

Supplement: Process Costing Using the FIFO Method

4

SUPPLEMENT OUTLINE

- Equivalent Units—FIFO Method
- Comparison of Equivalent Units of Production Under the Weighted-Average and FIFO Methods
- Cost per Equivalent Unit—FIFO Method
- Applying Costs—FIFO Method
- Cost Reconciliation Report—FIFO Method

LEARNING OBJECTIVES



After studying this Supplement to Chapter 4, you should be able to:

LO6 Compute the equivalent units of production using the FIFO method.

LO7 Compute the cost per equivalent unit using the FIFO method.

LO8 Assign costs to units using the FIFO method.

LO9 Prepare a cost reconciliation report using the FIFO method.

The FIFO method of process costing differs from the weighted-average method in two ways: (1) the computation of equivalent units, and (2) the way in which costs of beginning inventory are treated. The FIFO method is generally considered more accurate than the weighted-average method, but it is more complex. The complexity is not a problem for computers, but the FIFO method is a little more difficult to understand and to learn than the weighted-average method.

LEARNING OBJECTIVE 6

Compute the equivalent units of production using the FIFO method.



Equivalent Units—FIFO Method

The computation of equivalent units under the FIFO method differs from the computation under the weighted-average method in two ways.

First, the “units transferred out” is divided into two parts. One part consists of the units from the beginning inventory that were completed and transferred out, and the other part consists of the units that were both *started* and *completed* during the current period.

Second, full consideration is given to the amount of work expended during the current period on units in the *beginning* work in process inventory as well as on units in the ending inventory. Thus, under the FIFO method, both beginning and ending inventories are converted to an equivalent units basis. For the beginning inventory, the equivalent units represent the work done to *complete* the units; for the ending inventory, the equivalent units represent the work done to bring the units to a stage of partial completion at the end of the period (the same as with the weighted-average method).

The formula for computing the equivalent units of production under the FIFO method is more complex than under the weighted-average method:

FIFO Method (A Separate Calculation is Made for Each Cost Category in Each Processing Department)

$$\begin{aligned} \text{Equivalent units of production} = & \text{Equivalent units to complete beginning work in} \\ & \text{process inventory*} \\ & + \text{Units started and completed during the period} \\ & + \text{Equivalent units in ending work in process} \\ & \text{inventory} \end{aligned}$$

$$\begin{aligned} \text{*Equivalent units to} & & \text{Units in beginning} & & & & \text{Percentage completion} \\ \text{complete beginning work} & = & \text{work in process} & \times & \left(\text{100\% -} & \text{of beginning work in} \right) \\ \text{in process inventory} & & \text{inventory} & & \text{process inventory} & \end{aligned}$$

Or, the equivalent units of production can also be determined as follows:

$$\begin{aligned} \text{Equivalent units of production} = & \text{Units transferred out} \\ & + \text{Equivalent units in ending work in process} \\ & \text{inventory} \\ & - \text{Equivalent units in beginning work in process} \\ & \text{inventory} \end{aligned}$$

To illustrate the FIFO method, refer again to the data for the Shaping and Milling Department at Double Diamond Skis. The department completed and transferred 4,800 units to the Graphics Application Department during May. Because 200 of these units came from the beginning inventory, the Shaping and Milling Department must

| | Materials | Conversion |
|---|--------------------|--------------------|
| To complete beginning work in process: | | |
| Materials: 200 units \times (100% – 55%)* | 90 | |
| Conversion: 200 units \times (100% – 30%)* | | 140 |
| Units started and completed during the period | 4,600 [†] | 4,600 [†] |
| Ending work in process: | | |
| Materials: 400 units \times 40% complete | 160 | |
| Conversion: 400 units \times 25% complete..... | | 100 |
| Equivalent units of production..... | <u>4,850</u> | <u>4,840</u> |

*This is the work needed to complete the units in beginning inventory.
[†]5,000 units started – 400 units in ending work in process = 4,600 units started and completed. This can also be computed as 4,800 units completed and transferred to the next department – 200 units in beginning work in process inventory. The FIFO method assumes that the units in beginning inventory are finished first.

