

Supplement: Process Costing Using the FIFO Method

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
- A Comparison of Costing Methods

LEARNING OBJECTIVES

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

- LO5** Compute the equivalent units of production using the FIFO method.
- LO6** Compute the cost per equivalent unit using the FIFO method.
- LO7** Assign costs to units 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.

Equivalent Units—FIFO Method

LEARNING OBJECTIVE 5

Compute the equivalent units of production using the 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 work in process 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:

$$\begin{array}{l}
 \text{FIFO METHOD} \\
 \text{(a separate calculation is made for each cost category in} \\
 \text{each processing department)} \\
 \\
 \text{Equivalent units} \\
 \text{of production} = \text{Equivalent units to complete beginning work in process inventory}^* \\
 \quad + \text{Units started and completed during the period} \\
 \quad + \text{Equivalent units in ending work in process inventory} \\
 \\
 \text{*Equivalent units} \\
 \text{to complete} \\
 \text{beginning work in} \\
 \text{process inventory} = \text{Units in beginning} \\
 \text{work in process} \times \left(\text{Percentage completion} \right. \\
 \text{inventory} \quad \quad \quad \left. \text{of beginning work in} \right. \\
 \quad \quad \quad \quad \quad \quad \quad \quad \left. \text{process inventory} \right) \\
 \\
 \text{Or, the equivalent units of production can also be determined as follows:} \\
 \\
 \text{Equivalent units} \\
 \text{of production} = \text{Units transferred out} \\
 \quad + \text{Equivalent units in ending work in process inventory} \\
 \quad - \text{Equivalent units in beginning work in process inventory}
 \end{array}$$

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

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

	Materials	Conversion
To complete beginning work in process:		
Materials: 200 units × (100% – 55%)*	90	
Conversion: 200 units × (100% – 30%)*		140
Units started and completed during the period	4,600 [†]	4,600 [†]
Ending work in process:		
Materials: 400 units × 40% complete	160	
Conversion: 400 units × 25% complete		<u>100</u>
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 less 200 units in beginning work in process inventory. The FIFO method assumes that the units in beginning inventory are finished first.

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 Chapter 4, 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 × 55%	110	
200 units × 30%		<u>60</u>
Equivalent units—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 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 due to work performed in the current period.

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)

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

LEARNING OBJECTIVE 6

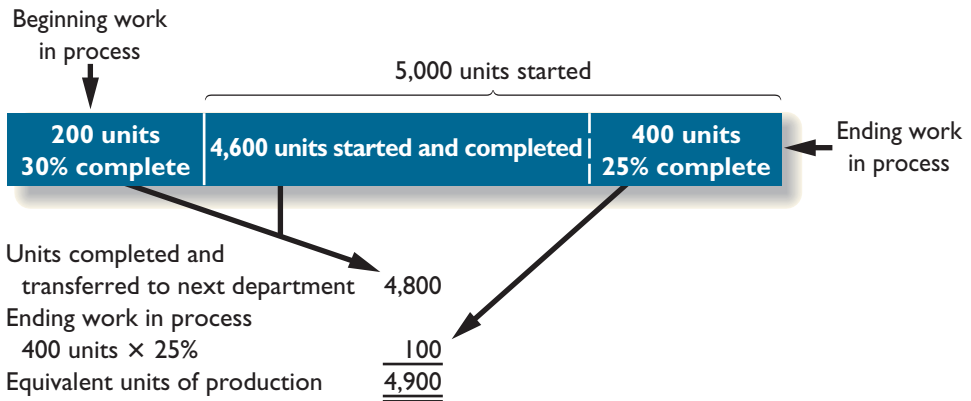
Compute the cost per equivalent unit using the FIFO method.

EXHIBIT 4S-2

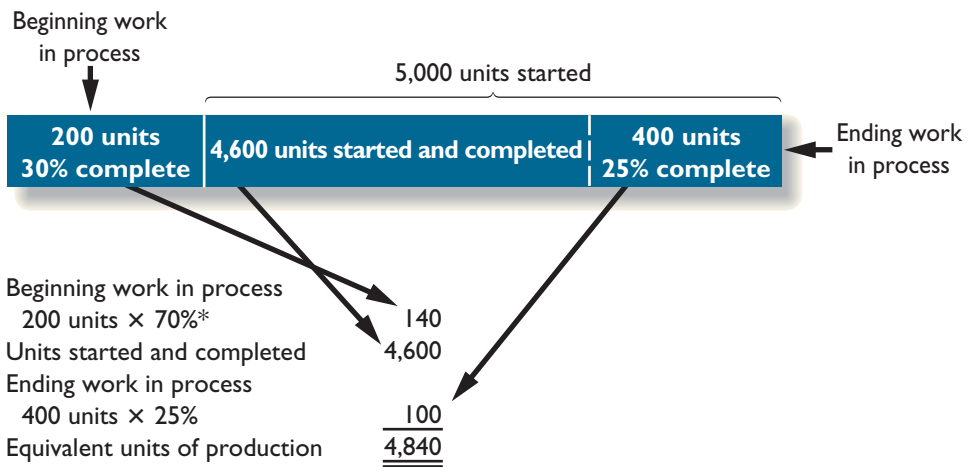
Visual Perspective of Equivalent Units of Production

**Double Diamond Skis
Shaping and Milling Department
Conversion Costs**

Weighted-Average Method



FIFO Method



* 100% – 30% = 70%. This 70% represents the work needed to complete the units in the beginning inventory.

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

LEARNING OBJECTIVE 7

Assign costs to units using the FIFO method.

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. Since 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.

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 (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	\$683,100
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.

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)	719,500
Total cost to be accounted for	<u>\$734,675</u>
Costs accounted for as follows:	
Cost of ending work in process inventory (see above)	\$ 19,410
Cost of units transferred out (see above)	715,265
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

