

CHAPTER 3

Process Cost Accounting

STUDY OBJECTIVES

After studying this chapter, you should be able to:

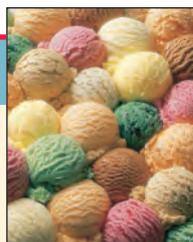
- 1 Understand who uses process cost systems.
- 2 Explain the similarities and differences between job order cost and process cost systems.
- 3 Explain the flow of costs in a process cost system.
- 4 Make the journal entries to assign manufacturing costs in a process cost system.
- 5 Compute equivalent units.
- 6 Explain the four steps necessary to prepare a production cost report.
- 7 Prepare a production cost report.



THE NAVIGATOR

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FEATURE STORY



Ben & Jerry's Tracks Its Mix-Ups

At one time, one of the fastest growing companies in the nation was **Ben & Jerry's Homemade, Inc.**, 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. The prep area is where extras such as cherries and walnuts are added to make plain ice cream into “Cherry Garcia.” And 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 actually produced? Running the plants around the clock, 18 million gallons are produced each year.

Using a 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.” More likely, though, Ben & Jerry’s

production people want to know how efficient they are. Why? Many own stock in the company.

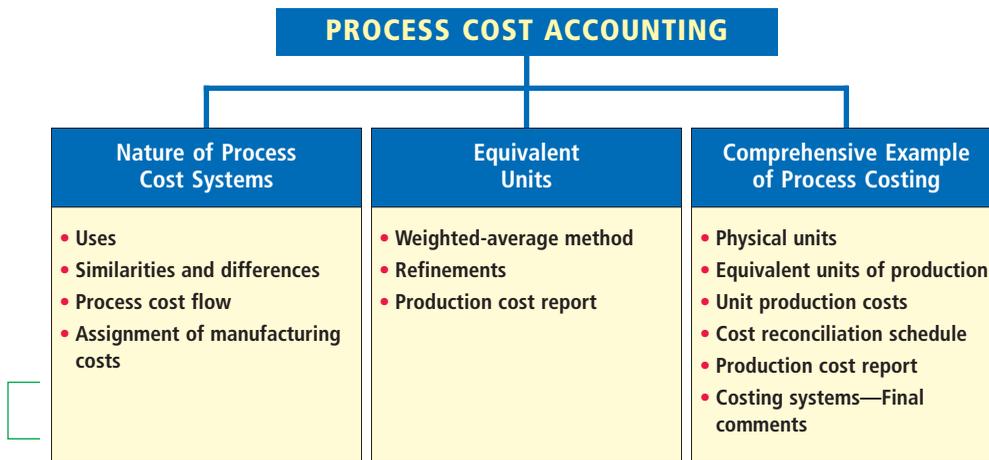


www.benjerry.com

PREVIEW OF CHAPTER 3

The cost accounting system used by companies such as **Ben & Jerry's** is called a **process cost accounting** system. 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 cost accounting.

The content and organization of this chapter are as follows.



The Nature of Process Cost Systems

USES OF PROCESS COST SYSTEMS

Process cost systems are used 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.

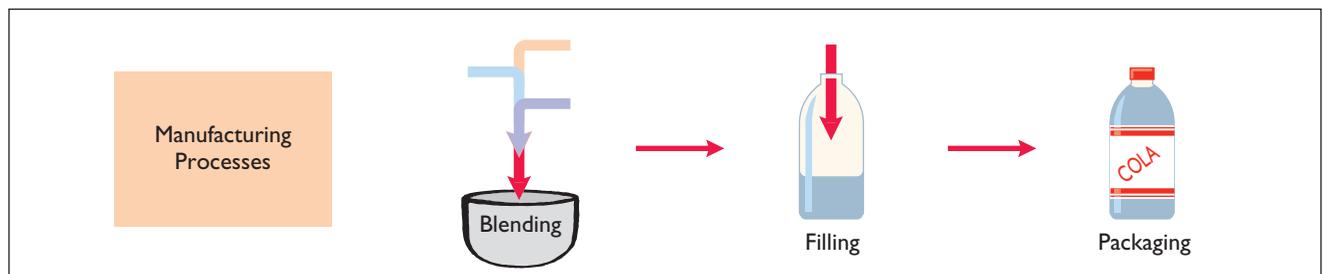
A company such as **USX** uses process costing in the manufacturing of steel. **Kellogg** and **General Mills** use process costing for cereal production; **Exxon-Mobil** uses process costing for its oil refining. And **Sherwin Williams** uses process costing for its paint products. At a bottling company like **Coca-Cola**, the manufacturing process begins with the blending of ingredients. Next the beverage is dispensed into bottles that are moved into position by automated machinery. The bottles are then capped, packaged, and forwarded to the finished goods warehouse. This process is shown in Illustration 3-1.

STUDY OBJECTIVE

1

Understand who uses process cost systems.

Illustration 3-1 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, costs in a job order cost system are assigned 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 3-2 provides examples of companies that primarily use either a process cost system or a job order cost system.

Illustration 3-2 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, J. Walter Thompson	Advertising 
ExxonMobil, Royal Dutch Shell	Oil 	Walt Disney, Warner Brothers	Motion pictures 
Intel, Advanced Micro Devices	Computer chips 	Center Ice Consultants, Ice Pro	Ice rinks 
Dow Chemical, DuPont	Chemicals 	Kaiser, Mayo Clinic	Patient health care 

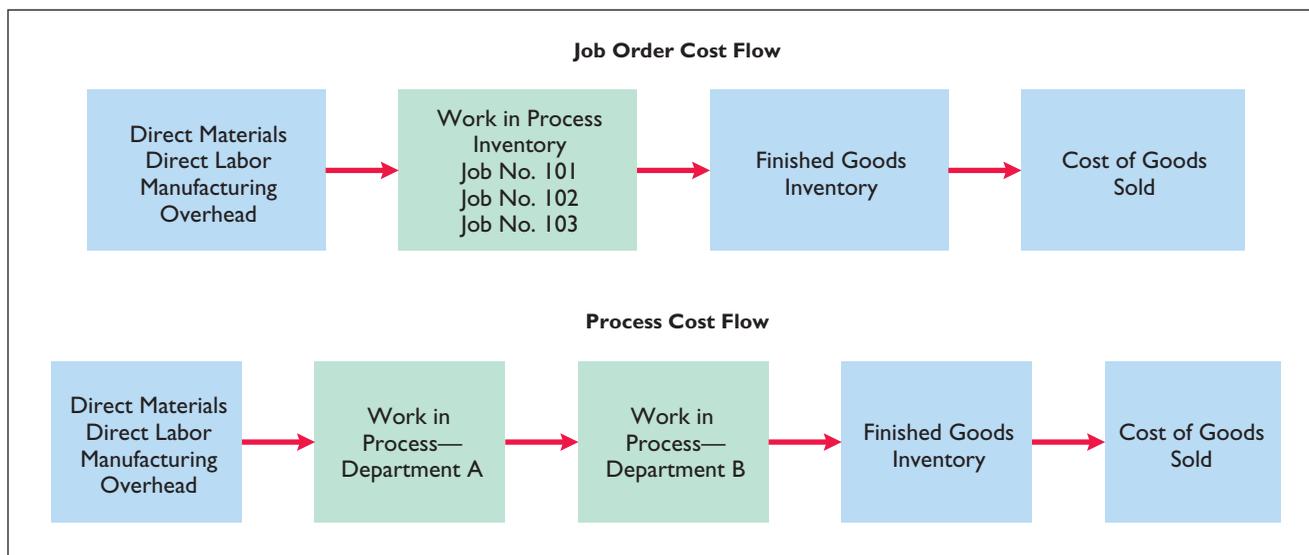
STUDY OBJECTIVE 2

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

SIMILARITIES AND DIFFERENCES BETWEEN JOB ORDER COST AND PROCESS COST SYSTEMS

In a job order cost system, costs are assigned to each job. In a process cost system, costs are tracked through a series of connected manufacturing processes or departments, rather than by individual jobs. Thus, process cost systems are used when a large volume of uniform or relatively homogeneous products is produced. The basic flow of costs in these two systems is shown in Illustration 3-3.

Illustration 3-3 Job order cost and process cost flow



The basic similarities and differences between these two systems are highlighted in the following analysis.

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.** In both costing systems, raw materials are debited to Raw Materials Inventory; factory labor is debited to Factory Labor; and manufacturing overhead costs are debited to Manufacturing Overhead.
3. **The flow of costs.** As noted above, all manufacturing costs are accumulated by debits to Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. These costs are then assigned to the same accounts in both costing systems—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.** In a job order cost system, only one work in process account is used. In a process cost system, multiple work in process accounts are used.
2. **Documents used to track costs.** In a job order cost system, costs are charged to individual jobs and summarized in a job cost sheet. In a process cost system, costs are summarized in a production cost report for each department.
3. **The point at which costs are totaled.** In a job order cost system, total costs are determined when the job is completed. In a process cost system, total costs are determined 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.

The major differences between a job order cost and a process cost system are summarized in Illustration 3-4.

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

Illustration 3-4 Job order versus process cost systems

PROCESS COST FLOW

Illustration 3-5 shows the flow of costs in the process cost system for Tyler Company. Tyler Company manufactures automatic can openers that are sold to retail outlets. Manufacturing consists of two processes: machining and assembly.

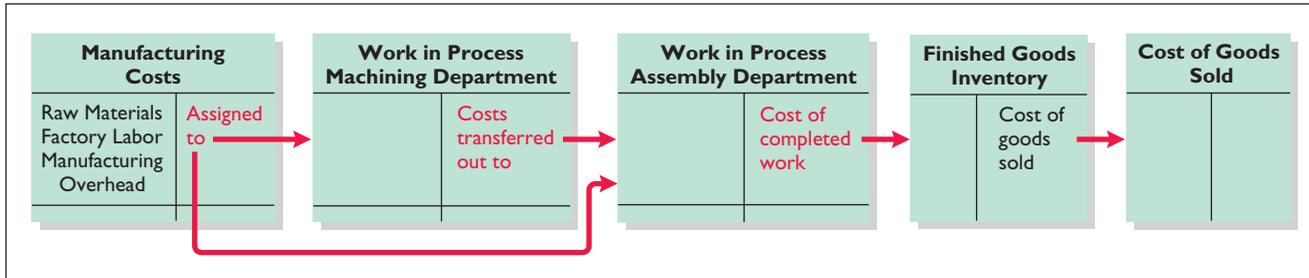
STUDY OBJECTIVE

3

Explain the flow of costs in a process cost system.