EXHIBIT 4S-1Equivalent Units of Production:
FIFO Method

have started and completed 4,600 units during May. The 200 units in the beginning inventory were 55% complete with respect to materials and only 30% complete with respect to conversion costs when the month started. Thus, to complete these units the department must have added another 45% of materials costs (100% – 55% = 45%) and another 70% of conversion costs (100% – 30% = 70%). Following this line of reasoning, the equivalent units for the department for May would be computed as shown in Exhibit 4S-1.

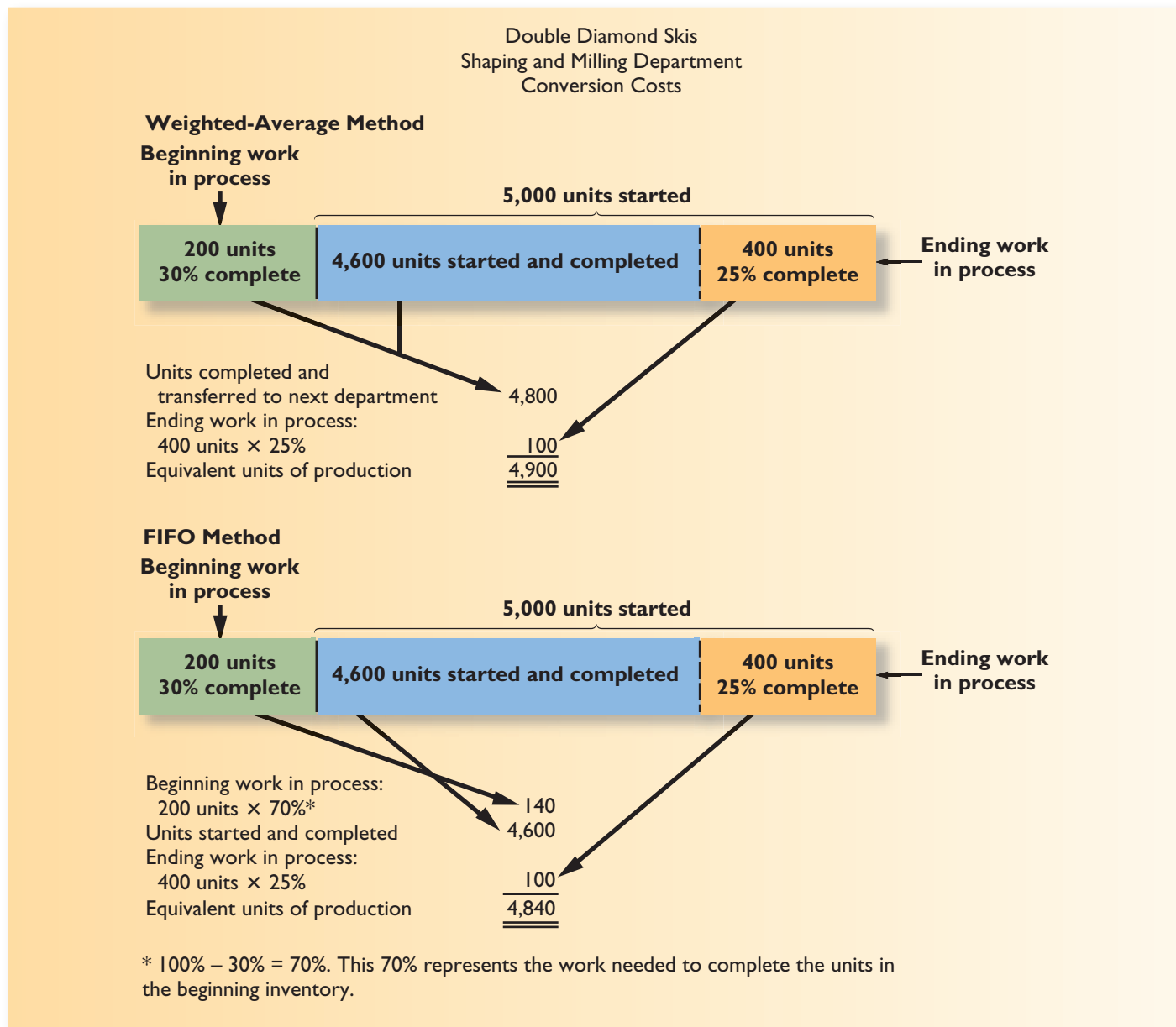
Comparison of Equivalent Units of Production under the Weighted-Average and FIFO Methods

Stop at this point and compare the data in Exhibit 4S-1 with the data in Exhibit 4-5 in the chapter, which shows the computation of equivalent units under the weighted-average method. Also refer to Exhibit 4S-2, which compares the two methods.

