

# Chapter 4

## Systems Design: Process Costing

### Solutions to Questions

**4-1** A process costing system should be used in situations where a homogeneous product is produced on a continuous basis.

**4-2**

1. Job-order costing and process costing have the same basic purposes—to assign materials, labor, and overhead cost to products and to provide a mechanism for computing unit product costs.
2. Both systems use the same basic manufacturing accounts.
3. Costs flow through the accounts in basically the same way in both systems.

**4-3** Costs are accumulated by department in a process costing system.

**4-4** In a process costing system, the activity performed in a department must be performed uniformly on all units moving through it and the output of the department must be homogeneous.

**4-5** Cost accumulation is simpler under process costing because costs only need to be assigned to departments—not separate jobs. A company usually has a small number of processing departments, whereas a job-order costing system often must keep track of the costs of hundreds or even thousands of jobs.

**4-6** In a process costing system, a Work in Process account is maintained for each separate processing department.

**4-7** The journal entry would be:  
Work in Process, Firing ..... XXXX  
    Work in Process, Mixing . . . . . XXXX

**4-8** The costs that might be added in the Firing Department include: (1) costs transferred in from the Mixing Department; (2) materials costs added in the Firing Department; (3) labor costs added in the Firing Department; and (4) overhead costs added in the Firing Department.

**4-9** Under the weighted-average method, equivalent units of production consist of units transferred to the next department (or to finished goods) during the period plus the equivalent units in the department's ending work in process inventory.

**4-10** A quantity schedule summarizes the physical flow of units through a department during a period. It serves several purposes. First, it provides information about activity in the department and also shows the stage of completion of any in-process units. Second, it provides data for computing the equivalent units and for preparing the other parts of the production report.

**4-11** In process costing a unit of product accumulates cost in each department that it passes through, with the costs of one department added to the costs of the preceding department in a snowballing fashion.

**4-12** The company will want to distinguish between the costs of the metals used to make the medallions, but the medals are otherwise identical and go through the same production processes. Thus, operation costing is ideally suited for the company's needs.

**4-13** Any company that manufactures products that have some common characteristics and some individual characteristics may want to use operation costing. Examples include textiles, shoes, electronic parts, and clothing.

**4-14** Under the FIFO method, units transferred out are divided into two parts. One part consists of the units in the beginning inventory. Only the work needed *to complete* these units is shown as part of the equivalent units for the current period. The other part of the units transferred out consists of the units *started and completed* during the current period; these units are shown as a separate amount in the equivalent units computation under the FIFO method.

**4-15** Under the FIFO method, units transferred out are divided into two groups. The first group consists of units from the beginning work

in process inventory. The second group consists of units started and completed during the period.

**4-16** The FIFO method is superior to the weighted-average method for cost control because current performance should be measured in relation to costs of the current period only, and the weighted-average method mixes these costs in with costs of the prior period. Thus, under the weighted-average method, the department's apparent performance in the current period is influenced to some extent by what happened in a prior period.

**Exercise 4-1** (20 minutes)

a. To record issuing raw materials for use in production:		
Work in Process—Molding Department .....	23,000	
Work in Process—Firing Department.....	8,000	
Raw Materials.....		31,000
b. To record direct labor costs incurred:		
Work in Process—Molding Department .....	12,000	
Work in Process—Firing Department.....	7,000	
Wages Payable .....		19,000
c. To record applying manufacturing overhead:		
Work in Process—Molding Department .....	25,000	
Work in Process—Firing Department.....	37,000	
Manufacturing Overhead .....		62,000
d. To record transfer of unfired, molded bricks from the Molding Department to the Firing Department:		
Work in Process—Firing Department.....	57,000	
Work in Process—Molding Department ..		57,000
e. To record transfer of finished bricks from the Firing Department to the finished bricks warehouse:		
Finished Goods .....	103,000	
Work in Process—Firing Department .....		103,000
f. To record Cost of Goods Sold:		
Cost of Goods Sold.....	101,000	
Finished Goods.....		101,000