In the Machining Department, the raw materials are shaped, honed, and drilled. In the Assembly Department, the parts are assembled and packaged.

Illustration 3-5 Flow of costs in process cost system



As the flow of costs indicates, materials, labor, and manufacturing overhead can be added in both the Machining and Assembly Departments. When the Machining Department finishes its work, the partially completed units are transferred to the Assembly Department. In the Assembly Department, the goods are finished and are then transferred to the finished goods inventory. Upon sale, the goods are removed from the finished goods inventory. Within each department, a similar set of activities is performed on each unit processed.

ASSIGNMENT OF MANUFACTURING COSTS—JOURNAL ENTRIES

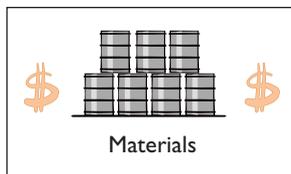
STUDY OBJECTIVE

4

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

As indicated earlier, 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. All raw materials are debited to Raw Materials Inventory when the materials are purchased. All factory labor is debited to Factory Labor when the labor costs are incurred. And overhead costs are debited to Manufacturing Overhead as they 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 these manufacturing cost elements are assigned in a process cost system.

Materials Costs



All raw materials issued for production are a materials cost to the producing department. Materials requisition slips may be used in a process cost system, but **fewer requisitions are generally required than in a job order cost system, because the materials are used for processes rather than for specific jobs.** Requisitions are issued less frequently in a process cost system because the requisitions are for larger quantities.

Materials are usually added to production at the beginning of the first process. However, in subsequent processes, 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. At Tyler Company, materials are entered at the beginning of each process. The entry to record the materials used is:

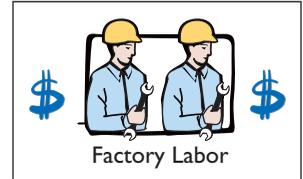
Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Raw Materials Inventory		XXXX
(To record materials used)		

At ice cream maker **Ben & Jerry's**, materials are added 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, time tickets may be used to determine the cost of labor assignable to production departments. Since labor costs are assigned to a process rather than a job, the labor cost chargeable to a process can be obtained from the payroll register or departmental payroll summaries.

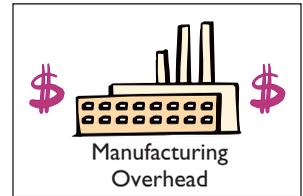
Labor costs for the Machining Department will include the wages of employees who shape, hone, and drill the raw materials. The entry to assign these costs for Tyler Company is:



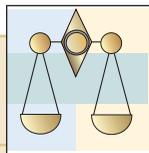
Work in Process—Machining	XXXX	
Work in Process—Assembly	XXXX	
Factory Labor (To assign factory labor to production)		XXXX

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, **machine hours are widely used** in allocating manufacturing overhead costs. The entry to allocate overhead to the two processes is:



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



Business Insight
Management Perspective

In one of **Caterpillar's** automated cost centers, work is fed into the cost center, processed by robotic machines, and transferred 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.



Transfer to Next Department

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

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

Transfer to Finished Goods

The units completed in the Assembly Department are transferred to the finished goods warehouse. The entry for this transfer is as follows.

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

Transfer to Cost of Goods Sold

When finished goods are sold, the entry to record the cost of goods sold is as follows.

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

BEFORE YOU GO ON . . .**Review It**

1. What type of manufacturing companies might use a process cost accounting system?
2. What are the principal similarities and differences between a job order cost system and a process cost system?

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. Units completed at a cost of \$19,000 in the Blending Department are transferred to the Bottling Department. Units completed at a cost of \$11,000 in the Bottling Department are transferred to Finished Goods. Journalize the assignment of these costs to the two processes and the transfer of units as appropriate.

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: BE3-1, BE3-2, BE3-3, E3-1, and E3-2.



Equivalent Units

Suppose you were asked to compute the cost of instruction per full-time equivalent student at your college. You are provided the following information.

STUDY OBJECTIVE 5

Compute equivalent units.

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

Illustration 3-6 Information for full-time student example

Part-time students take 60 percent 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.

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

Illustration 3-7 Full-time equivalent unit computation

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).

In a process cost system, the same idea, called equivalent units of production, is used. **Equivalent units of production** measure the work done during the period, expressed in fully completed units. This concept is used to determine the cost per unit of completed product.

WEIGHTED-AVERAGE METHOD

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

Illustration 3-8 Equivalent units of production formula

$$\text{Units Completed and Transferred Out} + \text{Equivalent Units of Ending Work in Process} = \text{Equivalent Units of Production}$$

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

Example 1: The Blending Department’s entire output during the period consists of ending work in process of 4,000 units which are 60 percent 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 Packaging Department’s output during the period consists of 10,000 units completed and transferred out, and 5,000 units in ending work in process which are 70 percent 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. An alternative method, called the FIFO method, is discussed in the appendix to this chapter.

REFINEMENTS ON THE WEIGHTED-AVERAGE METHOD

Kellogg Company has produced Eggo® Waffles since 1970. Three departments are used to produce these waffles: Mixing, Baking, and Freezing/Packaging. In the Mixing Department dry ingredients, including flour, salt, and baking powder, are mixed with liquid ingredients, including eggs and vegetable oil, to make waffle batter. Information related to the Mixing Department at the end of June is provided in Illustration 3-9.

Illustration 3-9 Information for Mixing Department

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

Illustration 3-9 indicates that the beginning work in process is 100 percent complete as to materials cost and 70 percent complete as to conversion costs. **Conversion costs** refers to the sum of labor costs and overhead costs. In other words, both the dry and liquid ingredients (materials) are added at the beginning of the process to make Eggo[®] Waffles. The conversion costs (labor and overhead) related to the mixing of these ingredients were incurred uniformly and are 70 percent complete. The ending work in process is 100 percent complete as to materials cost and 60 percent 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 percent complete as to conversion costs. **Two equivalent unit computations are therefore necessary:** one for materials and the other for conversion costs. Illustration 3-10 shows these computations.

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

Illustration 3-10 Computation of equivalent units—Mixing Department

The earlier formula used to compute equivalent units of production can be refined to show the computations for materials and for conversion costs, as follows.

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

Illustration 3-11 Refined equivalent units of production formula

PRODUCTION COST REPORT

As mentioned earlier, a production cost report is prepared for each department in a process cost system. A **production cost report** is the key document used by management to understand the activities in a department; it shows the production quantity and cost data related to that department. For example, in producing Eggo[®] Waffles, **Kellogg Company** would have three production cost reports: Mixing, Baking, and Freezing/Packaging. Illustration 3-12 (page 104) shows the flow of costs to make an Eggo[®] Waffle and the related production cost reports for each department.

Helpful Hint Question: When are separate unit cost computations needed for materials and conversion costs?
Answer: Whenever the two types of costs do not occur in the process at the same time.

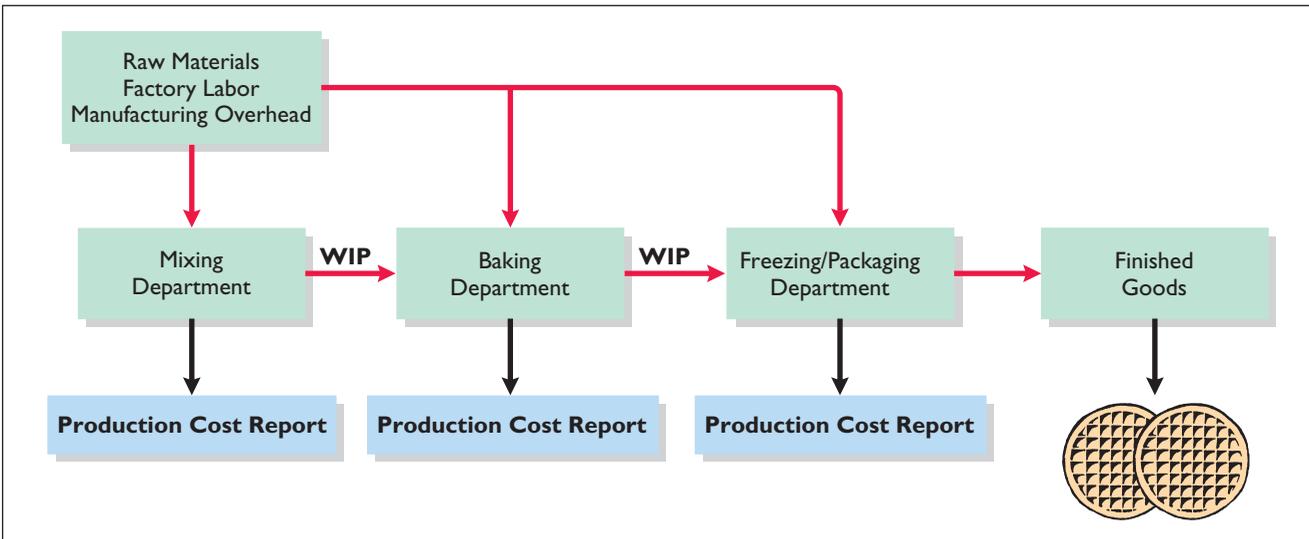


Illustration 3-12 Flow of costs in making Eggo® Waffles

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.

The next section explores these steps in an extended example.

STUDY OBJECTIVE

6

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

Comprehensive Example of Process Costing

Assumed data for the Mixing Department at **Kellogg Company** for the month of June are shown in Illustration 3-13. We will use this information to complete a production cost report for the Mixing Department.

Illustration 3-13 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, it is necessary to 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 3-14 shows the flow of physical units for Kellogg Company for the month of June for the Mixing Department.

