Assuming unit materials costs of \$3 and unit conversion costs of \$6, what are the costs to be assigned to units (a) transferred out and (b) in ending work in process?
- (a) Eve Adams believes the production cost report is an external report for stockholders. Is Eve correct? Explain.  
 (b) Identify the sections in a production cost report.
- What purposes are served by a production cost report?
- At Frank Company, there are 800 units of ending work in process that are 100% complete as to materials and 40% complete as to conversion costs. If the unit cost of materials is \$4 and the costs assigned to the 800 units is \$6,000, what is the per-unit conversion cost?
- What is the difference between operations costing and a process costing system?
- How does a company decide whether to use a job order or a process cost system?
- (a) Describe the philosophy and approach of just-in-time processing.  
 (b) Identify the major elements of JIT processing.
- (a) What are the principal differences between activity-based costing (ABC) and traditional product costing?  
 (b) What assumptions must be met for ABC costing to be useful?

**958 Chapter 21 Process Costing**

23. Dipak Co. identifies the following activities that pertain to manufacturing overhead: Materials Handling, Machine Setups, Factory Machine Maintenance, Factory Supervision, and Quality Control. For each activity identify an appropriate cost driver.
- \*24. (a) Identify the steps that pertain to activity-based costing.  
 (b) What are the advantages of ABC costing?



**BRIEF EXERCISES**

*Journalize entries for accumulating costs.*

(SO 4)

**BE21-1** Sanchez Manufacturing purchases \$45,000 of raw materials on account, and it incurs \$50,000 of factory labor costs. Journalize the two transactions on March 31 assuming the labor costs are not paid until April.

*Journalize the assignment of materials and labor costs.*

(SO 4)

**BE21-2** Data for Sanchez Manufacturing are given in BE21-1. Supporting records show that (a) the Assembly Department used \$24,000 of raw materials and \$30,000 of the factory labor, and (b) the Finishing Department used the remainder. Journalize the assignment of the costs to the processing departments on March 31.

*Journalize the assignment of overhead costs.*

(SO 4)

**BE21-3** Factory labor data for Sanchez Manufacturing are given in BE21-2. Manufacturing overhead is assigned to departments on the basis of 200% of labor costs. Journalize the assignment of overhead to the Assembly and Finishing Departments.

*Compute physical units of production.*

(SO 6)

**BE21-4** Bowyer Manufacturing Company has the following production data for selected months.

Month	Beginning Work in Process	Units Transferred Out	Ending Work in Process	
			Units	% Complete as to Conversion Cost
January	–0–	30,000	10,000	40%
March	–0–	40,000	8,000	75
July	–0–	40,000	16,000	25

Compute the physical units for each month.

*Compute equivalent units of production.*

(SO 5)

**BE21-5** Using the data in BE21-4, compute equivalent units of production for materials and conversion costs, assuming materials are entered at the beginning of the process.

*Compute unit costs of production.*

(SO 6)

**BE21-6** In Montego Company, total material costs are \$32,000, and total conversion costs are \$54,000. Equivalent units of production are materials 10,000 and conversion costs 12,000. Compute the unit costs for materials, conversion costs, and total manufacturing costs.

*Assign costs to units transferred out and in process.*

(SO 6)

**BE21-7** Hindi Company has the following production data for April: units transferred out 40,000, and ending work in process 5,000 units that are 100% complete for materials and 40% complete for conversion costs. If unit materials cost is \$4 and unit conversion cost is \$9, determine the costs to be assigned to the units transferred out and the units in ending work in process.

*Compute unit costs.*

(SO 6)

**BE21-8** Production costs chargeable to the Finishing Department in June in Castilla Company are materials \$15,000, labor \$29,500, overhead \$18,000. Equivalent units of production are materials 20,000 and conversion costs 19,000. Compute the unit costs for materials and conversion costs.

*Prepare cost reconciliation schedule.*

(SO 6)

**BE21-9** Data for Castilla Company are given in BE21-8. Production records indicate that 18,000 units were transferred out, and 2,000 units in ending work in process were 50% complete as to conversion cost and 100% complete as to materials. Prepare a cost reconciliation schedule.

*Compute equivalent units of production.*

(SO 5)

**BE21-10** The Smelting Department of Massaro Manufacturing Company has the following production and cost data for November.

Production: Beginning work in process 2,000 units that are 100% complete as to materials and 20% complete as to conversion costs; units transferred out 8,000 units; and ending work in process 5,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

Compute the equivalent units of production for (a) materials and (b) conversion costs for the month of November.

**BE21-11** Ernie Els has formulated the following list of statements about contemporary developments in managerial accounting.

1. Just-in-time processing results in a push approach; that is, raw materials are pushed through each process.
2. A primary objective of just-in-time processing is to eliminate all manufacturing inventories.
3. A major disadvantage of just-in-time processing is lower product quality.
4. A primary benefit of activity-based costing is more accurate and meaningful product costing.
5. A major advantage of activity-based costing is that it uses a single unit-level basis, such as direct labor or machine hours, to allocate overhead.

Identify each statement as true or false. If false, indicate how to correct the statement to make it true.

**\*BE21-12** Bristol Company identifies three activities in its manufacturing process: machine setups, machining, and inspections. Estimated annual overhead cost for each activity is \$120,000, \$300,000, and \$70,000, respectively. The cost driver for each activity and the expected annual usage are: number of setups 1,000, machine hours 25,000, and number of inspections 2,000. Compute the overhead rate for each activity.