**Exercise 4-2** (10 minutes)

Weighted-Average Method

	<u>Equivalent Units (EU)</u>	
	<i>Materials</i>	<i>Conversion</i>
Units transferred out .....	190,000	190,000
Work in process, ending:		
15,000 units × 80% .....	12,000	
15,000 units × 40% .....	<u>          </u>	<u>6,000</u>
Equivalent units .....	<u>202,000</u>	<u>196,000</u>

**Exercise 4-3** (10 minutes)

FIFO Method

	<u>Equivalent Units (EU)</u>	
	<i>Materials</i>	<i>Conversion</i>
Work in process, beginning:		
30,000 units × 35%* .....	10,500	
30,000 units × 70%* .....		21,000
Started and completed during October** ....	160,000	160,000
Work in process, ending:		
15,000 units × 80% .....	12,000	
15,000 units × 40% .....	<u>        </u>	<u>6,000</u>
Equivalent units .....	<u>182,500</u>	<u>187,000</u>

\* Work needed to complete these units.

\*\* 175,000 units started – 15,000 units in ending work in process  
= 160,000 started and completed

**Exercise 4-4** (15 minutes)

Weighted-Average Method

	<i>Tons</i>
1. Work in process, June 1 .....	20,000
Started into production during the month .....	<u>190,000</u>
Total tons in process.....	210,000
Deduct work in process, June 30.....	<u>30,000</u>
Completed and transferred out during the month .....	<u>180,000</u>
2. Tons to be accounted for:	
Work in process, June 1 (materials 90% complete, labor and overhead 80% complete) .....	20,000
Started into production during the month.....	<u>190,000</u>
Total tons to be accounted for .....	<u>210,000</u>
Tons accounted for as follows:	
Transferred out during the month.....	180,000
Work in process, June 30 (materials 60% complete, labor and overhead 40% complete) .....	<u>30,000</u>
Total tons accounted for .....	<u>210,000</u>

**Exercise 4-5** (15 minutes)

FIFO Method

1. The number of tons completed and transferred out during the month is the same regardless of the costing method used. Thus, as in the similar exercise that is based on the weighted-average method, 180,000 tons would have been completed and transferred out. However, under the FIFO method we must break this down between the tons that were completed from the beginning inventory and the tons started and completed during the current period. This breakdown is shown in Part 2 below:

2. Tons to be accounted for:

Work in process, June 1 (materials 90% complete; labor and overhead 80% complete) .....	20,000
Started into production during the month .....	<u>190,000</u>
Total tons to be accounted for .....	<u>210,000</u>

Tons accounted for as follows:

Transferred out during the month:	
Tons from the beginning inventory .....	20,000
Tons started and completed during the month .....	160,000 *
Work in process, June 30 (materials 60% complete; labor and overhead 40% complete) .....	<u>30,000</u>
Total tons accounted for .....	<u>210,000</u>

\* 190,000 tons started into production – 30,000 tons in ending work in process = 160,000 tons started and completed.

**Exercise 4-6** (15 minutes)

Weighted-Average Method

1.

	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Work in process, May 1 .....	\$ 18,000	\$ 5,500	\$ 27,500
Cost added during May.....	<u>238,900</u>	<u>80,300</u>	<u>401,500</u>
Total cost (a).....	<u>\$256,900</u>	<u>\$85,800</u>	<u>\$429,000</u>
Equivalent units of production (b) ....	35,000	33,000	33,000
Cost per equivalent unit (a) ÷ (b).....	\$7.34	\$2.60	\$13.00

2.

Cost per EU for materials.....	\$ 7.34
Cost per EU for labor.....	2.60
Cost per EU for overhead .....	<u>13.00</u>
Total cost per EU .....	<u>\$22.94</u>



**Exercise 4-7** (20 minutes)

Weighted-Average Method

1. Computation of the total cost per EU:

Cost per EU for materials.....	\$12.50
Cost per EU for labor.....	3.20
Cost per EU for overhead .....	<u>6.40</u>
Total cost per EU .....	<u>\$22.10</u>

2. Computation of equivalent units in ending inventory:

	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Units in ending inventory .....	3,000	3,000	3,000
Percentage completed .....	80%	60%	60%
Equivalent units of production.....	2,400	1,800	1,800