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

Illustration 3-14 Physical unit flow—Mixing Department

The records indicate that 900,000 units must be accounted for in the Mixing Department. 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, it is necessary to measure the Mixing Department's productivity in terms of equivalent units of production. In the Mixing Department, materials are added at the beginning of the process, and conversion costs are incurred uniformly during the process. Thus, two computations of equivalent units are required: 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%		120,000
Total equivalent units	<u>900,000</u>	<u>820,000</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 3-15 Computation of equivalent units—Mixing Department

Helpful Hint Remember that the beginning work in process is ignored 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, three unit costs are computed: (1) materials, (2) conversion, and (3) total manufacturing.

The computation of total materials cost related to Eggo[®] Waffles is as follows.

Illustration 3-16 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><u>\$450,000</u></u>

The computation of unit materials cost is as follows.

Illustration 3-17 Unit materials cost computation

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

The computation of total conversion costs is shown in Illustration 3-18.

Illustration 3-18 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><u>\$205,000</u></u>

The computation of unit conversion cost is as follows.

Illustration 3-19 Unit conversion cost computation

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

Total manufacturing cost per unit is therefore computed as shown in Illustration 3-20 (next page).

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

Illustration 3-20 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. The total costs that were charged to the Mixing Department in June are as follows.

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

Illustration 3-21 Costs charged to Mixing Department

The total costs charged to the Mixing Department in June are therefore \$655,000.

A cost reconciliation schedule is then prepared to assign these costs to (1) units transferred out to the Baking Department and (2) 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 3-22 Cost reconciliation schedule—Mixing Department

The total manufacturing cost per unit, \$0.75, is used 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 3-22) equal the **total costs to be accounted for** (see Illustration 3-21).

PREPARING THE PRODUCTION COST REPORT

At this point, we are 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. The production cost report for the Mixing Department is shown in Illustration 3-23 (page 108). The four steps are identified in the report.

STUDY OBJECTIVE

7

Prepare a production cost report.

Illustration 3-23 Production cost report

Mixing Department				
Production Cost Report				
For the Month Ended June 30, 2005				
		Equivalent Units		
	Physical Units	Materials	Conversion Costs	
QUANTITIES				
		Step 1	Step 2	
Units to be accounted for				
Work in process, June 1	100,000			
Started into production	800,000			
Total units	900,000			
Units accounted for				
Transferred out	700,000	700,000	700,000	
Work in process, June 30	200,000	200,000	120,000 (200,000 × 60%)	
Total units	900,000	900,000	820,000	
COSTS				
		Step 3	Materials	Conversion Costs
Unit costs				Total
Costs in June			\$450,000	\$205,000
Equivalent units	(a)		900,000	820,000
Unit costs [(a) ÷ (b)]	(b)		\$0.50	\$0.25
Costs to be accounted for				
Work in process, June 1				\$85,000
Started into production				570,000
Total costs				\$655,000
Cost Reconciliation Schedule				
		Step 4		
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)			30,000	130,000
Total costs				\$655,000

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

DECISION TOOLKIT

Decision Checkpoints	Info Needed for Decision	Tool to Use for Decision	How to Evaluate Results
			
What is the cost of a product?	Costs of materials, labor, and overhead assigned to processes used to make the product	Production cost report	Compare costs to previous periods, to competitors, and to expected selling price to evaluate overall profitability.

BEFORE YOU GO ON . . .

► Review It

1. How do physical units differ from equivalent units of production?
2. What are the formulas for computing unit costs of production?
3. How are costs assigned to units transferred out and in process?
4. What are the four steps in preparing a production cost report?

► Do It

In March, Rodayo Manufacturing had the following unit production costs: materials \$6 and conversion costs \$9. On March 1, it had zero work in process. During March, 12,000 units were transferred out, and 800 units that were 25 percent completed as to conversion costs and 100 percent complete as to materials were in ending work in process at March 31. Assign the costs to the units transferred out and in process.

Action Plan

- 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.

Solution The assignment of costs is as follows.

Costs accounted for		
Transferred out (12,000 × \$15)		\$180,000
Work in process, March 31		
Materials (800 × \$6)	\$4,800	
Conversion costs (200 ^a × \$9)	1,800	6,600
Total costs		\$186,600
^a 800 × 25%		

Related exercise material: BE3-4, BE3-5, BE3-6, BE3-7, BE3-8, BE3-10, E3-3, E3-4, E3-6, E3-8, E3-11, and E3-12.



COSTING SYSTEMS—FINAL COMMENTS

Companies often use a combination of a process cost and a job order cost system, called **operations costing**. Operations costing is similar to process costing in 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 different materials (such as seat coverings, paint, and tinted glass) may be used for different vehicles. Similarly, **Kellogg's** Pop-Tarts Toaster Pastries[®] go through numerous processes—mixing, filling, baking, frosting, and packaging. The pastry dough, though, comes in three flavors—plain, chocolate, and graham—and fillings include Smucker's[®] 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, an accurate cost per job can be provided. 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.



Business Insight Service Company Perspective

Frequently when we think of service companies we think of specific, nonroutine tasks, such as rebuilding an automobile engine, providing consulting services on a business acquisition, or working on a major lawsuit. Clearly, such nonroutine situations would call for job order costing.

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. For service companies that perform routine, repetitive services, process costing provides a simple solution to their accounting needs. In fact, since in many instances there is little or no work in process at the end of the period, applying process costing in this setting can be even easier than for a manufacturer.

BEFORE YOU GO ON . . .

Review It

1. In what circumstances would a manufacturer use operations costing instead of process costing?
2. Describe the cost-benefit tradeoff in deciding what costing system to use.



DECISION TOOLKIT

Decision Checkpoints	Info Needed for Decision	Tool to Use for Decision	How to Evaluate Results
			
What costing method should be used?	Type of product produced	Cost of accounting system; benefits of additional information	The benefits of providing the additional information should exceed the costs of the accounting system needed to develop the information.

Using the Decision Toolkit

Essence Company manufactures a high-end after-shave lotion, called Eternity, which is sold in 10-ounce shaped glass 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 the process, 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, 2005

	Physical Units	Equivalent Units		Total
		Materials	Conversion Costs	
Quantities				
	Step 1		Step 2	
Units to be accounted for				
Work in process, May 1	1,000			
Started into production	<u>2,000</u>			
Total units	<u>3,000</u>			
Units accounted for				
Transferred out	2,200	?	?	
Work in process, May 31	<u>800</u>	<u>?</u>	<u>?</u>	
Total units	<u>3,000</u>	<u>?</u>	<u>?</u>	
Costs		Materials	Conversion Costs	
Unit costs	Step 3			
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>\$175,620</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.				

(continued from page 111)

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.

Solution

- (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, 2005

Quantities	Physical Units	Equivalent Units		
	Step 1	Materials	Conversion Costs	
		Step 2		
Units to be accounted for				
Work in process, May 1	1,000			
Started into production	2,000			
Total units	3,000			
Units accounted for				
Transferred out	2,200	2,200	2,200	
Work in process, May 31	800	800	400 (800 × 50%)	
Total units	3,000	3,000	2,600	
Costs		Materials	Conversion Costs	Total
Unit costs Step 3				
Costs in May (a)		\$149,100	\$26,520	\$175,620
Equivalent units (b)		3,000	2,600	
Unit costs [(a) ÷ (b)]		\$49.70	\$10.20	\$59.90
Costs to be accounted for				
Work in process, May 1				\$ 56,300
Started into production				119,320
Total costs				\$175,620
Cost Reconciliation Schedule Step 4				
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				\$175,620
Additional computations to support production cost report data:				
Materials cost—\$49,100 + \$100,000				
Conversion costs—\$7,200 + \$19,320				

(b) Work in Process—Filling	131,780	
Work in Process—Mixing		131,780

- (c) Process cost systems are used to apply costs to similar products that are mass-produced in a continuous fashion. Essence Company uses a process cost system: 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.



Summary of Study Objectives

- 1 Understand who uses process cost systems.** Process cost systems are used by companies that mass-produce similar products in a continuous fashion. 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) Costs are accumulated in the same accounts—Raw Materials Inventory, Factory Labor, and Manufacturing Overhead. (3) Accumulated costs are assigned 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 production department or manufacturing process, rather than only one work in process account used in a job order cost system. (2) In a process cost system, costs are summarized in a production cost report for each department; in a job cost system, costs are charged to individual jobs and summarized in a job cost sheet. (3) Costs are totaled at the end of a time period in a process cost system and at the completion of a job in a job cost system. (4) In a process cost system, unit cost is calculated as: $\text{Total manufacturing costs for the period} \div \text{Units produced during the period}$. Unit cost in a job cost system is: $\text{Total cost per job} \div \text{Units produced}$.
- 3 Explain the flow of costs in a process cost system.** Manufacturing costs for raw materials, labor, and overhead are assigned to work in process accounts for various departments or manufacturing processes, and the costs of units completed in a department are transferred from one department to another as those units move through the manufacturing process. The costs of completed work are transferred to Finished Goods Inventory. When inventory is sold, costs are transferred 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 of the departments doing the processing.
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.
Finally, 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. This concept is used 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.





DECISION TOOLKIT—A SUMMARY

Decision Checkpoints 	Info Needed for Decision 	Tool to Use for Decision 	How to Evaluate Results 
What is the cost of a product?	Costs of materials, labor, and overhead assigned to processes used to make the product	Production cost report	Compare costs to previous periods, to competitors, and to expected selling price to evaluate overall profitability.
Which costing method should be used?	Type of product produced	Cost of accounting system; benefits of additional information	The benefits of providing the additional information should exceed the costs of the accounting system needed to develop the information.

APPENDIX FIFO METHOD

In Chapter 3, we demonstrated the weighted-average method of computing equivalent units. Some companies use a different method to compute equivalent units, which is referred to as the **first-in, first-out (FIFO) method**. The purpose of this appendix is to illustrate how the FIFO method is used in practice.

Equivalent Units Under FIFO

Under the FIFO method, the computation of equivalent units is done on a first-in, first-out basis. Some companies favor the FIFO method because the FIFO cost assumption usually corresponds to the actual physical flow of the goods. Under the FIFO method, it is assumed therefore that the beginning work in process is completed before new work is started.