*Understand contemporary developments.*

(SO 8, 9)

*Compute overhead rates for activities.*

(SO 10)

## DO IT! REVIEW



**DO IT! 21-1** Boaz Company manufactures CH-21 through two processes: Mixing and Packaging. In July, the following costs were incurred.

	<u>Mixing</u>	<u>Packaging</u>
Raw Materials used	\$10,000	\$24,000
Factory Labor costs	8,000	36,000
Manufacturing Overhead costs	12,000	54,000

Units completed at a cost of \$21,000 in the Mixing Department are transferred to the Packaging Department. Units completed at a cost of \$102,000 in the Packaging Department are transferred to Finished Goods. Journalize the assignment of these costs to the two processes and the transfer of units as appropriate.

*Assign and journalize manufacturing costs.*

(SO 4)

**DO IT! 21-2** The assembly department has the following production and cost data for the current month.

<u>Beginning Work in Process</u>	<u>Units Transferred Out</u>	<u>Ending Work in Process</u>
-0-	20,000	16,000

Materials are entered at the beginning of the process. The ending work in process units are 70% complete as to conversion costs. Compute the equivalent units of production for (a) materials and (b) conversion costs.

*Compute equivalent units.*

(SO 5)

**DO IT! 21-3** In March, Lasso Manufacturing had the following unit production costs: materials \$10 and conversion costs \$8. On March 1, it had zero work in process. During March, Lasso transferred out 22,000 units. As of March 31, 2,000 units that were 40% complete as to conversion costs and 100% complete as to materials were in ending work in process.

- (a) Compute the total units to be accounted for.
- (b) Compute the equivalent units of production.
- (c) Prepare a cost reconciliation schedule, including the costs of materials transferred out and the costs of materials in process.

*Prepare cost reconciliation schedule.*

(SO 6, 7)

**DO IT! 21-4** Indicate whether each of the following statements is true or false.

1. Just-in-time processing is also known as just-in-case processing.
2. Companies that use just-in-time processing complete finished goods just in time to be sold.
3. A major benefit of just-in-time processing is enhanced product quality.
4. An ABC system is similar to conventional costing systems in accounting for period costs but differs in regard to manufacturing costs.

*Answer questions about JIT and ABC.*

(SO 8, 9)

**960 Chapter 21 Process Costing**

5. The primary benefit of ABC is significant reduction or elimination of manufacturing inventories.
6. In recent years, the amount of direct labor used in many industries has greatly decreased and total overhead costs have significantly increased.



**EXERCISES**

*Understand process cost accounting.*

(SO 1, 2)

**E21-1** Doc Gibbs has prepared the following list of statements about process cost accounting.

1. Process cost systems are used to apply costs to similar products that are mass-produced in a continuous fashion.
2. A process cost system is used when each finished unit is indistinguishable from another.
3. Companies that produce soft drinks, motion pictures, and computer chips would all use process cost accounting.
4. In a process cost system, costs are tracked by individual jobs.
5. Job order costing and process costing track different manufacturing cost elements.
6. Both job order costing and process costing account for direct materials, direct labor, and manufacturing overhead.
7. Costs flow through the accounts in the same basic way for both job order costing and process costing.
8. In a process cost system, only one work in process account is used.
9. In a process cost system, costs are summarized in a job cost sheet.
10. In a process cost system, the unit cost is total manufacturing costs for the period divided by the units produced during the period.

**Instructions**

Identify each statement as true or false. If false, indicate how to correct the statement.

*Journalize transactions.*

(SO 4)

**E21-2** Fernando Company manufactures pizza sauce through two production departments: Cooking and Canning. In each process, materials and conversion costs are incurred evenly throughout the process. For the month of April, the work in process accounts show the following debits.

	<b>Cooking</b>	<b>Canning</b>
Beginning work in process	\$ -0-	\$ 4,000
Materials	21,000	6,000
Labor	8,500	7,000
Overhead	29,500	25,800
Costs transferred in		53,000

**Instructions**

Journalize the April transactions.

*Answer questions on costs and production.*

(SO 3, 5, 6)

**E21-3** The ledger of Molindo Company has the following work in process account.

<b>Work in Process—Painting</b>			
5/1	Balance	3,590	5/31 Transferred out ?
5/31	Materials	5,160	
5/31	Labor	2,740	
5/31	Overhead	1,650	
5/31	Balance	?	

Production records show that there were 400 units in the beginning inventory, 30% complete, 1,100 units started, and 1,200 units transferred out. The beginning work in process had materials cost of \$2,040 and conversion costs of \$1,550. The units in ending inventory were 40% complete. Materials are entered at the beginning of the painting process.

**Instructions**

- (a) How many units are in process at May 31?
- (b) What is the unit materials cost for May?
- (c) What is the unit conversion cost for May?
- (d) What is the total cost of units transferred out in May?
- (e) What is the cost of the May 31 inventory?

**E21-4** Douglas Manufacturing Company has two production departments: Cutting and Assembly. July 1 inventories are Raw Materials \$4,200, Work in Process—Cutting \$2,900, Work in Process—Assembly \$10,600, and Finished Goods \$31,000. During July, the following transactions occurred.

*Journalize transactions for two processes.*

(SO 4)

1. Purchased \$62,500 of raw materials on account.
2. Incurred \$56,000 of factory labor. (Credit Wages Payable.)
3. Incurred \$70,000 of manufacturing overhead; \$40,000 was paid and the remainder is unpaid.
4. Requisitioned materials for Cutting \$15,700 and Assembly \$8,900.
5. Used factory labor for Cutting \$29,000 and Assembly \$27,000.
6. Applied overhead at the rate of \$15 per machine hour. Machine hours were Cutting 1,680 and Assembly 1,720.
7. Transferred goods costing \$67,600 from the Cutting Department to the Assembly Department.
8. Transferred goods costing \$134,900 from Assembly to Finished Goods.
9. Sold goods costing \$150,000 for \$200,000 on account.