The essential difference between the two methods is that the weighted-average method blends work and costs from the prior period with work and costs in the current period, whereas the FIFO method separates the two periods. To see this more clearly, consider the following reconciliation of the two calculations of equivalent units:

| Shaping and Milling Department | Materials | Conversion |
|--|--------------|--------------|
| Equivalent units—weighted-average method | 4,960 | 4,900 |
| Less equivalent units in beginning inventory: | | |
| 200 units \times 55%..... | 110 | |
| 200 units \times 30%..... | | 60 |
| Equivalent units of production—FIFO method | <u>4,850</u> | <u>4,840</u> |

From the above, it is evident that the FIFO method removes the equivalent units that were already in beginning inventory from the equivalent units as defined using the weighted-average method. Thus, the FIFO method isolates the equivalent units that are due to work performed during the current period. The weighted-average method blends together the equivalent units already in beginning inventory with the equivalent units that are due to work performed in the current period.

EXHIBIT 4S-2 Visual Perspective of Equivalent Units of Production**LEARNING OBJECTIVE 7**

Compute the cost per equivalent unit using the FIFO method.

**Cost per Equivalent Unit—FIFO Method**

In the FIFO method, the cost per equivalent unit is computed as follows:

FIFO Method
(A Separate Calculation is Made for Each Cost Category in Each Processing Department)

$$\text{Cost per equivalent unit} = \frac{\text{Cost added during the period}}{\text{Equivalent units of production}}$$

Unlike the weighted-average method, in the FIFO method the cost per equivalent unit is based only on the costs incurred in the department in the current period.

The costs per equivalent unit for materials and for conversion are computed below for the Shaping and Milling Department for May:

| Shaping and Milling Department | | |
|--|-----------|------------|
| Costs per Equivalent Unit—FIFO method | Materials | Conversion |
| Cost added during the period (a) | \$368,600 | \$350,900 |
| Equivalent units of production (b) | 4,850 | 4,840 |
| Cost per equivalent unit (a) ÷ (b) | \$76.00 | \$72.50 |

Applying Costs—FIFO Method

The costs per equivalent unit are used to value units in ending inventory and units that are transferred to the next department. For example, each unit transferred out of the Shaping and Milling Department to the Graphics Application Department will carry with it a cost of \$148.50—\$76.00 for materials cost and \$72.50 for conversion cost. Because 4,800 units were transferred out in May to the next department, the total cost assigned to those units would be \$712,800 (4,800 units × \$148.50 per unit).

A complete accounting of the costs of both ending work in process inventory and the units transferred out appears below. It is more complicated than the weighted average method. This is because the cost of the units transferred out consists of three separate components: (1) the cost of beginning work in process inventory; (2) the cost to complete the units in beginning work in process inventory; and (3) the cost of units started and completed during the period.

LEARNING OBJECTIVE 8

Assign costs to units using the FIFO method.



| Shaping and Milling Department | | | |
|--|-----------|------------|------------------|
| Costs of Ending Work in Process Inventory and Units Transferred Out—FIFO Method | Materials | Conversion | Total |
| Ending work in process inventory: | | | |
| Equivalent units of production | | | |
| (see Exhibit 4S-1) (a) | 160 | 100 | |
| Cost per equivalent unit (see above) (b) | \$76.00 | \$72.50 | |
| Cost of ending work in process inventory | | | |
| (a) × (b) | \$12,160 | \$7,250 | <u>\$19,410</u> |
| Units transferred out: | | | |
| Cost in beginning work in process inventory | \$9,600 | \$5,575 | \$15,175 |
| Cost to complete the units in beginning work in process inventory: | | | |
| Equivalent units of production required to complete the units in beginning inventory | | | |
| (see Exhibit 4S-1) (a) | 90 | 140 | |
| Cost per equivalent unit (see above) (b) | \$76.00 | \$72.50 | |
| Cost to complete the units in beginning inventory | | | |
| inventory (a) × (b) | \$6,840 | \$10,150 | \$16,990 |
| Cost of units started and completed this period: | | | |
| Units started and completed this period | | | |
| (see Exhibit 4S-1) (a) | 4,600 | 4,600 | |
| Cost per equivalent unit (see above) (b) | \$76.00 | \$72.50 | |
| Cost of units started and completed this period | | | |
| (a) × (b) | \$349,600 | \$333,500 | <u>\$683,100</u> |
| Total cost of units transferred out | | | <u>\$715,265</u> |