Using the FIFO method, equivalent units are the sum of the work performed to:

1. Finish the units of beginning work in process inventory.
2. Complete the units started into production during the period (referred to as the **units started and completed**).
3. Start, but only partially complete, the units in ending work in process inventory.

Normally, in a process costing system, some units will always be in process at both the beginning and end of the period.

ILLUSTRATION

Illustration 3A-1 shows the physical flow of units for the Assembly Department of Shutters Inc. In addition, the illustration indicates the degree of completion of the work in process accounts in regard to conversion costs.

STUDY OBJECTIVE

8

Compute equivalent units using the FIFO method.

Helpful Hint The computation of unit production costs and the assignment of costs to units transferred out and in process also are done on the same basis.

ASSEMBLY DEPARTMENT	
	<u>Physical Units</u>
Units to be accounted for	
Work in process, June 1 (40% complete)	500
Started (transferred) into production	<u>8,000</u>
Total units	<u>8,500</u>
Units accounted for	
Completed and transferred out	8,100
Work in process, June 30 (75% complete)	<u>400</u>
Total units	<u>8,500</u>

Illustration 3A-1 Physical unit flow—Assembly Department

In Illustration 3A-1, the units completed and transferred out (8,100) plus the units in ending work in process (400) equal the total units to be accounted for (8,500). We then compute equivalent units using FIFO as follows.

1. The 500 units of beginning work in process were 40 percent complete. Thus, 300 equivalent units ($60\% \times 500$ units) were required to complete the beginning inventory.
2. The units started and completed during the current month are the units transferred out minus the units in beginning work in process. For the Assembly Department, units started and completed are 7,600 ($8,100 - 500$).
3. The 400 units of ending work in process were 75 percent complete. Thus, equivalent units were 300 ($400 \times 75\%$).

Thus, equivalent units for the Assembly Department are 8,200, computed as follows.

ASSEMBLY DEPARTMENT			
<u>Production Data</u>	<u>Physical Units</u>	<u>Work Added This Period</u>	<u>Equivalent Units</u>
Work in process, June 1	500	60%	300
Started and completed	7,600	100%	7,600
Work in process, June 30	<u>400</u>	75%	<u>300</u>
Total	<u>8,500</u>		<u>8,200</u>

Illustration 3A-2 Computation of equivalent units—FIFO method

Comprehensive Example

To provide a complete illustration of the FIFO method, we will use the data for the Mixing Department at **Kellogg Company** for the month of June, as shown in Illustration 3A-3 (page 116).

COMPUTE THE PHYSICAL UNIT FLOW (STEP 1)

Illustration 3A-4 (page 116) shows the physical flow of units for **Kellogg Company** for the month of June for the Mixing Department.

Under the FIFO method, the physical units schedule is often expanded (as shown in Illustration 3A-5, page 116) to explain the transferred-out section. As a result, in this section the beginning work in process and the units started and completed are reported. These two items further explain the completed and transferred out section.

Illustration 3A-3 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>\$570,000</u>

Illustration 3A-4 Physical unit flow—Mixing Department

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

Illustration 3A-5 Physical unit flow (FIFO)—Mixing Department

MIXING DEPARTMENT	
	<u>Physical Units</u>
Units to be accounted for	
Work in process, June 1	100,000
Started (transferred) into production	800,000
Total units	<u>900,000</u>
Units accounted for	
Completed and transferred out	
Work in process, June 1	100,000
Started and completed	600,000
	700,000
Work in process, June 30	200,000
Total units	<u>900,000</u>

The records indicate that 900,000 units must be accounted for in the Mixing Department. 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)

As with the method presented in the chapter, once the physical flow of the units is established, it is necessary to determine equivalent units of production. In the Mixing Department, materials are added at the beginning of the process, and conversion costs are incurred uniformly during the process. Thus, two computations of equivalent units are required: one for materials and one for conversion costs.

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

Equivalent Units for Materials

Since materials are entered at the beginning of the process, no additional materials costs are required to complete the beginning work in process. In addition, 100 percent of the materials costs has been incurred on the ending work in process. Thus, the computation of equivalent units for materials is as follows.

MIXING DEPARTMENT—MATERIALS			
Production Data	Physical Units	Materials Added This Period	Equivalent Units
Work in process, June 1	100,000	—0—	—0—
Started and finished	600,000	100%	600,000
Work in process, June 30	200,000	100%	200,000
Total	<u>900,000</u>		<u>800,000</u>

Illustration 3A-6 Computation of equivalent units—materials

Equivalent Units for Conversion Costs

The 100,000 units of beginning work in process were 70 percent complete in terms of conversion costs. Thus, 30,000 equivalent units ($30\% \times 100,000$ units) of conversion costs were required to complete the beginning inventory. In addition, the 200,000 units of ending work in process were 60 percent complete in terms of conversion costs. Thus, the equivalent units for conversion costs is 750,000, computed as follows.

MIXING DEPARTMENT—CONVERSION COSTS			
Production Data	Physical Units	Work Added This Period	Equivalent Units
Work in process, June 1	100,000	30%	30,000
Started and finished	600,000	100%	600,000
Work in process, June 30	200,000	60%	120,000
Total	<u>900,000</u>		<u>750,000</u>

Illustration 3A-7 Computation of equivalent units—conversion costs

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, three unit costs are computed: (1) materials, (2) conversion, and (3) total manufacturing.

Under the FIFO method, the unit costs of production are based entirely on the production costs incurred during the month. Thus, the costs in the beginning work in process are not relevant, because they were incurred on work done in the preceding month. As indicated from Illustration 3A-3, the costs incurred during production in June were:

Illustration 3A-8 Costs incurred during production in June

Direct materials	\$400,000
Conversion costs	170,000
Total costs	<u>\$570,000</u>

The computation of unit materials cost, unit conversion costs, and total unit cost related to Eggo® Waffles is as follows.

Illustration 3A-9 Unit cost formulas and computations—Mixing Department

(1)	Total Materials Cost	÷	Equivalent Units of Materials	=	Unit Materials Cost
	\$400,000	÷	800,000	=	\$0.50
(2)	Total Conversion Costs	÷	Equivalent Units of Conversion Costs	=	Unit Conversion Cost
	\$170,000	÷	750,000	=	\$0.227 (rounded)*
(3)	Unit Materials Cost	+	Unit Conversion Cost	=	Total Manufacturing Cost per Unit
	\$0.50	+	\$0.227	=	\$0.727

***For homework problems, round unit costs to three decimal places.**

As shown, the unit costs are \$0.50 for materials, \$0.227 for conversion costs, and \$0.727 for total manufacturing costs.

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. The total costs that were charged to the Mixing Department in June are as follows.

Illustration 3A-10 Costs charged to Mixing Department

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

The total costs charged to the Mixing Department in June are \$655,000. A cost reconciliation is then prepared to assign these costs to (1) units transferred out to the Baking Department and (2) ending work in process. Under the FIFO method, the first goods to be completed during the period are the units in beginning work in process. Thus, the cost of the beginning work in process is always assigned to the goods transferred to finished goods (or the next department). The FIFO method also means that ending work in process will be assigned

only production costs that are incurred in the current period. Illustration 3A-11 shows a cost reconciliation schedule for the Mixing Department.

MIXING DEPARTMENT Cost Reconciliation Schedule		
Costs accounted for		
Transferred out		
Work in process, June 1		\$ 85,000
Costs to complete beginning work in process		
Conversion costs (30,000 × \$0.227)		6,810
Total costs		91,810
Units started and completed (600,000 × \$0.727)		435,950*
Total costs transferred out		527,760
Work in process, June 30		
Materials (200,000 × \$0.50)	\$100,000	
Conversion costs (120,000 × \$0.227)	27,240	127,240
Total costs		\$655,000

Illustration 3A-11 Cost reconciliation report

*Any rounding errors should be adjusted in the “Units started and completed” calculation.

As you can see, the total costs accounted for (\$655,000 from Illustration 3A-11) equal the total costs to be accounted for (\$655,000 from Illustration 3A-10).

PREPARING THE PRODUCTION COST REPORT

At this point, we are ready to prepare the production cost report for the Mixing Department. 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. The production cost report for the Mixing Department is shown in Illustration 3A-12 (page 120), with the four steps identified in the report.

As indicated in the chapter, production cost reports provide a basis for evaluating the productivity of a department. In addition, the cost data can be used to assess whether unit costs and total costs are reasonable. By comparing the quantity and cost data with predetermined goals, top management can also judge whether current performance is meeting planned objectives.

FIFO and Weighted Average

The weighted-average method of computing equivalent units has **one major advantage**: It is simple to understand and apply. In cases where prices do not fluctuate significantly from period to period, the weighted-average method will be very similar to the FIFO method. In addition, companies that have been using just-in-time procedures effectively for inventory control purposes will have minimal inventory balances, and therefore differences between the weighted-average and the FIFO methods will not be material.

Conceptually, the FIFO method is superior to the weighted-average method because **current performance is measured** using only costs incurred in the

Illustration 3A-12 Production cost report

Mixing Department			
Production Cost Report			
For the Month Ended June 30, 2005			
	Physical Units	Equivalent Units	
		Materials	Conversion Costs
QUANTITIES	Step 1	Step 2	
Units to be accounted for			
Work in process, June 1	100,000		
Started into production	800,000		
Total units	900,000		
Units accounted for			
Completed and transferred out			
Work in process, June 1	100,000	0	30,000
Started and completed	800,000	800,000	800,000
Work in process, June 30	200,000	200,000	120,000
Total units	900,000	800,000	750,000
COSTS			
Unit costs	Step 3	Conversion	
		Materials	Costs
Costs in June (excluding beginning WIP) (a)		\$400,000	\$170,000
Equivalent units (b)		800,000	750,000
Unit costs [(a) ÷ (b)]		\$0.50	\$0.227
Costs to be accounted for			
Work in process, June 1			\$85,000
Started into production			570,000
Total costs			\$655,000
Cost Reconciliation Schedule	Step 4		
Costs accounted for			
Transferred out			
Work in process, June 1			\$85,000
Costs to complete beginning work in process			
Conversion costs (30,000 × \$0.227)			6,810
Total costs			91,810
Units started and completed (600,000 × \$0.727)**			435,950
Total costs transferred out			527,760
Work in process, June 30			
Materials (200,000 × \$0.50)		\$100,000	
Conversion costs (120,000 × \$0.227)		27,240	127,240
Total costs			\$655,000

Helpful Hint What are the two self-checks in the report?
 Answer: (1) Total physical units accounted for must equal the total units to be accounted for. (2) Total costs accounted for must equal the total costs to be accounted for.

current period. Managers are, therefore, not held responsible for costs from prior periods over which they may not have any control. In addition, the FIFO method **provides current cost information**, which can be used to establish **more accurate pricing strategies** for goods manufactured and sold in the current period.