**Instructions**

Journalize the transactions. (Omit explanations.)

**E21-5** In Ramirez Company, materials are entered at the beginning of each process. Work in process inventories, with the percentage of work done on conversion costs, and production data for its Sterilizing Department in selected months during 2010 are as follows.

*Compute physical units and equivalent units of production.*

(SO 5, 6)

Month	Beginning Work in Process		Units Transferred Out	Ending Work in Process	
	Units	Conversion Cost%		Units	Conversion Cost%
January	–0–	—	7,000	2,000	60
March	–0–	—	12,000	3,000	30
May	–0–	—	16,000	5,000	80
July	–0–	—	10,000	1,500	40

**Instructions**

- (a) Compute the physical units for January and May.
- (b) Compute the equivalent units of production for (1) materials and (2) conversion costs for each month.

**E21-6** The Cutting Department of Groneman Manufacturing has the following production and cost data for July.

*Determine equivalent units, unit costs, and assignment of costs.*

(SO 5, 6)

Production	Costs
1. Transferred out 9,000 units.	Beginning work in process \$ –0–
2. Started 3,000 units that are 60% complete as to conversion costs and 100% complete as to materials at July 31.	Materials 45,000
	Labor 16,200
	Manufacturing overhead 18,900

Materials are entered at the beginning of the process. Conversion costs are incurred uniformly during the process.

**Instructions**

- (a) Determine the equivalent units of production for (1) materials and (2) conversion costs.
- (b) Compute unit costs and prepare a cost reconciliation schedule.

**E21-7** The Sanding Department of Ortiz Furniture Company has the following production and manufacturing cost data for March 2010, the first month of operation.

*Prepare a production cost report.*

(SO 5, 6, 7)

Production: 12,000 units finished and transferred out; 3,000 units started that are 100% complete as to materials and 20% complete as to conversion costs.  
 Manufacturing costs: Materials \$33,000; labor \$27,000; overhead \$36,000.



**962 Chapter 21 Process Costing**

**Instructions**

Prepare a production cost report.

*Determine equivalent units, unit costs, and assignment of costs.*

(SO 5, 6)

**E21-8** The Blending Department of Hancock Company has the following cost and production data for the month of April.

Costs:	
Work in process, April 1	
Direct materials: 100% complete	\$100,000
Conversion costs: 20% complete	70,000
Cost of work in process, April 1	\$170,000
Costs incurred during production in April	
Direct materials	\$ 800,000
Conversion costs	362,000
Costs incurred in April	\$1,162,000

Units transferred out totaled 14,000. Ending work in process was 1,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

**Instructions**

- (a) Compute the equivalent units of production for (1) materials and (2) conversion costs for the month of April.
- (b) Compute the unit costs for the month.
- (c) Determine the costs to be assigned to the units transferred out and in ending work in process.

*Determine equivalent units, unit costs, and assignment of costs.*

(SO 5, 6)

**E21-9** Podsednik Company has gathered the following information.

Units in beginning work in process	–0–
Units started into production	36,000
Units in ending work in process	6,000
Percent complete for conversion costs in ending work in process	40%
Costs incurred:	
Direct materials	\$72,000
Direct labor	\$81,000
Overhead	\$97,200

**Instructions**

- (a) Compute equivalent units of production for materials and for conversion costs.
- (b) Determine the unit costs of production.
- (c) Show the assignment of costs to units transferred out and in process.

*Determine equivalent units, unit costs, and assignment of costs.*

(SO 5, 6)

**E21-10** Pink Martini Company has gathered the following information.

Units in beginning work in process	20,000
Units started into production	72,000
Units in ending work in process	24,000
Percent complete for conversion costs in ending work in process	60%
Costs incurred (includes beginning work in process):	
Direct materials	\$101,200
Direct labor	\$164,800
Overhead	\$123,600

**Instructions**

- (a) Compute equivalent units of production for materials and for conversion costs.
- (b) Determine the unit costs of production.
- (c) Show the assignment of costs to units transferred out and in process.



**E21-11** The Polishing Department of Estaban Manufacturing Company has the following production and manufacturing cost data for September. Materials are entered at the beginning of the process.

*Production:* Beginning inventory 1,600 units that are 100% complete as to materials and 30% complete as to conversion costs; units started during the period are 18,400; ending inventory of 5,000 units 10% complete as to conversion costs.

*Manufacturing costs:* Beginning inventory costs, comprised of \$20,000 of materials and \$43,180 of conversion costs; materials costs added in Polishing during the month, \$177,200; labor and overhead applied in Polishing during the month, \$102,680 and \$257,140, respectively.

Compute equivalent units, unit costs, and costs assigned.

(SO 5, 6)



**Instructions**

- (a) Compute the equivalent units of production for materials and conversion costs for the month of September.
- (b) Compute the unit costs for materials and conversion costs for the month.
- (c) Determine the costs to be assigned to the units transferred out and in process.

**E21-12** Stan Maley has recently been promoted to production manager, and so he has just started to receive various managerial reports. One of the reports he has received is the production cost report that you prepared. It showed that his department had 2,000 equivalent units in ending inventory. His department has had a history of not keeping enough inventory on hand to meet demand. He has come to you, very angry, and wants to know why you credited him with only 2,000 units when he knows he had at least twice that many on hand.