3. Cost Reconciliation

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Over- head</i>
Cost accounted for as follows:				
Transferred to the next de- partment: 25,000 units at \$22.10 per unit.....	<u>\$552,500</u>	25,000	25,000	25,000
Work in process, ending:				
Materials, at \$12.50 per EU ..	30,000	2,400		
Labor, at \$3.20 per EU .....	5,760		1,800	
Overhead, at \$6.40 per EU ...	<u>11,520</u>			1,800
Total work in process.....	<u>47,280</u>			
Total cost accounted for .....	<u>\$599,780</u>			

**Exercise 4-8** (10 minutes)

FIFO Method

1.		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
	Cost added during May (a) .....	\$193,320	\$62,000	\$310,000
	Equivalent units of production (b) ...	27,000	25,000	25,000
	Cost per equivalent unit (a) ÷ (b)....	\$7.16	\$2.48	\$12.40
2.	Cost per EU for materials.....	\$ 7.16		
	Cost per EU for labor.....	2.48		
	Cost per EU for overhead.....	<u>12.40</u>		
	Total cost per EU .....	<u>\$22.04</u>		

**Exercise 4-9** (45 minutes)

FIFO Method

1. Computation of the total cost per EU:

Cost per EU for material .....	\$25.40
Cost per EU for conversion .....	<u>18.20</u>
Total cost per EU .....	<u>\$43.60</u>

2. Computation of equivalent units in ending inventory:

	<i>Materials</i>	<i>Conversion</i>
Units in ending inventory .....	300	300
Percentage completed .....	70%	60%
Equivalent units of production...	210	180

3. Computation of equivalent units required to complete the beginning inventory:

	<i>Materials</i>	<i>Conversion</i>
Units in beginning inventory .....	400	400
Percentage uncompleted .....	20%	60%
Equivalent units of production...	80	240

4. Units transferred to the next department .....	3,100
Units from the beginning inventory.....	<u>400</u>
Units started and completed during the period .....	<u>2,700</u>

**Exercise 4-9** (continued)

5. Cost Reconciliation

	<i>Total Cost</i>	<u><i>Equivalent Units</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to the next department:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 11,040		
Cost to complete these units:			
Materials at \$25.40 per EU .....	2,032	80	
Conversion at \$18.20 per EU .....	<u>4,368</u>		240
Total cost from beginning inventory .....	17,440		
Units started and completed this month at \$43.60 per unit .....	<u>117,720</u>	2,700	2,700
Total cost transferred to the next department.....	135,160		
Work in process, ending:			
Materials at \$25.40 per EU .....	5,334	210	
Conversion at \$18.20 per EU .....	<u>3,276</u>		180
Total work in process, ending.....	<u>8,610</u>		
Total cost accounted for.....	<u>\$143,770</u>		

**Exercise 4-10** (10 minutes)

Work in Process—Cooking.....	42,000	
Raw Materials Inventory .....		42,000
Work in Process—Cooking.....	50,000	
Work in Process—Molding .....	36,000	
Wages Payable.....		86,000
Work in Process—Cooking.....	75,000	
Work in Process—Molding .....	45,000	
Manufacturing Overhead.....		120,000
Work in Process—Molding .....	160,000	
Work in Process—Cooking.....		160,000
Finished Goods.....	240,000	
Work in Process—Molding .....		240,000

**Exercise 4-11** (15 minutes)

Weighted-Average Method

	<i>Quantity</i>	<i>Schedule</i>	
Pounds to be accounted for:			
Work in process, July 1 (materials 100% complete, conversion 30% complete) .....	20,000		
Started into production during July...	<u>380,000</u>		
Total pounds to be accounted for .....	<u>400,000</u>		
		<i>Equivalent Units (EU)</i>	
		<i>Materials</i>	<i>Conversion</i>
Pounds accounted for as follows:			
Transferred to next department during July* .....	375,000	375,000	375,000
Work in process, July 31 (materials 100% complete, conversion 60% complete) .....	<u>25,000</u>	<u>25,000</u>	<u>15,000</u>
Total pounds accounted for .....	<u>400,000</u>	<u>400,000</u>	<u>390,000</u>