Summary of Study Objective for Appendix

8 *Compute equivalent units using the FIFO method.* Equivalent units under the FIFO method are the sum of the work performed to: (1) Finish the units of beginning work in process inventory, if any; (2) com-

plete the units started into production during the period; and (3) start, but only partially complete, the units in ending work in process inventory.

Glossary



Conversion costs The sum of labor costs and overhead costs. (p. 103)

Cost reconciliation schedule A schedule that shows that the total costs accounted for equal the total costs to be accounted for. (p. 107)

Equivalent units of production A measure of the work done during the period, expressed in fully completed units. (p. 102)

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. 109)

Physical units Actual units to be accounted for during a period, irrespective of any work performed. (p. 105)

Process cost system An accounting system used to apply costs to similar products that are mass-produced in a continuous fashion. (p. 95)

Production cost report An internal report for management that shows both production quantity and cost data for a production department. (p. 103)

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. 105, 107)

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. 105, 107)

Unit production costs Costs expressed in terms of equivalent units of production. (p. 106)

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. 102)

Demonstration Problem



Karlene Industries produces plastic ice cube trays in two processes: heating and stamping. All materials are added at the beginning of the Heating Department. Karlene uses the weighted-average method to compute equivalent units.

On November 1, 1,000 trays that were 70% complete were in process in the Heating Department. During November 12,000 trays were started into production. On November 30, 2005, 2,000 trays that were 60% complete were in process.

The following cost information for the Heating Department was also available.

Work in process, November 1:		Costs incurred in November:	
Materials	\$ 640	Material	\$3,000
Conversion costs	360	Labor	2,300
Cost of work in process, Nov. 1	<u>\$1,000</u>	Overhead	4,050

Instructions

- (a) Prepare a production cost report for the Heating Department for the month of November 2005, using the weighted-average method.
- (b) Journalize the transfer of costs to the Stamping Department.

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 Demonstration Problem

(a)

KARLENE INDUSTRIES
Heating Department
Production Cost Report
For the Month Ended November 30, 2005

	Physical Units	Equivalent Units		Total
		Materials	Conversion Costs	
Quantities	Step 1	Step 2		
Units to be accounted for				
Work in process, November 1	1,000			
Started into production	12,000			
Total units	13,000			
Units accounted for				
Transferred out	11,000	11,000	11,000	
Work in process, November 30	2,000	2,000	1,200	
Total units	13,000	13,000	12,200	
Costs				
Unit costs Step 3		Materials	Conversion Costs	
Costs in November	(a)	\$ 3,640	\$ 6,710	\$10,350
Equivalent units	(b)	13,000	12,200	
Unit costs [(a) ÷ (b)]		\$0.28	\$0.55	\$0.83
Costs to be accounted for				
Work in process, November 1				\$ 1,000
Started into production				9,350
Total costs				\$10,350
Cost Reconciliation Schedule Step 4				
Costs accounted for				
Transferred out (11,000 × \$0.83)				\$ 9,130
Work in process, November 30				
Materials (2,000 × \$0.28)			\$ 560	
Conversion costs (1,200 × \$0.55)			660	1,220
Total costs				\$10,350
(b) Work in Process—Stamping			9,130	
Work in Process—Heating				9,130
(To record transfer of units to the Stamping Department)				



Note: All asterisked Questions, Exercises, and Problems relate to material 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* a characteristic of a process cost system?
- (a) Once production begins, it continues until the finished product emerges.

- (b) The products produced are heterogeneous in nature.
- (c) The focus is on continually producing homogeneous products.
- (d) 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.
- (a) Both a job order and a process cost system track the same three manufacturing cost elements—direct materials, direct labor, and manufacturing overhead.
- (b) In a job order cost system, only one work in process account is used, whereas in a process cost system, multiple work in process accounts are used.
- (c) Manufacturing costs are accumulated the same way in a job order and in a process cost system.
- (d) 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, the flow of costs is:
- (a) work in process, cost of goods sold, finished goods.
- (b) finished goods, work in process, cost of goods sold.
- (c) finished goods, cost of goods sold, work in process.
- (d) work in process, finished goods, cost of goods sold.
- (SO 4) 4. In making the journal entry to assign raw materials costs:
- (a) the debit is to Finished Goods Inventory.
- (b) the debit is often to two or more work in process accounts.
- (c) the credit is generally to two or more work in process accounts.
- (d) the credit is to Finished Goods Inventory.
- (SO 5) 5. 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:
- (a) 22,600. (c) 24,000.
- (b) 23,000. (d) 25,000.
- (SO 6) 6. In the 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:
- (a) 7,000. (c) 7,500.
- (b) 7,360. (d) 7,340.
- (SO 6) 7. Mora 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:
- (a) 22,000, 24,000.
- (b) 24,000, 26,000.
- (c) 26,000, 24,000.
- (d) 26,000, 26,000.
8. 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:
- (a) \$5.00.
- (b) \$5.45 rounded.
- (c) \$6.00.
- (d) No correct answer is given.
- (SO 6) 9. 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:
- (a) \$45,000.
- (b) \$55,000.
- (c) \$75,000.
- (d) \$100,000.
- (SO 7) 10. A production cost report
- (a) is an external report.
- (b) shows both the production quantity and cost data related to a department.
- (c) shows equivalent units of production but not physical units.
- (d) contains six steps.
- (SO 8) *11. Hollins Company uses the FIFO method to compute equivalent units. It has 2,000 units in beginning work in process, 20% complete as to conversion costs, 25,000 units started and completed, and 3,000 units in ending work in process, 30% complete as to conversion costs. All units are 100% complete as to materials. Equivalent units for materials and conversion costs are, respectively:
- (a) 28,000 and 26,600.
- (b) 28,000 and 27,500.
- (c) 27,000 and 26,200.
- (d) 27,000 and 29,600.
- (SO 8) *12. KLM Company uses the FIFO method to compute equivalent units. It has no beginning work in process; 9,000 units are started and completed and 3,000 units in ending work in process are one-third completed. All material is added at the beginning of the process. If total materials cost is \$60,000, the unit materials cost is:

- (a) \$5.00.
- (b) \$6.00.
- (c) \$6.67 (rounded).
- (d) No correct answer given.

(SO 8) *13. Toney Company uses the FIFO method to compute equivalent units. It has unit costs of \$10 for materials and \$30 for conversion costs. If there are 2,500 units in ending work in process,

100% complete as to materials and 40% complete as to conversion costs, the total cost assignable to the ending work in process inventory is:

- (a) \$45,000.
- (b) \$55,000.
- (c) \$75,000.
- (d) \$100,000.



Questions

1. Identify which costing system—job order or process cost—the following companies would use: (a) **Quaker Oats**, (b) **Ford Motor Company**, (c) **Kinko's Print Shop**, and (d) **Warner Bros. Motion Pictures**.
2. Contrast the primary focus of job order cost accounting and of process cost accounting.
3. What are the similarities between a job order and a process cost system?
4. Your roommate is confused about the features of process cost accounting. Identify and explain the distinctive features for your roommate.
5. Tina Turner believes there are no significant differences in the flow of costs between job order cost accounting and process cost accounting. Is Turner correct? Explain.
6. (a) What source documents are used in assigning (1) materials and (2) labor to production?
(b) What criterion and basis are commonly used in allocating overhead to processes?
7. At Cale Company, overhead is assigned to production departments at the rate of \$15 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.
8. Ben Bratt 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.
9. Aaron Carter is confused about computing physical units. Explain to Aaron how physical units to be accounted for and physical units accounted for are determined.
10. What is meant by the term “equivalent units of production”?
11. How are equivalent units of production computed?
12. Clay 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?
13. Gia Co. has zero units of beginning work in process. During the period 12,000 units were completed, and there were 600 units of ending work in process 20% 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?
14. Hall Co. started 3,000 units during the period. Its beginning inventory is 800 units 25% complete as to conversion costs and 100% complete as to materials costs. Its ending inventory is 400 units 20% complete as to conversion costs and 100% complete as to materials costs. How many units were transferred out this period?
15. Grael 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 \$9, what are the costs to be assigned to units (a) transferred out and (b) in ending work in process?
16. (a) Jim Jain believes the production cost report is an external report for stockholders. Is Jim correct? Explain.
(b) Identify the sections in a production cost report.
17. What purposes are served by a production cost report?
18. At Adan 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 \$6,600, what is the per-unit conversion cost?
19. What is the difference between operations costing and a process costing system?
20. How does a company decide whether to use a job order or a process cost system?
- *21. Silva Co. started and completed 2,000 units for the period. Its beginning inventory is 600 units 25% complete and its ending inventory is 400 units 20% complete. Silva uses the FIFO method to compute equivalent units. How many units were transferred out this period?
- *22. Ortiz Company transfers out 12,000 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. Ortiz uses the FIFO method to compute equivalent units. Assuming unit materials costs of \$3 and unit conversion costs of \$9, what are the costs to be assigned to units (a) transferred out and (b) in ending work in process?

Brief Exercises

BE3-1 Turner Manufacturing purchases \$60,000 of raw materials on account, and it incurs \$40,000 of factory labor costs. Journalize the two transactions on May 31 assuming the labor costs are not paid until June.

Journalize entries for accumulating costs.
(SO 4)

BE3-2 Data for Turner Manufacturing are given in BE3-1. Supporting records show that (a) the Assembly Department used \$29,000 of raw materials and \$28,000 of the factory labor, and (b) the Finishing Department used the remainder. Journalize the assignment of the costs to the processing departments on May 31.