Explain the production cost report.

(SO 7)

**Instructions**

Explain to him why his production cost report showed only 2,000 equivalent units in ending inventory. Write an informal memo. Be kind and explain very clearly why he is mistaken.

**E21-13** The Welding Department of Batista Manufacturing Company has the following production and manufacturing cost data for February 2010. All materials are added at the beginning of the process.

Prepare a production cost report.

(SO 5, 6, 7)

Manufacturing Costs			Production Data	
Beginning work in process			Beginning work in process	15,000 units
Materials	\$18,000			1/10 complete
Conversion costs	<u>14,175</u>	\$32,175	Units transferred out	49,000
Materials		180,000	Units started	60,000
Labor		32,780	Ending work in process	26,000 units
Overhead		61,445		1/5 complete

**Instructions**

Prepare a production cost report for the Welding Department for the month of February.

**\*E21-14** Carmeli Instrument Inc. manufactures two products: missile range instruments and space pressure gauges. During January, 50 range instruments and 300 pressure gauges were produced, and overhead costs of \$81,000 were incurred. An analysis of overhead costs reveals the following activities.

Compute overhead rates and assign overhead using ABC.

(SO 10)

Activity	Cost Driver	Total Cost
1. Materials handling	Number of requisitions	\$30,000
2. Machine setups	Number of setups	27,000
3. Quality inspections	Number of inspections	24,000


The cost driver volume for each product was as follows.

Cost Driver	Instruments	Gauges	Total
Number of requisitions	400	600	1,000
Number of setups	150	300	450
Number of inspections	200	400	600



**964 Chapter 21 Process Costing**

**Instructions**

- (a) Determine the overhead rate for each activity.
- (b) Assign the manufacturing overhead costs for January to the two products using activity-based costing.
- (c)  Write a memo to the president of Carmeli Instrument, explaining the benefits of activity-based costing.

Compute product cost using traditional costing and ABC. (SO 10)

**\*E21-15** Oakenfeld Company manufactures a number of specialized machine parts. Part Bunkka-22 uses \$35 of direct materials and \$15 of direct labor per unit.

Oakenfeld's estimated manufacturing overhead is as follows:

Materials handling	\$100,000
Machining	200,000
Factory supervision	150,000
Total	\$450,000

Overhead is applied based on direct labor costs, which were estimated at \$200,000.

Oakenfeld is considering adopting activity-based costing. The cost drivers are estimated at:

Activity	Cost driver	Expected use
Materials handling	Weight of materials	50,000 pounds
Machining	Machine hours	20,000 hours
Factory supervision	Direct labor hours	12,000 hours

**Instructions**

- (a) Compute the cost of 1,000 units of Bunkka-22 using the current traditional costing system.
- (b) Compute the cost of 1,000 units of Bunkka-22 using the proposed activity-based costing system. Assume the 1,000 units use 2,500 pounds of materials, 500 machine hours, and 1,000 direct labor hours.



**EXERCISES: SET B**

Visit the book's companion website at [www.wiley.com/college/weygandt](http://www.wiley.com/college/weygandt), and choose the Student Companion site, to access Exercise Set B.

**PROBLEMS: SET A**

Complete four steps necessary to prepare a production cost report. (SO 5, 6, 7)

**P21-1A** Kasten Company manufactures bowling balls through two processes: Molding and Packaging. In the Molding Department, the urethane, rubber, plastics, and other materials are molded into bowling balls. In the Packaging Department, the balls are placed in cartons and sent to the finished goods warehouse. All materials are entered at the beginning of each process. Labor and manufacturing overhead are incurred uniformly throughout each process. Production and cost data for the Molding Department during June 2010 are presented below.

Production Data	June
Beginning work in process units	–0–
Units started into production	20,000
Ending work in process units	2,000
Percent complete—ending inventory	60%
Cost Data	
Materials	\$198,000
Labor	50,400
Overhead	112,800
Total	\$361,200

**Instructions**

- (a) Prepare a schedule showing physical units of production.
- (b) Determine the equivalent units of production for materials and conversion costs.
- (c) Compute the unit costs of production.
- (d) Determine the costs to be assigned to the units transferred and in process for June.
- (e) Prepare a production cost report for the Molding Department for the month of June.

**P21-2A** Ortega Industries Inc. manufactures in separate processes furniture for homes. In each process, materials are entered at the beginning, and conversion costs are incurred uniformly. Production and cost data for the first process in making two products in two different manufacturing plants are as follows.

*Complete four steps necessary to prepare a production cost report.*

(SO 5, 6, 7)

	<b>Cutting Department</b>	
	<b>Plant 1 T12-Tables</b>	<b>Plant 2 C10-Chairs</b>
<b>Production Data—July</b>		
Work in process units, July 1	–0–	–0–
Units started into production	20,000	16,000
Work in process units, July 31	3,000	500
Work in process percent complete	60	80
<b>Cost Data—July</b>		
Work in process, July 1	\$ –0–	\$ –0–
Materials	380,000	288,000
Labor	234,400	125,900
Overhead	104,000	96,700
Total	<u>\$718,400</u>	<u>\$510,600</u>

**Instructions**

- (a) For each plant:
  - (1) Compute the physical units of production.
  - (2) Compute equivalent units of production for materials and for conversion costs.
  - (3) Determine the unit costs of production.
  - (4) Show the assignment of costs to units transferred out and in process.
- (b) Prepare the production cost report for Plant 1 for July 2010.