\*  $20,000 + 380,000 - 25,000 = 375,000$

**Exercise 4-12** (15 minutes)

FIFO Method

	<i>Quantity Schedule</i>
Pounds to be accounted for:	
Work in process, July 1 (materials 100% complete, conversion 30% complete) .....	20,000
Started into production during July .....	<u>380,000</u>
Total pounds to be accounted for ...	<u>400,000</u>

	<i>Equivalent Units (EU)</i>		
	<i>Materials</i>	<i>Conversion</i>	
Pounds accounted for as follows			
Transferred to next department:			
From the beginning inventory....	20,000	0	14,000 *
Started and completed this month** .....	355,000	355,000	355,000
Work in process, July 31 (materials 100% complete, conversion 60% complete) .....	<u>25,000</u>	<u>25,000</u>	<u>15,000</u>
Total pounds accounted for .....	<u>400,000</u>	<u>380,000</u>	<u>384,000</u>

\* Work required to complete these units:

$20,000 \text{ pounds} \times (100\% - 30\%) = 14,000 \text{ pounds.}$

\*\*  $380,000 \text{ pounds started} - 25,000 \text{ pounds in ending work in process inventory} = 355,000 \text{ pounds started and completed this month.}$

**Exercise 4-13** (20 minutes)

Weighted-Average Method

1. For the sake of brevity, only the portion of the quantity schedule from which the equivalent units are computed is shown below.

	<i>Quantity Schedule</i>	<i>Equivalent Units (EU)</i>	
		<i>Materials</i>	<i>Conversion</i>
Units accounted for as follows:			
Transferred to the next process .....	175,000	175,000	175,000
Work in process, May 31 (materials 100% complete, conversion 30% complete).....	<u>10,000</u>	<u>10,000</u>	<u>3,000</u>
Total units accounted for .....	<u>185,000</u>	<u>185,000</u>	<u>178,000</u>

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
2.				
Cost to be accounted for:				
Work in process, May 1 .....	\$ 5,500	\$ 1,500	\$ 4,000	
Cost added by the department .....	<u>406,000</u>	<u>54,000</u>	<u>352,000</u>	
Total cost to be accounted for (a) .....	<u>\$411,500</u>	<u>\$55,500</u>	<u>\$356,000</u>	
Equivalent units (b) .....		185,000	178,000	
Cost per equivalent unit (a) ÷ (b).....		\$0.30	+	\$2.00 = \$2.30



**Exercise 4-14** (15 minutes)

Weighted-Average Method

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to the next process (175,000 units × \$2.30 per unit).....	\$402,500	175,000	175,000
Work in process, May 31:			
Materials, at \$0.30 per EU.....	3,000	10,000	
Conversion, at \$2.00 per EU.....	<u>6,000</u>		3,000
Total work in process.....	<u>9,000</u>		
Total cost accounted for .....	<u>\$411,500</u>		

**Exercise 4-15** (20 minutes)

FIFO Method

1. Quantity schedule and equivalent units:

	<i>Quantity Schedule</i>		
Units to be accounted for:			
Work in process, May 1 (materials 100% complete, conversion 40% complete) .....	5,000		
Started into production .....	<u>180,000</u>		
Total units to be accounted for .....	<u>185,000</u>		
		<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Units accounted for as follows:			
Transferred to the next process:			
From the beginning inventory .....	5,000	0	3,000 *
Started and completed this month** .....	170,000	170,000	170,000
Work in process, May 31 (materials 100% complete, conversion 30% complete) .....	<u>10,000</u>	<u>10,000</u>	<u>3,000</u>
Total units accounted for .....	<u>185,000</u>	<u>180,000</u>	<u>176,000</u>

\* Work needed to complete the units in beginning inventory.

\*\* 180,000 units started into production – 10,000 units in ending work in process = 170,000 units started and completed

**Exercise 4-15** (continued)

2.