Journalize the assignment of materials and labor costs.
(SO 4)

BE3-3 Factory labor data for Turner Manufacturing are given in BE3-2. Manufacturing overhead is assigned to departments on the basis of 150% of labor costs. Journalize the assignment of overhead to the Assembly and Finishing Departments.

Journalize the assignment of overhead costs.
(SO 4)

BE3-4 Barclay Manufacturing Company has the following production data for selected months.

Compute physical units of production.
(SO 6)

Month	Beginning Work in Process	Units Transferred Out	Ending Work in Process	
			Units	% Complete as to Conversion Cost
January	–0–	20,000	5,000	40%
March	–0–	30,000	4,000	75
July	–0–	50,000	10,000	25

Compute the physical unit flow for each month.

BE3-5 Using the data in BE3-4, compute equivalent units of production for materials and conversion costs, assuming materials are entered at the beginning of the process.

Compute equivalent units of production.
(SO 5)

BE3-6 In Georgia Company, total material costs are \$52,000, and total conversion costs are \$60,000. 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.

Compute unit costs of production.
(SO 6)

BE3-7 Sosa Company has the following production data for March: 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 \$8 and unit conversion cost is \$15, determine the costs to be assigned to the units transferred out and the units in ending work in process.

Assign costs to units transferred out and in process.
(SO 6)

BE3-8 Production costs chargeable to the Finishing Department in July in Murdock Company are materials \$9,000, labor \$23,800, 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.

Compute unit costs.
(SO 6)

BE3-9 Data for Murdock Company are given in BE3-8. 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.

Prepare cost reconciliation schedule.
(SO 6)

BE3-10 The Smelting Department of Dewey Manufacturing Company has the following production and cost data for October.

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 3,000 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 October.

Compute equivalent units of production.
(SO 5)

***BE3-11** Mora Company has the following production data for March: no beginning work in process, units started and completed 30,000, and ending work in process 5,000 units that are 100% complete for materials and 40% complete for conversion costs. Mora uses the FIFO method to compute equivalent units. If unit materials cost is \$8 and unit

Assign costs to units transferred out and in process.
(SO 8)

conversion cost is \$12, determine the costs to be assigned to the units transferred out and the units in ending work in process. The total costs to be assigned are \$664,000.

Prepare a partial production cost report.

(SO 7, 8)

Compute unit costs.
(SO 8)

***BE3-12** Using the data in BE3-11, prepare the cost section of the production cost report for Mora Company.

***BE3-13** Production costs chargeable to the Finishing Department in May at Bell Company are materials \$8,000, labor \$20,000, overhead \$18,000, and transferred-in costs \$62,000. Equivalent units of production are materials 20,000 and conversion costs 19,000. Bell uses the FIFO method to compute equivalent units. Compute the unit costs for materials and conversion costs. Transferred-in costs are considered materials costs.

Exercises

Journalize transactions.
(SO 3, 4)



E3-1 Sally May 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 March, the work in process accounts show the following debits.

	<u>Cooking</u>	<u>Canning</u>
Beginning work in process	\$ -0-	\$ 4,000
Materials	14,000	6,000
Labor	8,500	7,000
Overhead	29,500	22,000
Costs transferred in		45,000

Instructions

Journalize the March transactions.

Journalize transactions for two processes.
(SO 4)



E3-2 Greenleaf Manufacturing Company has two production departments: Cutting and Assembly. August 1 inventories are Raw Materials \$4,200, Work in Process—Cutting \$3,900, Work in Process—Assembly \$10,600, and Finished Goods \$31,900. During August, the following transactions occurred.

- Purchased \$56,300 of raw materials on account.
- Incurred \$55,000 of factory labor. (Credit Wages Payable.)
- Incurred \$70,000 of manufacturing overhead; \$36,000 was paid and the remainder is unpaid.
- Requisitioned materials for Cutting \$15,700 and Assembly \$8,900.
- Used factory labor for Cutting \$28,000 and Assembly \$27,000.
- Applied overhead at the rate of \$20 per machine hour. Machine hours were Cutting 1,640 and Assembly 1,720.
- Transferred goods costing \$77,600 from the Cutting Department to the Assembly Department.
- Transferred goods costing \$135,000 from Assembly to Finished Goods.
- Sold goods costing \$130,000 for \$200,000 on account.

Instructions

Journalize the transactions. (Omit explanations.)

Compute physical units and equivalent units of production.
(SO 5, 6)

E3-3 In Bing 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 2005 are as follows.

Month	Beginning Work in Process		Units Transferred Out	Ending Work in Process	
	Units	Conversion Cost %		Units	Conversion Cost %
January	-0-	—	7,000	2,000	70
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 unit flow for January and May.
 (b) Compute the equivalent units of production for (1) materials and (2) conversion costs for each month.

E3-4 The Cutting Department of Behan 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 1,000 units that are 40% complete as to conversion costs and 100% complete as to materials at July 31.	Materials	45,000
	Labor	14,940
	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.

E3-5 The Sanding Department of Han Furniture Company has the following production and manufacturing cost data for April 2005.

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 40% complete as to conversion costs.

Manufacturing costs: Materials \$36,000; labor \$30,000; overhead \$37,320.

Instructions

Prepare a production cost report. There is no beginning work in process.

E3-6 The Blending Department of Ceja Company has the following cost and production data for the month of May.

Determine equivalent units, unit costs, and assignment of costs.
 (SO 5, 6)

Work in process, May 1	
Direct materials: 100% complete	\$100,000
Conversion costs: 20% complete	75,000
Cost of work in process, May 1	<u>\$175,000</u>
Costs incurred during production in May	
Direct materials	\$ 800,000
Conversion costs	350,000
Costs incurred in May	<u>\$1,150,000</u>

Units transferred out totaled 8,000. Ending work in process was 2,000 units that are 100% complete as to materials and 25% complete as to conversion costs.

Instructions

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

E3-7 The ledger of Liu Company has the following work in process account.

Answer questions on costs and production.
 (SO 3, 5, 6)

Work in Process—Painting					
7/1	Balance	4,450	7/31	Transferred out	?
7/31	Materials	6,100			
7/31	Labor	2,500			
7/31	Overhead	1,650			
7/31	Balance	?			

Production records show that there were 700 units in the beginning inventory, 30% complete, 1,100 units started, and 1,300 units transferred out. The beginning work in process had materials cost of \$2,900 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

- How many units are in process at July 31?
- What is the unit materials cost for July?
- What is the unit conversion cost for July?
- What is the total cost of units transferred out in July?
- What is the cost of the July 31 inventory?

Compute equivalent units, unit costs, and costs assigned.

(SO 5, 6)



E3-8 The Polishing Department of Dimetry Manufacturing Company has the following production and manufacturing cost data for October. 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 11,000; ending inventory of 2,000 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, \$162,700; labor and overhead applied in Polishing during the month, \$100,080 and \$250,940, respectively.

Instructions

- Compute the equivalent units of production for materials and conversion costs for the month of October.
- Compute the unit costs for materials and conversion costs for the month.
- Determine the costs to be assigned to the units transferred out and in process.

Explain the production cost report.

(SO 7)

E3-9 Mary Mahr has recently been promoted to production manager, and so she has just started to receive various managerial reports. One of the reports she has received is the production cost report that you prepared. It showed that her department had 1,000 equivalent units in ending inventory. Her department has had a history of not keeping enough inventory on hand to meet demand. She has come to you, very angry, and wants to know why you credited her with only 1,000 units when she knows she had at least twice that many on hand.

Instructions

 Explain to her why her production cost report showed only 1,000 equivalent units in ending inventory. Write an informal memo. Be kind and explain very clearly why she is mistaken.

Prepare a production cost report.

(SO 5, 6, 7)

E3-10 The Welding Department of Marlin Manufacturing Company has the following production and manufacturing cost data for February 2005. All materials are added at the beginning of the process.

Manufacturing Costs			Production Data	
Beginning work in process			Beginning work in process	15,000 units,
Materials	\$15,000			10% complete
Conversion costs	30,435	\$ 45,435	Units transferred out	49,000
Materials		180,000	Units started	60,000
Labor		35,100	Ending work in process	26,000,
Overhead		64,545		20% complete

Instructions

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

Compute physical units and equivalent units of production.

(SO 5, 6)

E3-11 Container Shipping, Inc. is contemplating the use of process costing to track the costs of its operations. The operation consists of three segments (departments): receiving, shipping, and delivery. Containers are received at Container's docks and sorted according to the ship they will be carried on. The containers are loaded onto a ship, which carries them to the appropriate port of destination. The containers are then off-loaded and delivered to the receiving company.



Container Shipping wants to begin using process costing in the shipping department. Direct materials represent the fuel costs to run the ship, and “Containers in transit” represents work in process. Listed below is information about the shipping department’s first month’s activity.

Containers in transit, April 1	0
Containers loaded	800
Containers in transit, April 30	350, 40% of direct materials and 30% of conversion costs

Instructions

- Determine the physical flow of containers for the month.
- Calculate the equivalent units for direct materials and conversion costs.

E3-12 Hi-Tech Mortgage Company uses a process costing system to accumulate costs in its loan application department. When an application is completed it is forwarded to the loan department for final processing. The following processing and cost data pertain to September.

1. Applications in process on September 1, 100	Beginning WIP:	
2. Applications started in September, 900	Direct materials	\$ 1,000
3. Completed applications during September, 800	Conversion costs	4,000
4. Applications still in process at September 30 were 100% complete as to materials (forms) and 60% complete as to conversion costs.	September costs:	
	Direct materials	\$ 4,000
	Direct labor	12,000
	Overhead	9,400

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

(SO 5, 6)



Materials are the forms used in the application process, and these costs are incurred at the beginning of the process. Conversion costs are incurred uniformly during the process.

Instructions

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

***E3-13** Using the data in E3-12, assume Hi-Tech Mortgage Company uses the FIFO method. Also assume that the applications in process on September 1 were 100% complete as to materials (forms) and 40% complete as to conversion costs.

Compute equivalent units, unit costs, and costs assigned.