**P21-3A** Fiedel Company manufactures its product, Vitadrink, through two manufacturing processes: Mixing and Packaging. All materials are entered at the beginning of each process. On October 1, 2010, inventories consisted of Raw Materials \$26,000, Work in Process—Mixing \$0, Work in Process—Packaging \$250,000, and Finished Goods \$289,000. The beginning inventory for Packaging consisted of 10,000 units that were 50% complete as to conversion costs and fully complete as to materials. During October, 50,000 units were started into production in the Mixing Department and the following transactions were completed.

*Journalize transactions.*

(SO 3, 4)

1. Purchased \$300,000 of raw materials on account.
2. Issued raw materials for production: Mixing \$210,000 and Packaging \$45,000.
3. Incurred labor costs of \$248,900.
4. Used factory labor: Mixing \$182,500 and Packaging \$66,400.
5. Incurred \$790,000 of manufacturing overhead on account.
6. Applied manufacturing overhead on the basis of \$22 per machine hour. Machine hours were 28,000 in Mixing and 6,000 in Packaging.
7. Transferred 45,000 units from Mixing to Packaging at a cost of \$979,000.
8. Transferred 53,000 units from Packaging to Finished Goods at a cost of \$1,315,000.
9. Sold goods costing \$1,604,000 for \$2,500,000 on account.

**Instructions**

Journalize the October transactions.

## 966 Chapter 21 Process Costing

Assign costs and prepare production cost report.

(SO 5, 6, 7)

**P21-4A** Cavalier Company has several processing departments. Costs charged to the Assembly Department for November 2010 totaled \$2,229,000 as follows.

Work in process, November 1		
Materials	\$69,000	
Conversion costs	<u>48,150</u>	\$ 117,150
Materials added		1,548,000
Labor		225,920
Overhead		337,930

Production records show that 35,000 units were in beginning work in process 30% complete as to conversion costs, 700,000 units were started into production, and 25,000 units were in ending work in process 40% complete as to conversion costs. Materials are entered at the beginning of each process.

### Instructions

- Determine the equivalent units of production and the unit production costs for the Assembly Department.
- Determine the assignment of costs to goods transferred out and in process.
- Prepare a production cost report for the Assembly Department.

Determine equivalent units and unit costs and assign costs.

(SO 5, 6, 7)

**P21-5A** Chen Company manufactures basketballs. Materials are added at the beginning of the production process and conversion costs are incurred uniformly. Production and cost data for the month of July 2010 are as follows.

<u>Production Data—Basketballs</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, July 1	500	60%
Units started into production	1,000	
Work in process units, July 31	600	30%
<b><u>Cost Data—Basketballs</u></b>		
Work in process, July 1		
Materials	\$750	
Conversion costs	<u>600</u>	\$1,350
Direct materials		2,400
Direct labor		1,580
Manufacturing overhead		1,060

### Instructions

- Calculate the following.
  - The equivalent units of production for materials and conversion.
  - The unit costs of production for materials and conversion costs.
  - The assignment of costs to units transferred out and in process at the end of the accounting period.
- Prepare a production cost report for the month of July for the basketballs.

Compute equivalent units and complete production cost report.

(SO 5, 7)

**P21-6A** Luther Processing Company uses a weighted-average process costing system and manufactures a single product—a premium rug shampoo and cleaner. The manufacturing activity for the month of October has just been completed. A partially completed production cost report for the month of October for the mixing and cooking department is shown on page 967.

### Instructions

- Prepare a schedule that shows how the equivalent units were computed so that you can complete the “Quantities: Units accounted for” equivalent units section shown in the production cost report, and compute October unit costs.
- Complete the “Cost Reconciliation Schedule” part of the production cost report on page 967.

### LUTHER PROCESSING COMPANY

Mixing and Cooking Department  
Production Cost Report  
For the Month Ended October 31

QUANTITIES	Physical Units	Equivalent Units		Total
		Materials	Conversion Costs	
Units to be accounted for				
Work in process, October 1	20,000			
Started into production	160,000			
Total units	180,000			
Units accounted for				
Transferred out	130,000	?	?	
Work in process, October 31 (60% materials, 40% conversion costs)	50,000	?	?	
Total units	180,000	?	?	
<b>COSTS</b>				
Unit costs		<b>Materials</b>	<b>Conversion Costs</b>	
Costs in October		\$240,000	\$105,000	\$345,000
Equivalent units		?	?	
Unit costs		\$ ?	\$ ?	= \$ ?
Costs to be accounted for				
Work in process, October 1				\$ 30,000
Started into production				315,000
Total costs				\$345,000

#### COST RECONCILIATION SCHEDULE

Costs accounted for			
Transferred out			\$ ?
Work in process, October 31			
Materials		?	
Conversion costs		?	?
Total costs			?

**\*P21-7A** Darby Electronics manufactures two large-screen television models: the Royale which sells for \$1,500, and a new model, the Majestic, which sells for \$1,200. The production cost per unit for each model in 2010 was as follows.

Assign overhead to products using ABC.

(SO 10)

	<u>Royale</u>	<u>Majestic</u>
Direct materials	\$ 700	\$420
Direct labor (\$20 per hour)	100	80
Manufacturing overhead (\$40 per DLH)	200	160
Total per unit cost	<u>\$1,000</u>	<u>\$660</u>

In 2010, Darby manufactured 30,000 units of the Royale and 10,000 units of the Majestic. The overhead rate of \$40 per direct labor hour was determined by dividing total expected manufacturing overhead of \$7,600,000 by the total direct labor hours (190,000) for the two models.