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, May 1 .....	\$ 5,500			
Cost added by the department (a) .....	<u>406,000</u>	\$54,000	\$352,000	
Total cost to be accounted for.....	<u>\$411,500</u>			
Equivalent units (b) .....		180,000	176,000	
Cost per equivalent unit (a) ÷ (b).....		\$0.30 +	\$2.00 =	\$2.30

**Exercise 4-16** (20 minutes)

FIFO Method

	<i>Total</i>	<u><i>Equivalent Units (EU)</i></u>	
	<i>Cost</i>	<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to the next process:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 5,500		
Cost to complete these units:			
Materials, at \$0.30 per EU .....	0	0	
Conversion, at \$2.00 per EU .....	<u>6,000</u>		3,000
Total cost from beginning inventory..	11,500		
Units started and completed this month: 170,000 units × \$2.30 per unit.....			
	<u>391,000</u>	170,000	170,000
Total cost transferred.....	<u>402,500</u>		
Work in process, May 31:			
Materials, at \$0.30 per EU.....	3,000	10,000	
Conversion, at \$2.00 per EU.....	<u>6,000</u>		3,000
Total work in process .....	<u>9,000</u>		
Total cost accounted for .....	<u>\$411,500</u>		

**Exercise 4-17** (20 minutes)

Weighted-Average Method

1.

*Quantity  
Schedule*

Units to be accounted for:

Work in process, beginning (materials 80% complete, labor and overhead 60% complete) .....	5,000
Started into production.....	<u>45,000</u>
Total units to be accounted for...	<u>50,000</u>

*Equivalent Units (EU)*

Units accounted for as follows:

		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Transferred to the next de- partment .....	42,000	42,000	42,000	42,000
Work in process, ending (ma- terials 75% complete, labor and overhead 50% com- plete) .....	<u>8,000</u>	<u>6,000</u>	<u>4,000</u>	<u>4,000</u>
Total units accounted for .....	<u>50,000</u>	<u>48,000</u>	<u>46,000</u>	<u>46,000</u>

**Exercise 4-17** (continued)

2.	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, beginning .....	\$ 7,150	\$ 4,320	\$ 1,040	\$ 1,790	
Cost added by the department ....	<u>106,550</u>	<u>52,800</u>	<u>21,500</u>	<u>32,250</u>	
Total cost to be accounted for (a) ..	<u>\$113,700</u>	<u>\$57,120</u>	<u>\$22,540</u>	<u>\$34,040</u>	
Equivalent units (b) .....		48,000	46,000	46,000	
Cost per equivalent unit (a) ÷ (b)...		\$1.19	\$0.49 +	\$0.74 =	\$2.42

**Exercise 4-18** (20 minutes)

FIFO Method

1.

	<i>Quantity Schedule</i>
Units to be accounted for:	
Work in process, beginning (materials 80% complete, labor and overhead 60% complete) .....	5,000
Started into production.....	<u>45,000</u>
Total units accounted for .....	<u>50,000</u>

	<u><i>Equivalent Units (EU)</i></u>		
	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Units accounted for as follows:			
Transferred to the next department:			
From the beginning inventory.....	5,000	1,000 *	2,000 *
Started and completed this month** .....	37,000	37,000	37,000
Work in process, ending (materials 75% complete, labor and overhead 50% complete) .....	<u>8,000</u>	<u>6,000</u>	<u>4,000</u>
Total units accounted for .....	<u>50,000</u>	<u>44,000</u>	<u>43,000</u>

\* Work required to complete the beginning inventory.

\*\* 45,000 units started into production – 8,000 units in ending work in process  
= 37,000 started and completed

**Exercise 4-18** (continued)

2.

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, beginning .....	\$ 7,150				
Cost added during the month (a) ..	<u>106,550</u>	\$52,800	\$21,500	\$32,250	
Total cost to be accounted for.....	<u>\$113,700</u>				
Equivalent units (b) .....		44,000	43,000	43,000	
Cost per equivalent unit (a) ÷ (b)....		\$1.20	+ \$0.50	+ \$0.75	= \$2.45



**Problem 4-19** (45 minutes)

Weighted-Average Method

1., 2., and 3.