(SO 4, 5, 6, 8)

Instructions

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



***E3-14** The Cutting Department of Chan Manufacturing has the following production and cost data for August.

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

(SO 4, 5, 6, 8)

Production	Costs	
1. Started and completed 8,000 units.	Beginning work in process	\$ -0-
2. Started 1,000 units that are 40% completed at August 31.	Materials	45,000
	Labor	14,700
	Manufacturing overhead	18,900

Materials are entered at the beginning of the process. Conversion costs are incurred uniformly during the process. Chan Manufacturing uses the FIFO method to compute equivalent units.

Instructions

- Determine the equivalent units of production for (1) materials and (2) conversion costs.
- Compute unit costs and show the assignment of manufacturing costs to units transferred out and in work in process.

Compute equivalent units, unit costs, and costs assigned.
(SO 4, 5, 6, 8)

***E3-15** The Smelting Department of Amber Manufacturing Company has the following production and cost data for September.

Production: Beginning work in process 2,000 units that are 100% complete as to materials and 20% complete as to conversion costs; units started and finished 11,000 units; and ending work in process 1,000 units that are 100% complete as to materials and 40% complete as to conversion costs.

Manufacturing costs: Work in process, September 1, \$15,200; materials added \$60,000; labor and overhead \$143,000.

Amber uses the FIFO method to compute equivalent units.

Instructions

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

Answer questions on costs and production.
(SO 3, 4, 5, 6, 8)

***E3-16** The ledger of Platt Company has the following work in process account.

Work in Process—Painting					
3/1	Balance	3,680		3/31	Transferred out ?
3/31	Materials	6,600			
3/31	Labor	2,500			
3/31	Overhead	1,280			
<hr/>					
3/31	Balance	?			

Production records show that there were 800 units in the beginning inventory, 30% complete, 1,000 units started, and 1,300 units transferred out. The units in ending inventory were 40% complete. Materials are entered at the beginning of the painting process. Platt uses the FIFO method to compute equivalent units.

Instructions

Answer the following questions.

- (a) How many units are in process at March 31?
- (b) What is the unit materials cost for March?
- (c) What is the unit conversion cost for March?
- (d) What is the total cost of units started in February and completed in March?
- (e) What is the total cost of units started and finished in March?
- (f) What is the cost of the March 31 inventory?

Prepare a production cost report for a second process.
(SO 8)

***E3-17** The Welding Department of Hirohama Manufacturing Company has the following production and manufacturing cost data for February 2005. All materials are added at the beginning of the process. Hirohama uses the FIFO method to compute equivalent units.

Manufacturing Costs	Production Data
Beginning work in process \$ 32,175	Beginning work in process 15,000 units,
Costs transferred in 135,000	10% complete
Materials 57,000	Units transferred out 50,000
Labor 35,100	Units transferred in 60,000
Overhead 71,900	Ending work in process 25,000,
	20% complete

Instructions

Prepare a production cost report for the Welding Department for the month of February. Transferred-in costs are considered materials costs.

Problems: Set A

Journalize transactions.
(SO 3, 4)

P3-1A Vargas 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, 2005, 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.

1. Purchased \$25,000 of raw materials on account.
2. Issued raw materials for production: Blending \$16,800 and Packaging \$7,200.
3. Incurred labor costs of \$18,770.
4. Used factory labor: Blending \$12,230 and Packaging \$6,540.
5. Incurred \$41,300 of manufacturing overhead on account.
6. Applied manufacturing overhead at the rate of \$35 per machine hour. Machine hours were Blending 900 and Packaging 300.
7. Transferred 8,200 units from Blending to Packaging at a cost of \$54,940.
8. Transferred 8,600 units from Packaging to Finished Goods at a cost of \$74,490.
9. Sold goods costing \$62,000 for \$85,000 on account.

Instructions

Journalize the August transactions.

P3-2A Zion 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 2005 are presented below.

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



Production Data	January
Beginning work in process units	–0–
Units started into production	43,000
Ending work in process units	3,000
Percent complete—ending inventory	40%
Cost Data	
Materials	\$550,400
Labor	126,640
Overhead	170,000
Total	<u>\$847,040</u>

Instructions

- (a) Compute the physical unit flow.
- (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.

(c) Materials \$12.80
(d) Transferred out \$800,000
WIP \$47,040

P3-3A Stein 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.

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

	Stamping Department	
	Plant A	Plant B
	R12 Refrigerators	F24 Freezers
Production Data—June		
Work in process units, June 1	–0–	–0–
Units started into production	20,000	20,000
Work in process units, June 30	2,000	3,000
Work in process percent complete	70%	50%
Cost Data—June		
Work in process, June 1	\$ –0–	\$ –0–
Materials	840,000	700,000
Labor	200,800	236,000
Overhead	420,000	319,000
Total	<u>\$1,460,800</u>	<u>\$1,255,000</u>

(a) Plant A:
(1) Transferred out 18,000
WIP 2,000
(2) Materials 20,000
CC 19,400
(3) Materials \$42
CC \$32
(4) Transferred out \$1,332,000
WIP \$128,800

Instructions

- (a) For each plant:
 - (1) Compute the physical unit flow.
 - (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 2005.

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



P3-4A Elite Company has several processing departments. Costs charged to the Assembly Department for October 2005 totaled \$1,328,400 as follows.

Work in process, October 1		
Materials	\$ 9,000	
Conversion costs	27,400	\$ 36,400
Materials added		1,071,000
Labor		90,000
Overhead		131,000

Production records show that 35,000 units were in beginning work in process 40% complete as to conversion cost, 415,000 units were started into production, and 45,000 units were in ending work in process 20% 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 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.

(b) Transferred out \$1,215,000
WIP \$113,400

Determine equivalent units and unit costs and assign costs.
(SO 5, 6, 7)

P3-5A Sprague Company manufactures bicycles and tricycles. For bicycles, 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 are as follows.

<u>Production Data—Bicycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, July 1	400	80%
Units started in production	1,100	
Work in process units, July 31	500	10%
 <u>Cost Data—Bicycles</u> 		
Work in process, July 1		
Materials	\$10,000	
Conversion costs	9,300	\$19,300
Direct materials		50,000
Direct labor		23,700
Manufacturing overhead		30,000

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 July.

(a) (1) Materials 1,500
(2) Materials \$40
(3) Transferred out \$100,000
WIP \$23,000

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

P3-6A Taylor Cleaner Company uses a weighted-average process cost system and manufactures a single product—an all-purpose liquid cleaner. The manufacturing activity for the month of May has just been completed. A partially completed production cost report for the month of May for the Mixing and Blending Department is shown on the next page.

TAYLOR CLEANER COMPANY
Mixing and Blending Department
Production Cost Report
For the Month Ended May 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, May 1 (40% materials, 20% conversion costs)	7,000		
Started into production	100,000		
Total units	107,000		
Units accounted for			
Transferred out	95,000	?	?
Work in process, May 31 (3/4 materials, 1/4 conversion costs)	12,000	?	?
Total units accounted for	107,000	?	?
<u>Costs</u>			
Unit costs		<u>Materials</u>	<u>Conversion Costs</u> <u>Total</u>
Costs in May		\$166,400	\$98,000 \$264,400
Equivalent units		?	? ?
Unit costs		\$?	+ \$? = \$?
Costs to be accounted for			
Work in process, May 1			\$ 12,000
Started into production			252,400
Total costs			\$264,400
<u>Cost Reconciliation Schedule</u>			
Costs accounted for			
Transferred out			\$?
Work in process, May 31			
Materials		\$?	
Conversion costs		?	\$?
Total costs			\$?

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.
- (b) Compute May unit costs.
- (c) Complete the "Cost Reconciliation Schedule" part of the production cost report above.

(a) Materials	104,000
(b) Materials	\$1.60
(c) Transferred out WIP	\$247,000 \$17,400

***P3-7A** Nicholas Company manufactures bicycles and tricycles. For both products, materials are added at the beginning of the production process, and conversion costs are incurred uniformly. Nicholas Company uses the FIFO method to compute equivalent units. Production and cost data for the month of March are as follows.

Determine equivalent units and unit costs and assign costs for processes; prepare production cost report. (SO 8)

<u>Production Data—Bicycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, March 1	200	80%
Units started into production	1,000	
Work in process units, March 31	200	40%

<u>Cost Data—Bicycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process, March 1	\$19,280	
Direct materials	50,000	
Direct labor	25,200	
Manufacturing overhead	30,000	

<u>Production Data—Tricycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, March 1	100	75%
Units started into production	800	
Work in process units, March 31	60	25%

<u>Cost Data—Tricycles</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process, March 1	\$ 6,125	
Direct materials	38,400	
Direct labor	15,100	
Manufacturing overhead	20,000	

(a) Bicycles:	
(1) Materials	1,000
(2) Materials	\$50
(3) Transferred out	\$109,680
WIP	\$14,800

Instructions

- (a) Calculate the following for both the bicycles and the tricycles.
- 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.
- (b) Prepare a production cost report for the month of March for the bicycles only.

Problems: Set B

Journalize transactions.
(SO 3, 4)

P3-1B Pepi 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, 2005, inventories consisted of Raw Materials \$26,000, Work in Process—Mixing \$0, Work in Process—Packaging \$250,000, and Finished Goods \$89,000. 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.

- Purchased \$500,000 of raw materials on account.
- Issued raw materials for production: Mixing \$210,000 and Packaging \$45,000.
- Incurred labor costs of \$238,900.
- Used factory labor: Mixing \$182,000 and Packaging \$56,900.
- Incurred \$800,000 of manufacturing overhead on account.
- Applied manufacturing overhead on the basis of \$24 per machine hour. Machine hours were 28,000 in Mixing and 7,000 in Packaging.
- Transferred 45,000 units from Mixing to Packaging at a cost of \$999,000.
- Transferred 53,000 units from Packaging to Finished Goods at a cost of \$1,455,000.
- Sold goods costing \$1,500,000 for \$2,500,000 on account.

Instructions

Journalize the October transactions.

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



P3-2B Aquatic 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 2005 are presented below.