The gross profit on the model was: Royale \$500 (\$1,500 – \$1,000) and Majestic \$540 (\$1,200 – \$660). Because of this difference, management is considering phasing out the Royale model and increasing the production of the Majestic model.

**968 Chapter 21 Process Costing**

Before finalizing its decision, management asks the controller, Marie Stumfall, to prepare an analysis using activity-based costing. Marie accumulates the following information about overhead for the year ended December 31, 2010.

<u>Activity</u>	<u>Cost Driver</u>	<u>Total Cost</u>	<u>Cost Driver Volume</u>	<u>Overhead Rate</u>
Purchase orders	Number of orders	\$1,200,000	30,000	\$40
Machine setups	Number of setups	900,000	15,000	60
Machining	Machine hours	4,800,000	160,000	30
Quality control	Number of inspections	700,000	35,000	20

The cost driver volume for each product was:

<u>Cost Driver</u>	<u>Royale</u>	<u>Majestic</u>	<u>Total</u>
Purchase orders	16,000	14,000	30,000
Machine setups	5,000	10,000	15,000
Machine hours	100,000	60,000	160,000
Inspections	10,000	25,000	35,000

**Instructions**

- (a) Assign the total 2010 manufacturing overhead costs to the two products using activity-based costing (ABC).
- (b) What was the cost per unit and gross profit of each model using ABC costing?
- (c) Are management's future plans for the two models sound?

**PROBLEMS: SET B**

Complete four steps necessary to prepare a production cost report.

(SO 5, 6, 7)

**P21-1B** Walters Corporation manufactures water skis through two processes: Molding and Packaging. In the Molding Department fiberglass is heated and shaped into the form of a ski. In the Packaging Department, the skis are placed in cartons and sent to the finished goods warehouse. Materials are entered at the beginning of both processes. Labor and manufacturing overhead are incurred uniformly throughout each process. Production and cost data for the Molding Department for January 2010 are presented below.

<u>Production Data</u>	<u>January</u>
Beginning work in process units	–0–
Units started into production	42,500
Ending work in process units	2,500
Percent complete—ending inventory	40%
<u>Cost Data</u>	
Materials	\$510,000
Labor	96,000
Overhead	150,000
Total	<u>\$756,000</u>

**Instructions**

- (a) Compute the physical units of production.
- (b) Determine the equivalent units of production for materials and conversion costs.
- (c) Compute the unit costs of production.
- (d) Determine the costs to be assigned to the units transferred out and in process.
- (e) Prepare a production cost report for the Molding Department for the month of January.

Complete four steps necessary to prepare a production cost report.

(SO 5, 6, 7)

**P21-2B** Slocum Corporation manufactures in separate processes refrigerators and freezers for homes. In each process, materials are entered at the beginning and conversion costs are incurred uniformly. Production and cost data for the first process in making two products in two different manufacturing plants are as follows.

Production Data—June	Stamping Department	
	Plant A	Plant B
	R12 Refrigerators	F24 Freezers
Work in process units, June 1	–0–	–0–
Units started into production	21,000	20,000
Work in process units, June 30	4,000	2,500
Work in process percent complete	75	60
<b>Cost Data—June</b>		
Work in process, June 1	\$ –0–	\$ –0–
Materials	840,000	720,000
Labor	220,000	221,000
Overhead	420,000	292,000
Total	<u>\$1,480,000</u>	<u>\$1,233,000</u>

**Instructions**

- (a) For each plant:
  - (1) Compute the physical units of production.
  - (2) Compute equivalent units of production for materials and for conversion costs.
  - (3) Determine the unit costs of production.
  - (4) Show the assignment of costs to units transferred out and in process.
- (b) Prepare the production cost report for Plant A for June 2010.

**P21-3B** Buehler Company manufactures a nutrient, Everlife, through two manufacturing processes: Blending and Packaging. All materials are entered at the beginning of each process. On August 1, 2010, inventories consisted of Raw Materials \$5,000, Work in Process—Blending \$0, Work in Process—Packaging \$3,945, and Finished Goods \$7,500. The beginning inventory for Packaging consisted of 500 units, two-fifths complete as to conversion costs and fully complete as to materials. During August, 9,000 units were started into production in Blending, and the following transactions were completed.

*Journalize transactions.*  
(SO 3, 4)

1. Purchased \$25,000 of raw materials on account.
2. Issued raw materials for production: Blending \$18,930 and Packaging \$9,140.
3. Incurred labor costs of \$23,770.
4. Used factory labor: Blending \$13,320 and Packaging \$10,450.
5. Incurred \$41,500 of manufacturing overhead on account.
6. Applied manufacturing overhead at the rate of \$25 per machine hour. Machine hours were Blending 900 and Packaging 300.
7. Transferred 8,200 units from Blending to Packaging at a cost of \$44,940.
8. Transferred 8,600 units from Packaging to Finished Goods at a cost of \$67,490.
9. Sold goods costing \$62,000 for \$90,000 on account.

**Instructions**

Journalize the August transactions.

**P21-4B** McNair Company has several processing departments. Costs charged to the Assembly Department for October 2010 totaled \$1,249,500 as follows.

*Assign costs and prepare production cost report.*  
(SO 5, 6, 7)

Work in process, October 1		
Materials	\$29,000	
Conversion costs	<u>16,500</u>	\$ 45,500
Materials added		1,006,000
Labor		90,000
Overhead		108,000

Production records show that 25,000 units were in beginning work in process 40% complete as to conversion cost, 425,000 units were started into production, and 35,000 units were in ending work in process 40% complete as to conversion costs. Materials are entered at the beginning of each process.