Again, note that the cost of the units transferred out consists of three distinct components—the cost of beginning work in process inventory, the cost to complete the units in beginning inventory, and the cost of units started and completed during the period. This is a major difference between the weighted-average and FIFO methods.

LEARNING OBJECTIVE 9

Prepare a cost reconciliation report using the FIFO method.



Cost Reconciliation Report—FIFO Method

The costs assigned to ending work in process inventory and to the units transferred out reconcile with the costs we started with in Exhibit 4–7 as shown below:

| Shaping and Milling Department | |
|---|------------------|
| Cost Reconciliation | |
| Costs to be accounted for: | |
| Cost of beginning work in process inventory (Exhibit 4–7)..... | \$ 15,175 |
| Costs added to production during the period (Exhibit 4–7) | <u>719,500</u> |
| Total cost to be accounted for | <u>\$734,675</u> |
| Costs accounted for as follows: | |
| Cost of ending work in process inventory (see page 5) | \$ 19,410 |
| Cost of units transferred out (see page 5)..... | <u>715,265</u> |
| Total cost accounted for | <u>\$734,675</u> |

The \$715,265 cost of the units transferred to the next department, Graphics Application, will be accounted for in that department as “costs transferred in.” As in the weighted-average method, this cost will be treated in the process costing system as just another category of costs like materials or conversion costs. The only difference is that the costs transferred in will always be 100% complete with respect to the work done in the Graphics Applications Department. Costs are passed on from one department to the next in this fashion, until they reach the last processing department, Finishing and Pairing. When the products are completed in this last department, their costs are transferred to finished goods.

A Comparison of Costing Methods

In most situations, the weighted-average and FIFO methods will produce very similar unit costs. If there never are any ending inventories, the two methods will produce identical results. The reason for this is that without any ending inventories, no costs can be carried forward into the next period and the weighted-average method will base unit costs on just the current period’s costs—just as in the FIFO method. If there *are* ending inventories, either erratic input prices or erratic production levels would also be required to generate much of a difference in unit costs under the two methods. This is because the weighted-average method will blend the unit costs from the prior period with the unit costs of the current period. Unless these unit costs differ greatly, the blending will not make much difference.

Nevertheless, from the standpoint of cost control, the FIFO method is superior to the weighted-average method. Current performance should be evaluated based on costs of the current period only but the weighted-average method mixes costs of the current period with costs of the prior period. Thus, under the weighted-average method, the manager’s apparent performance in the current period is influenced by what happened in the prior period. This problem does not arise under the FIFO method because the FIFO method makes a clear distinction between costs of prior periods and costs incurred during the current period. For the same reason, the FIFO method also provides more up-to-date cost data for decision-making purposes.

On the other hand, the weighted-average method is simpler to apply than the FIFO method, but computers can handle the additional calculations with ease once they have been appropriately programmed.

SUMMARY

LO6 Compute the equivalent units of production using the FIFO method.

To compute unit costs in a department, the department's equivalent units of output must be determined. In the FIFO method, the equivalent units for a period are the sum of the equivalent units required to complete the beginning inventory, the units started and completed during the period, and the equivalent units in ending work in process inventory at the end of the period.

LO7 Compute the cost per equivalent unit using the FIFO method.

The cost per equivalent unit for a particular cost category in a department is computed by dividing the cost added during the period by the equivalent units of production for the period.

LO8 Assign costs to units using the FIFO method.

The cost per equivalent unit is used to value units in ending inventory and units transferred to the next department. The cost assigned to ending inventory is determined by multiplying the cost per equivalent unit by the equivalent units in ending inventory. The cost assigned to the units transferred to the next department is broken down into three parts—the cost in beginning work in process inventory, the cost to complete the units in beginning work in process inventory, and the cost of units started and completed during the period. See the chapter for the details of how these costs are determined.