<u>Production Data</u>	<u>June</u>
Beginning work in process units	–0–
Units started into production	20,000
Ending work in process units	5,000
Percent complete—ending inventory	40%
<u>Cost Data</u>	
Materials	\$286,000
Labor	114,000
Overhead	101,900
Total	<u>\$501,900</u>

Instructions

- (a) Prepare a schedule showing physical unit flow.
 (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.

(c) Materials	\$14.30
CC	\$12.70
(d) Transferred out	\$405,000
WIP	\$96,900

P3-3B Freedo 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)

	<u>Cutting Department</u>	
	<u>Plant 1</u> <u>T12-Tables</u>	<u>Plant 2</u> <u>C10-Chairs</u>
Production Data—August		
Work in process units, August 1	–0–	–0–
Units started into production	20,000	15,000
Work in process units, August 31	2,000	500
Work in process percent complete	50%	80%
Cost Data—August		
Work in process, August 1	\$ –0–	\$ –0–
Materials	380,000	225,000
Labor	190,000	118,100
Overhead	76,000	60,700
Total	<u>\$646,000</u>	<u>\$403,800</u>

(a) Plant 1:	
(1) Transferred out	18,000
WIP	2,000
(2) Materials	20,000
CC	19,000
(3) Materials	\$19
CC	\$14
(4) Transferred out	\$594,000
WIP	\$52,000

Instructions

- (a) For each plant:
 (1) Compute the physical unit flow.
 (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 of units transferred out and in process.
 (b) Prepare the production cost report for Plant 1 for August 2005.

P3-4B Wang Company has several processing departments. Costs charged to the Assembly Department for November 2005 totaled \$2,126,000 as follows.

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

Work in process, November 1		
Materials	\$70,000	
Conversion costs	<u>48,000</u>	\$ 118,000
Materials added		1,270,000
Labor		358,000
Overhead		380,000

Production records show that 30,000 units were in beginning work in process 30% complete as to conversion costs, 640,000 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

(b) Transferred out \$2,064,000
WIP \$62,000

- (a) Determine the equivalent units of production and the unit 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.

Determine equivalent units and unit costs and assign costs.

(SO 5, 6, 7)



P3-5B Clemente 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 2005 are as follows.

Production Data—Basketballs		Units	Percent Complete
Work in process units, July 1		500	60%
Units started into production		1,600	
Work in process units, July 31		600	40%

Cost Data—Basketballs		
Work in process, July 1		
Materials	\$540	
Conversion costs	<u>500</u>	\$1,040
Direct materials		2,400
Direct labor		1,600
Manufacturing overhead		1,380

Instructions

(a) (1) Materials 2,100
(2) Materials \$1.40
(3) Transferred out \$5,100
WIP \$1,320

- (a) Calculate the following.
 - (1) The equivalent units of production for materials and conversion costs.
 - (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 July for the basketballs.

Compute equivalent units and complete production cost report.

(SO 5, 7)

P3-6B Magic Processing Company uses a weighted-average process cost system and manufactures a single product—a premium rug shampoo and cleaner. The manufacturing activity for the month of November has just been completed. A partially completed production cost report for the month of November for the Mixing and Cooking Department is shown below and on the next page.

MAGIC PROCESSING COMPANY
Mixing and Cooking Department
Production Cost Report
For the Month Ended November 30

Quantities	Physical Units	Equivalent Units	
		Materials	Conversion Costs
Units to be accounted for			
Work in process, November 1 (all materials, 70% conversion costs)	10,000		
Started into production	<u>160,000</u>		
Total units	<u>170,000</u>		
Units accounted for			
Transferred out	130,000	?	?
Work in process, November 30 (50% materials, 25% conversion costs)	<u>40,000</u>	<u>?</u>	<u>?</u>
Total units accounted for	<u>170,000</u>	<u>?</u>	<u>?</u>

<u>Costs</u>	<u>Materials</u>	<u>Conversion Costs</u>	<u>Total</u>
Unit costs			
Costs in November	\$240,000	\$98,000	\$338,000
Equivalent units	?	?	
Unit costs	\$?	\$?	\$?
Costs to be accounted for			
Work in process, November 1			\$ 38,000
Started into production			300,000
Total costs			\$338,000

Cost Reconciliation Schedule

Costs accounted for			
Transferred out			\$?
Work in process, November 30			
Materials		\$?	
Conversion costs		?	?
Total costs			\$?

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.
- (b) Compute November unit costs.
- (c) Complete the "Cost Reconciliation Schedule" part of the production cost report above.

(a) Materials	150,000
(b) Materials	\$1.60
(c) Transferred out	\$299,000
WIP	\$39,000

***P3-7B** Jessica Company manufactures basketballs and soccer balls. For both products, materials are added at the beginning of the production process and conversion costs are incurred uniformly. Jessica uses the FIFO method to compute equivalent units. Production and cost data for the month of August are as follows.

Determine equivalent units and unit costs and assign costs for processes; prepare production cost report. (SO 8)

<u>Production Data—Basketballs</u>	<u>Units</u>	<u>Percent Complete</u>
Work in process units, August 1	500	60%
Units started into production	1,600	
Work in process units, August 31	600	50%
Cost Data—Basketballs		
Work in process, August 1	\$1,125	
Direct materials	1,600	
Direct labor	1,175	
Manufacturing overhead	1,000	
Production Data—Soccer Balls		
Work in process units, August 1	200	80%
Units started into production	2,000	
Work in process units, August 31	150	70%
Cost Data—Soccer Balls		
Work in process, August 1	\$ 450	
Direct materials	2,600	
Direct labor	1,000	
Manufacturing overhead	995	

Instructions

- (a) Calculate the following for both the basketballs and the soccer balls.
- 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.
- (b) Prepare a production cost report for the month of August for the basketballs only.

(a) Basketballs:	
(1) Materials	1,600
(2) Materials	\$1
(3) Transferred out	\$3,865
WIP	\$1,035



Problems: Set C

Problem Set C is provided at the book's Web site, www.wiley.com/college/veygandt.

BROADENING YOUR PERSPECTIVE

Group Decision Case

BYP 3-1 British Beach Company manufactures suntan lotion, called Surtan, which is sold 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, 2005, Sara Simmons, the chief accountant for the past 20 years, opted to take early retirement. Her replacement, Joe Jacobs, had extensive accounting experience with motels in the area but only limited contact with manufacturing accounting.

During July, Joe 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 100,000 gallons; work in process, July 31, 5,000 gallons 20% complete. Materials are added at the beginning of the process.

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 \$600,000, conversion costs \$785,800.

Joe then prepared a production cost report on the basis of physical units started into production. His report showed a production cost of \$14.738 per gallon of Surtan. The management of British Beach was surprised at the high unit cost. The president comes to you, as Sara's top assistant, to review Joe's report and prepare a correct report if necessary.

Instructions

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

- Show how Joe arrived at the unit cost of \$14.738 per gallon of Surtan.
- What error(s) did Joe make in preparing his production cost report?
- Prepare a correct production cost report for July.

Managerial Analysis

BYP 3-2 Harris Furniture Company manufactures living room furniture through two departments: Framing and Upholstering. Materials are entered at the beginning of each process. Costs transferred in should be treated as materials cost. 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	210,000	330,000
Costs transferred in	-0-	550,000
Costs transferred out	550,000	?
Work in process, May 31	80,000	?

Instructions

Answer the following questions.

- 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), what was the per unit conversion cost of the sofas transferred to Upholstering?
- (c) Continuing the assumptions in (a), what is the percentage of completion of the units in process at May 31 in the Framing Department?

Real-World Focus

BYP 3-3 General Microwave Corp. is engaged primarily in the design, development, manufacture, and marketing of microwave, electronic, and fiber-optic test equipment, components, and subsystems. A substantial portion of the company's microwave product is sold to manufacturers and users of microwave systems and equipment for applications in the defense electronics industry.

General Microwave Corp. reports the following information in one of the notes to its financial statements.

GENERAL MICROWAVE CORPORATION Notes to the Financial Statements

Work in process inventory reflects all accumulated production costs, which are comprised of direct production costs and overhead, reduced by amounts attributable to units delivered. Work in process inventory is reduced to its estimated net realizable value by a charge to cost of sales in the period [in which] excess costs are identified. Raw materials and finished goods inventories are reflected at the lower of cost or market.

Instructions

- (a) What types of manufacturing costs are accumulated in the work in process inventory account?
- (b) What types of information must General Microwave have to be able to compute equivalent units of production?
- (c) How does General Microwave assign costs to the completed units transferred out of work in process?

Exploring the Web

BYP 3-4 Search the Internet and find the Web sites of two manufacturers that you think are likely to use process costing. Are there any specifics included in their Web sites that confirm the use of process costing for each of these companies?



Communication Activity

BYP 3-5 Jenna Haines 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 Clark Enterprises, and your friend was promoted to regional sales manager for the same division of Clark. Jenna 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. These included the following.

1. Since Clark 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 only one Work in Process account?

Instructions

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

Research Assignment

BYP 3-6 The May 10, 2004, edition of the *Wall Street Journal* includes an article by Evan Ramstad titled “A Tight Squeeze” (p. R9).

Instructions

Read the article and answer the following questions.

- What is **Proview**'s profit margin on computer monitors? Why is the profit margin so thin on computer monitors?
- What are some of the steps that Proview International has taken to control costs?
- Why does the company continue to build tube-based monitors even as many consumers are moving away from them?
- Mr. Wang's final comment is, “Every aspect of the business is important, but the most important is cost.” Why does he feel this way?

Ethics Case

BYP 3-7 C. C. Daibo 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.

Barb Crusmer is the department head in the Molding Department, and Wayne Terago is her quality control inspector. During the month of June, Barb 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, Barb told Wayne to pass through inspection and on to the Assembly Department all units that had defects nondetectable to the human eye. “Company and industry tolerances on this product are too high anyway,” says Barb. “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

- Who are the potential stakeholders involved in this situation?
- What alternatives does Wayne have in this situation? What might the company do to prevent this situation from occurring?

Answers to Self-Study Questions

1. b 2. d 3. d 4. b 5. b 6. a 7. c 8. a 9. b 10. b
 *11. b *12. a *13. b



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