**Instructions**

- (a) Determine the equivalent units of production and the unit production costs for the Assembly Department.
- (b) Determine the assignment of costs to goods transferred out and in process.
- (c) Prepare a production cost report for the Assembly Department.

**970 Chapter 21 Process Costing**

Determine equivalent units and unit costs and assign costs. (SO 5, 7)

**P21-5B** Marte Company manufactures bicycles and tricycles. For both products, materials are added at the beginning of the production process, and conversion costs are incurred uniformly. Production and cost data for the month of May are as follows.

<u>Production Data—Bicycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, May 1	500	80%
Units started in production	1,500	
Work in process units, May 31	800	25%
<u>Cost Data—Bicycles</u>		
Work in process, May 1		
Materials	\$15,000	
Conversion costs	<u>18,000</u>	\$ 33,000
Direct materials		50,000
Direct labor		18,320
Manufacturing overhead		<u>33,680</u>

**Instructions**

- (a) Calculate the following.
- (1) The equivalent units of production for materials and conversion.
  - (2) The unit costs of production for materials and conversion costs.
  - (3) The assignment of costs to units transferred out and in process at the end of the accounting period.
- (b) Prepare a production cost report for the month of May for the bicycles.

Compute equivalent units and complete production cost report. (SO 5, 6, 7)

**P21-6B** Guthrie Cleaner Company uses a weighted-average process costing system and manufactures a single product—an all-purpose liquid cleaner. The manufacturing activity for the month of March has just been completed. A partially completed production cost report for the month of March for the mixing and blending department is shown below.

**GUTHRIE CLEANER COMPANY**

Mixing and Blending Department  
Production Cost Report  
For the Month Ended March 31

<u>QUANTITIES</u>	<u>Physical Units</u>	<u>Equivalent Units</u>		
		<u>Materials</u>	<u>Conversion Costs</u>	
Units to be accounted for				
Work in process, March 1	10,000			
Started into production	<u>100,000</u>			
Total units	<u>110,000</u>			
Units accounted for				
Transferred out	95,000	?	?	
Work in process, March 31 (60% materials, 20% conversion costs)	<u>15,000</u>	<u>?</u>	<u>?</u>	
Total units	<u>110,000</u>	<u>?</u>	<u>?</u>	
<u>COSTS</u>		<u>Materials</u>	<u>Conversion Costs</u>	<u>Total</u>
Unit costs				
Costs in March		<u>\$156,000</u>	<u>\$98,000</u>	<u>\$254,000</u>
Equivalent units		<u>?</u>	<u>?</u>	
Unit costs		<u>\$ ?</u>	<u>\$ ?</u>	<u>\$ ?</u>



Costs to be accounted for		
Work in process, March 1		\$ 8,700
Started into production		<u>245,300</u>
Total costs		<u>\$254,000</u>

COST RECONCILIATION SCHEDULE

Costs accounted for		
Transferred out		\$ ?
Work in process, March 31		
Materials	?	
Conversion costs	<u>?</u>	<u>?</u>
Total costs		<u>?</u>

**Instructions**

- (a) Prepare a schedule that shows how the equivalent units were computed so that you can complete the “Quantities: Units accounted for” equivalent units section shown in the production cost report above, and compute March unit costs.
- (b) Complete the “Cost Reconciliation Schedule” part of the production cost report above.

**PROBLEMS: SET C**


Visit the book’s companion website at [www.wiley.com/college/veygandt](http://www.wiley.com/college/veygandt), and choose the Student Companion site, to access Problem Set C.



**WATERWAYS CONTINUING PROBLEM**

(Note: This is a continuation of the Waterways Problem from Chapters 19 and 20.)

**WCP21** Because most of the parts for its irrigation systems are standard, Waterways handles the majority of its manufacturing as a process cost system. There are multiple process departments. Three of these departments are the Molding, Cutting, and Welding departments. All items eventually end up in the Packaging department which prepares items for sale in kits or individually. This problem asks you to help Waterways calculate equivalent units and prepare a production cost report.

 Go to the book’s companion website, [www.wiley.com/college/veygandt](http://www.wiley.com/college/veygandt), to find the remainder of this problem.

**BROADENING YOUR PERSPECTIVE**

**Decision Making Across the Organization**



**BYP21-1** Sunshine Beach Company manufactures suntan lotion, called Surtan, in 11-ounce plastic bottles. Surtan is sold in a competitive market. As a result, management is very cost-conscious. Surtan is manufactured through two processes: mixing and filling. Materials are entered at the beginning of each process and labor and manufacturing overhead occur uniformly throughout each process. Unit costs are based on the cost per gallon of Surtan using the weighted-average costing approach.

On June 30, 2010, Jill Ritzman, the chief accountant for the past 20 years, opted to take early retirement. Her replacement, Sid Benili, had extensive accounting experience with motels in the area but only limited contact with manufacturing accounting. During July, Sid correctly accumulated the following production quantity and cost data for the Mixing Department.

**Production quantities:** Work in process, July 1, 8,000 gallons 75% complete; started into production 91,000 gallons; work in process, July 31, 5,000 gallons 20% complete. Materials are added at the beginning of the process.

## 972 Chapter 21 Process Costing

**Production costs:** Beginning work in process \$88,000, comprised of \$21,000 of materials costs and \$67,000 of conversion costs; incurred in July: materials \$573,000, conversion costs \$769,000.