LO9 Prepare a cost reconciliation report using the FIFO method.

This report reconciles the cost of beginning work in process inventory and costs added to production with the cost of ending work in process inventory and cost of units transferred out.

QUESTIONS

- 4S-1 How does the computation of equivalent units under the FIFO method differ from the computation of equivalent units under the weighted-average method?
- 4S-2 On the cost reconciliation part of the production report, the weighted-average method treats all units transferred out in the same way. How does this differ from the FIFO method of handling units transferred out?
- 4S-3 From the standpoint of cost control, why is the FIFO method superior to the weighted-average method?

connect™ BRIEF EXERCISES

BRIEF EXERCISE 4S-1 Computation of Equivalent Units—FIFO Method [LO6]

Refer to the data for Clonex Labs, Inc., in Brief Exercise 4-2.

Required:

Compute the equivalent units of production for October assuming that the company uses the FIFO method of accounting for units and costs.

BRIEF EXERCISE 4S-2 Cost per Equivalent Unit—FIFO Method [LO7]

Superior Micro Products uses the FIFO method in its process costing system. Data for the Assembly Department for May appear below:

| | Materials | Labor | Overhead |
|--------------------------------------|-----------|----------|-----------|
| Cost added during May | \$193,320 | \$62,000 | \$310,000 |
| Equivalent units of production | 27,000 | 25,000 | 25,000 |

Required:

Compute the cost per equivalent unit for materials, labor, overhead, and in total.

BRIEF EXERCISE 4S-3 Applying Costs to Units—FIFO Method [LO8]

Data concerning a recent period's activity in the Assembly Department, the first processing department in a company that uses process costing, appear below:

| | Materials | Conversion |
|--|-----------|------------|
| Cost of work in process inventory at the beginning of the period | \$3,200 | \$650 |
| Equivalent units of production in the ending work in process inventory ... | 400 | 200 |
| Equivalent units of production required to complete the beginning work in process inventory | 600 | 1,200 |
| Cost per equivalent unit for the period..... | \$2.32 | \$0.75 |

A total of 26,000 units were completed and transferred to the next processing department during the period. Beginning work in process inventory consisted of 2,000 units and ending work in process inventory consisted of 1,000 units.

Required:

Using the FIFO method, compute the cost of the units transferred to the next department during the period and the cost of ending work in process inventory.

EXERCISES**connect™****EXERCISE 4S-4 Cost Reconciliation Report—FIFO Method [LO9]**

Schroeder Baking Corporation uses a process costing system in its large-scale baking operations. The Mixing Department is one of the company's processing departments. In the Mixing Department in July, the cost of beginning work in process inventory was \$1,460, the cost of ending work in process inventory was \$3,120, and the cost added to production was \$36,540.

Required:

Prepare a cost reconciliation report for the Mixing Department for July.

EXERCISE 4S-5 Computation of Equivalent Units—FIFO Method [LO6]

MediSecure, Inc., produces clear plastic containers for pharmacies in a process that starts in the Molding Department. Data concerning that department's operations in the most recent period appear below:

| | |
|---|---------|
| Beginning work in process: | |
| Units in process | 500 |
| Stage of completion with respect to materials | 80% |
| Stage of completion with respect to conversion..... | 40% |
| Units started into production during the month..... | 153,600 |
| Units completed and transferred out | 153,700 |
| Ending work in process: | |
| Units in process | 400 |
| Stage of completion with respect to materials | 75% |
| Stage of completion with respect to conversion..... | 20% |

Required:

MediSecure uses the FIFO method in its process costing system. Compute the equivalent units of production for the period for the Molding Department.

EXERCISE 4S-6 Equivalent Units and Cost per Equivalent Unit—FIFO Method [LO6, LO7, LO8]

Refer to the data for Pureform, Inc., in Exercise 4–8.

Required:

Assume that the company uses the FIFO method of accounting for units and costs.

1. Compute the equivalent units for the month for the first processing department.
2. Determine the costs per equivalent unit for the month.

EXERCISE 4S-7 Equivalent Units—FIFO Method [LO6]

Refer to the data for Hielta Oy in Exercise 4–7. Assume that the company uses the FIFO method in its process costing system.

Required:

1. Compute the number of tons of pulp completed and transferred out during June.
2. Compute the equivalent units of production for materials and for labor and overhead for June.