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<i>Equivalent Units (EU)</i>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Units to be accounted for:				
Work in process, May 1 (materials 100% complete; labor and overhead 80% complete) .....	10,000			
Started into production.....	<u>100,000</u>			
Total units to be accounted for.....	<u>110,000</u>			
Units accounted for as follows:				
Transferred out .....	95,000	95,000	95,000	95,000
Work in process, May 31 (materials 60% complete; labor and overhead 20% complete).....	<u>15,000</u>	<u>9,000</u>	<u>3,000</u>	<u>3,000</u>
Total units accounted for .....	<u>110,000</u>	<u>104,000</u>	<u>98,000</u>	<u>98,000</u>

**Problem 4-19** (continued)

*Cost per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, May 1 .....	\$ 8,700	\$ 1,500	\$ 1,800	\$ 5,400	
Cost added during the month .....	<u>245,300</u>	<u>154,500</u>	<u>22,700</u>	<u>68,100</u>	
Total cost to be accounted for (a) ...	<u>\$254,000</u>	<u>\$156,000</u>	<u>\$24,500</u>	<u>\$73,500</u>	
Equivalent units (b) .....		104,000	98,000	98,000	
Cost per equivalent unit (a) ÷ (b) ...		\$1.50 +	\$0.25 +	\$0.75 =	\$2.50

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Cost accounted for as follows:				
Transferred out: 95,000 units × \$2.50 per unit .....	<u>\$237,500</u>	95,000	95,000	95,000
Work in process, May 31:				
Materials, at \$1.50 per EU .....	13,500	9,000		
Labor, at \$0.25 per EU .....	750		3,000	
Overhead, at \$0.75 per EU .....	<u>2,250</u>			3,000
Total work in process .....	<u>16,500</u>			
Total cost accounted for .....	<u>\$254,000</u>			

**Problem 4-20** (45 minutes)

FIFO Method

1. 2., and 3.

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Units to be accounted for:			
Work in process, July 1 (materials 100% complete; conversion 30% complete) .....	10,000		
Started into production.....	<u>170,000</u>		
Total units to be accounted for.....	<u>180,000</u>		
Units accounted for as follows:			
Transferred to packaging:			
From the beginning inventory.....	10,000	0	7,000*
Started and completed this month** .....	150,000	150,000	150,000
Work in process, July 31 (materials 100% complete; conversion 40% complete) .....	<u>20,000</u>	<u>20,000</u>	<u>8,000</u>
Total units accounted for .....	<u>180,000</u>	<u>170,000</u>	<u>165,000</u>

\*  $10,000 \times (100\% - 30\%) = 7,000$

\*\*  $170,000$  units started into production –  $20,000$  units in ending work in process  
=  $150,000$  units started and completed

**Problem 4-20** (continued)

*Cost per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, July 1 .....	\$ 13,400			
Cost added by the department (a) .....	<u>383,600</u>	\$139,400	\$244,200	
Total cost to be accounted for .....	<u>\$397,000</u>			
Equivalent units (b) .....		170,000	165,000	
Cost per equivalent unit (a) ÷ (b) .....		\$0.82 +	\$1.48	= \$2.30

**Problem 4-20** (continued)

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to packaging:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 13,400		
Cost to complete these units:			
Materials, at \$0.82 per EU .....	0	0	
Conversion, at \$1.48 per EU .....	<u>10,360</u>		7,000
Total cost from beginning inventory.....	23,760		
Started and completed this month:			
150,000 units × \$2.30 per unit .....	<u>345,000</u>	150,000	150,000
Total cost transferred.....	<u>368,760</u>		
Work in process, July 31:			
Materials, at \$0.82 per EU.....	16,400	20,000	
Conversion, at \$1.48 per EU.....	<u>11,840</u>		8,000
Total work in process .....	<u>28,240</u>		
Total cost accounted for .....	<u>\$397,000</u>		

