

FIFO and WA method: comparison and use in a Process Costing System

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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).

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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)

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

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

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Equivalent units under FIFO method are calculated using the following formula:

$$\text{Equivalent units for each cost component} = (100\% - A) \times B + C + D \times E$$

Where

A = percentage of completion at the end of last period

B = units in opening work in process

C = units added/started and transferred out

D = percentage of completion of units in closing work in process

E = units in closing work in process

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

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

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In the weighted average method, total equivalent units for the process for a period are calculated using the following formula:

$$\text{Total equivalent units for a cost component} = A + B \times C$$

Where

A = units transferred out to the next department/finished goods

B = units in closing work in process

C = percentage of completion with respect to the relevant cost component

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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 have started and completed 4,600 units during May. The 200 units in the beginning inventory were 50% 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 50% of materials costs ($100\% - 50\% = 50\%$) and another 70% of conversion costs ($100\% - 30\% = 70\%$).

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Production Report Milling



Work in process, May 1: 200 units	Cost
Materials: 50% complete.	\$ 3,000
Conversion: 30% complete.	1,000

Units started into production in May:	5,000
Units completed and transferred out in May:	4,800

Costs added to production in May	
Materials cost	\$ 74,000
Conversion cost	70,000

Work in process, May 31: 400 units	
Materials	40% complete.
Conversion	25% complete.

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Following this line of reasoning, the equivalent units for the department for May would be computed as shown.

	Materials	Conversion
To complete beg WIP:		
Materials: $200 \times (100\% - 50\%)$ ⁽¹⁾	100	
Conversion: $200 \times (100\% - 30\%)$ ⁽¹⁾		140
Units started and completed during the period ⁽²⁾	4,600	4,600
Ending WIP		
Materials: $400 \times 40\%$ complete	160	
Conversion: $400 \times 25\%$ complete		100
Equivalent units of production	4,860	4,840

⁽¹⁾ This is the work needed to complete the units in beginning inventory.

⁽²⁾ 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.

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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	Material	Conversion
Equivalent units – Weighted average method	4,960	4,900
Less equivalent units in beginning inventory:		
200 x 50%	100	
200 x 30%		60
Equivalent Units of production – FIFO method	4,860	4,840

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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.

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