EXERCISE 4S-8 Equivalent Units; Applying Costs—FIFO Method [LO6, LO7, LO8]

Jarvene Corporation uses the FIFO method in its process costing system. The following data are for the most recent month of operations in one of the company's processing departments:

| | |
|---|-------|
| Units in beginning inventory | 400 |
| Units started into production..... | 3,000 |
| Units in ending inventory | 300 |
| Units transferred to the next department..... | 3,100 |

| | Materials | Conversion |
|---|-----------|------------|
| Percentage completion of beginning inventory..... | 80% | 40% |
| Percentage completion of ending inventory | 70% | 60% |

The cost of beginning inventory according to the company's costing system was \$11,040 of which \$8,120 was for materials and the remainder was for conversion cost. The costs added during the month amounted to \$132,730. The costs per equivalent unit for the month were:

| | Materials | Conversion |
|-------------------------------|-----------|------------|
| Cost per equivalent unit..... | \$25.40 | \$18.20 |

Required:

1. Compute the total cost per equivalent unit for the month.
2. Compute the equivalent units of material and of conversion costs in the ending inventory.
3. Compute the equivalent units of material and of conversion costs that were required to complete the beginning inventory.
4. Determine the number of units started and completed during the month.
5. Determine the costs of ending inventory and units transferred out.

EXERCISE 4S-9 Equivalent Units—FIFO Method [LO6]

Refer to the data for Alaskan Fisheries, Inc., in Exercise 4–12.

Required:

Compute the equivalent units for July for the Cleaning Department assuming that the company uses the FIFO method of accounting for units.

PROBLEMS

connect™

CHECK FIGURE

- (3) Ending work in process: \$89,800

PROBLEM 4S-10A Equivalent Units; Cost per Equivalent Unit; Applying Costs—FIFO Method [LO6, LO7, LO8, LO9]

Refer to the data for the Blending Department of Sunspot Beverages, Ltd., in Problem 4-13A. Assume that the company uses the FIFO method rather than the weighted-average method in its process costing system.

Required:

- Determine the equivalent units for June for the Blending Department.
- Compute the costs per equivalent unit for June for the Blending Department.
- Determine the total cost of ending work in process inventory and the total cost of units transferred to the next process for the Blending Department in June.
- Prepare a cost reconciliation report for the Blending Department for June.

CHECK FIGURE

- (2) Conversion: \$1.48 per equivalent unit;
 (3) Ending work in process: \$28,240

PROBLEM 4S-11A Equivalent Units; Applying Costs; Cost Reconciliation Report—FIFO Method [LO6, LO7, LO8, LO9]

Selzik Company makes super-premium cake mixes that go through two processing departments, Blending and Packaging. The following activity was recorded in the Blending Department during July:

| | |
|---|-----------|
| Production data: | |
| Units in process, July 1 (materials 100% complete; conversion 30% complete) | 10,000 |
| Units started into production | 170,000 |
| Units in process, July 31 (materials 100% complete; conversion 40% complete) | 20,000 |
| Cost data: | |
| Work in process inventory, July 1: | |
| Materials cost | \$8,500 |
| Conversion cost..... | \$4,900 |
| Cost added during the month: | |
| Materials cost \$139,400 | |
| Conversion cost..... | \$244,200 |

All materials are added at the beginning of work in the Blending Department. The company uses the FIFO method in its process costing system.

Required:

- Determine the equivalent units for July for the Blending Department.
- Compute the costs per equivalent unit for July for the Blending Department.
- Determine the total cost of ending work in process inventory and the total cost of units transferred to the next process for the Blending Department in July.
- Prepare a cost reconciliation report for the Blending Department for July.

CHECK FIGURE

- (1) Ending work in process: \$7,200

ANALYTICAL THINKING [LO6, LO7, LO8]

Refer to the data for Provost Industries in Analytical Thinking in Chapter 4 (p. 194). Assume that the company uses the FIFO method in its process costing system.

Required:

- Prepare a report for the Finishing Department for April showing how much cost should have been assigned to the units completed and transferred to finished goods and how much cost should have been assigned to the ending work in process inventory.
- As stated in the case, the company experienced an increase in materials prices during April. Would the effects of this price increase tend to show up more under the weighted-average method or under the FIFO method? Why?