**Problem 4-21** (45 minutes)

Weighted-Average Method

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Units to be accounted for:			
Work in process, June 1 (materials 100% complete, conversion 75% complete) .....	20,000		
Started into production.....	<u>180,000</u>		
Total units to be accounted for.....	<u>200,000</u>		
Units accounted for as follows:			
Transferred to bottling: .....	160,000	160,000	160,000
Work in process, June 30 (materials 100% complete, conversion 25% complete) .....	<u>40,000</u>	<u>40,000</u>	<u>10,000</u>
Total units accounted for .....	<u>200,000</u>	<u>200,000</u>	<u>170,000</u>

**Problem 4-21** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, June 1 .....	\$ 50,000	\$ 25,200	\$ 24,800	
Cost added during June.....	<u>573,500</u>	<u>334,800</u>	<u>238,700</u>	
Total cost to be accounted for (a).....	<u>\$623,500</u>	<u>\$360,000</u>	<u>\$263,500</u>	
Equivalent units (b) .....		200,000	170,000	
Cost per equivalent unit (a) ÷ (b) .....		\$1.80	+ \$1.55	= \$3.35

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to bottling:			
160,000 units × \$3.35 per unit.....	<u>\$536,000</u>	160,000	160,000
Work in process, June 30:			
Materials, at \$1.80 per EU.....	72,000	40,000	
Conversion, at \$1.55 per EU.....	<u>15,500</u>		10,000
Total work in process .....	<u>87,500</u>		
Total cost accounted for .....	<u>\$623,500</u>		

**Problem 4-22** (45 minutes)

FIFO Method

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>		
Units to be accounted for:			
Work in process, June 1 (materials 100% complete, conversion 75% complete) .....	20,000		
Started into production.....	<u>180,000</u>		
Total units to be accounted for.....	<u>200,000</u>		
		<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Units accounted for as follows:			
Transferred to bottling:			
From the beginning inventory.....	20,000	0	5,000 *
Started and completed this month** .....	140,000	140,000	140,000
Work in process, June 30 (materials 100% complete, conversion 25% complete) .....	<u>40,000</u>	<u>40,000</u>	<u>10,000</u>
Total units accounted for .....	<u>200,000</u>	<u>180,000</u>	<u>155,000</u>

\*  $20,000 \times (100\% - 75\%) = 5,000$

\*\*  $180,000$  units started into production –  $40,000$  units in ending work in process  
=  $140,000$  units started and completed



**Problem 4-22** (continued)

*Cost per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, June 1 .....	\$ 50,000			
Cost added during June (a) .....	<u>573,500</u>	\$334,800	\$238,700	
Total cost to be accounted for .....	<u>\$623,500</u>			
Equivalent units (b) .....		180,000	155,000	
Cost per equivalent unit (a) ÷ (b) .....		\$1.86 +	\$1.54 =	\$3.40

**Problem 4-22** (continued)

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to bottling:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 50,000		
Cost to complete these units:			
Materials, at \$1.86 per EU.....	0	0	
Conversion, at \$1.54 per EU.....	<u>7,700</u>		5,000
Total cost from beginning inventory.....	57,700		
Units started and completed during June:			
140,000 units × \$3.40 per unit .....	<u>476,000</u>	140,000	140,000
Total cost transferred to bottling.....	<u>533,700</u>		
Work in process, June 30:			
Materials, at \$1.86 per EU.....	74,400	40,000	
Conversion, at \$1.54 per EU.....	<u>15,400</u>		10,000
Total work in process .....	<u>89,800</u>		
Total cost accounted for .....	<u>\$623,500</u>		

**Problem 4-23** (45 minutes)

Weighted-Average Method

1. A completed production report follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Labor &amp; Overhead</i>
Pounds to be accounted for:			
Work in process, May 1 (materials 100% complete, labor and overhead 1/3 complete).....	18,000		
Started into production .....	<u>167,000</u>		
Total pounds to be accounted for .....	<u>185,000</u>		
Pounds accounted for as follows:			
Transferred to mixing .....	170,000	170,000	170,000
Work in process, May 31 (materials 100% complete, labor and overhead 2/3 complete).....	<u>15,000</u>	<u>15,000</u>	<u>10,000</u>
Total pounds accounted for.....	<u>185,000</u>	<u>185,000</u>	<u>180,000</u>