Sid then prepared a production cost report on the basis of physical units started into production. His report showed a production cost of \$15.71 per gallon of Surtan. The management of Sunshine Beach was surprised at the high unit cost. The president comes to you, as Jill's top assistant, to review Sid's report and prepare a correct report if necessary.

### Instructions

With the class divided into groups, answer the following questions.

- (a) Show how Sid arrived at the unit cost of \$15.71 per gallon of Surtan.
- (b) What error(s) did Sid make in preparing his production cost report?
- (c) Prepare a correct production cost report for July.

## Managerial Analysis

**BYP21-2** Guion Furniture Company manufactures living room furniture through two departments: Framing and Upholstering. Materials are entered at the beginning of each process. For May, the following cost data are obtained from the two work in process accounts.

	<u>Framing</u>	<u>Upholstering</u>
Work in process, May 1	\$ -0-	\$ ?
Materials	420,000	?
Conversion costs	280,000	330,000
Costs transferred in	-0-	600,000
Costs transferred out	600,000	?
Work in process, May 31	100,000	?

### Instructions

Answer the following questions.

- (a) If 3,000 sofas were started into production on May 1 and 2,500 sofas were transferred to Upholstering, what was the unit cost of materials for May in the Framing Department?
- (b) Using the data in (a) above, what was the per unit conversion cost of the sofas transferred to Upholstering?
- (c) Continuing the assumptions in (a) above, what is the percentage of completion of the units in process at May 31 in the Framing Department?



## Exploring the Web

**BYP21-3** Search the Internet and find the websites of two manufacturers that you think are likely to use process costing. Are there any specifics included in their websites that confirm the use of process costing for each of these companies?

## Communication Activity

**BYP21-4** Carol Gorden was a good friend of yours in high school and is from your home town. While you chose to major in accounting when you both went away to college, she majored in marketing and management. You have recently been promoted to accounting manager for the Snack Foods Division of Koonce Enterprises, and your friend was promoted to regional sales manager for the same division of Koonce. Carol recently telephoned you. She explained that she was familiar with job cost sheets, which had been used by the Special Projects division where she had formerly worked. She was, however, very uncomfortable with the production cost reports prepared by your division. She faxed you a list of her particular questions:

1. Since Koonce occasionally prepares snack foods for special orders in the Snack Foods Division, why don't we track costs of the orders separately?
2. What is an equivalent unit?
3. Why am I getting four production cost reports? Isn't there one Work in Process account?

### Instructions

Prepare a memo to Carol. Answer her questions, and include any additional information you think would be helpful. You may write informally, but do use proper grammar and punctuation.

## Ethics Case

**BYP21-5** R. B. Patrick Company manufactures a high-tech component that passes through two production processing departments, Molding and Assembly. Department managers are partially compensated on the basis of units of products completed and transferred out relative to units of product put into production. This was intended as encouragement to be efficient and to minimize waste.

Sue Wooten is the department head in the Molding Department, and Fred Barando is her quality control inspector. During the month of June, Sue had three new employees who were not yet technically skilled. As a result, many of the units produced in June had minor molding defects. In order to maintain the department's normal high rate of completion, Sue told Fred to pass through inspection and on to the Assembly Department all units that had defects non-detectable to the human eye. "Company and industry tolerances on this product are too high anyway," says Sue. "Less than 2% of the units we produce are subjected in the market to the stress tolerance we've designed into them. The odds of those 2% being any of this month's units are even less. Anyway, we're saving the company money."

### Instructions

- (a) Who are the potential stakeholders involved in this situation?
- (b) What alternatives does Fred have in this situation? What might the company do to prevent this situation from occurring?

## "All About You" Activity



**BYP21-6** Many of you ultimately will work in service environments, such as medical facilities. Many service organizations have adopted activity-based management systems, which incorporate activity-based costing concepts throughout the organization.

East Valley Hospital is a primary medical health-care facility and trauma center that serves 11 small, rural Midwestern communities within a 40-mile radius. The hospital offers all the medical/surgical services of a typical small hospital. It has a staff of 18 full-time doctors and 20 part-time visiting specialists. East Valley has a payroll of 150 employees, consisting of nurses, technicians, therapists, dietitians, managers, directors, administrators, secretaries, data processors, and janitors.

### Instructions

- (a) Using your existing knowledge (however limited, moderate, or in-depth) of a hospital's operations, identify as many *activities* as you can that would serve as the basis for implementing an activity-based costing system.
- (b) For each of the activities listed in (a), identify a *cost driver* that would serve as a valid measure of the resources consumed in the activity.

## Answers to Insight and Accounting Across the Organization Questions



### p. 935 Choosing a Cost Driver

Q: What is the result if a company uses the wrong "cost driver" to assign manufacturing overhead?

A: *Incorrect application of manufacturing overhead will result in some products receiving too much overhead and others receiving too little.*

### p. 940 Keeping Score for the Xbox

Q: In what ways has cost accounting probably become more critical for Microsoft in recent years?

A: *In the past Microsoft enjoyed very high profit margins on its software sales. As a consequence, it could afford to be less cost-conscious than most companies. In addition, in producing software, manufacturing costs represented a very small part of its total product cost. But the video-game hardware market is very competitive. In order to achieve its profitability goals, Microsoft will have to manufacture its product efficiently in order to meet its cost targets to ensure adequate margins. The information provided by process cost accounting will be critical to its efforts.*

## Answers to Self-Study Questions

1. b 2. d 3. c 4. b 5. c 6. b 7. b 8. a 9. c 10. a 11. b 12. b 13. d  
14. d 15. c 16. a 17. c 18. b