**Problem 4-23** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor &amp; Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, May 1 .....	\$ 21,800	\$ 14,600	\$ 7,200	
Cost added during May.....	<u>360,200</u>	<u>133,400</u>	<u>226,800</u>	
Total cost to be accounted for (a).....	<u>\$382,000</u>	<u>\$148,000</u>	<u>\$234,000</u>	
Equivalent units (b) .....		185,000	180,000	
Cost per equivalent unit (a) ÷ (b) .....		\$0.80 +	\$1.30 =	\$2.10

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Labor &amp; Over- head</i>
Cost accounted for as follows:			
Transferred to mixing: 170,000 units × \$2.10 per unit.....	<u>\$357,000</u>	170,000	170,000
Work in process, May 31:			
Materials, at \$0.80 per EU .....	12,000	15,000	
Labor and overhead, at \$1.30 per EU ....	<u>13,000</u>		10,000
Total work in process.....	<u>25,000</u>		
Total cost accounted for .....	<u>\$382,000</u>		

### **Problem 4-23** (continued)

2. The weighted-average method mixes costs of the prior period with current period costs. Thus, under the weighted-average method, unit costs are influenced to some extent by what happened in a prior period. This problem becomes particularly significant when attempting to measure performance in the current period. Good cost control in the current period might be concealed to some degree by the unit costs that have been brought forward in the beginning inventory. The reverse could also be true in that poor cost control might be concealed by the costs of the prior period that have been brought forward and added in with current period costs.

**Problem 4-24** (45 minutes)

FIFO Method

The completed production report follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Materials</i>	<i>Conversion</i>
Gallons to be accounted for:			
Work in process, April 1 (materials 100% complete, conversion 80% complete) .....	10,000		
Started into production.....	<u>140,000</u>		
Total gallons to be accounted for.....	<u>150,000</u>		
Gallons accounted for as follows:			
Transferred to mixing:			
From the beginning inventory.....	10,000	0	2,000 *
Started and completed this month** .....	110,000	110,000	110,000
Work in process, April 30 (materials 100% complete, conversion 60% complete) .....	<u>30,000</u>	<u>30,000</u>	<u>18,000</u>
Total gallons accounted for .....	<u>150,000</u>	<u>140,000</u>	<u>130,000</u>

\* Work required to complete units in beginning inventory

\*\* 140,000 units started – 30,000 units in ending work in process = 110,000 started and completed

**Problem 4-24** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:				
Work in process, April 1 .....	\$ 39,000			
Cost added during April (a).....	<u>571,000</u>	\$259,000	\$312,000	
Total cost to be accounted for .....	<u>\$610,000</u>			
Equivalent units (b) .....		140,000	130,000	
Cost per equivalent unit (a) ÷ (b) .....		\$1.85 +	\$2.40 =	\$4.25

**Problem 4-24** (continued)

*Cost Reconciliation*

	<i>Total</i>	<u><i>Equivalent Units (EU)</i></u>	
	<i>Cost</i>	<i>Materials</i>	<i>Conversion</i>
Cost accounted for as follows:			
Transferred to Mixing:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 39,000		
Cost to complete these units:			
Materials, at \$1.85 per EU.....	0	0	
Conversion, at \$2.40 per EU .....	<u>4,800</u>		2,000
Total cost from beginning inventory.....	43,800		
Gallons started and completed during April:			
110,000 × \$4.25 per unit .....	<u>467,500</u>	110,000	110,000
Total cost transferred to Mixing.....	<u>511,300</u>		
Work in process, April 30:			
Materials, at \$1.85 per EU.....	55,500	30,000	
Conversion, at \$2.40 per EU.....	<u>43,200</u>		18,000
Total work in process .....	<u>98,700</u>		
Total cost accounted for .....	<u>\$610,000</u>		



**Problem 4-25** (30 minutes)

Weighted-Average Method

1. The equivalent units for the month would be:

	<i>Quantity Schedule</i>	<i>Equivalent Units (EU)</i>	
		<i>Materials</i>	<i>Conversion</i>
Units accounted for as follows:			
Transferred to next department.....	190,000	190,000	190,000
Work in process, April 30 (materials 75% complete, conversion 60% complete) .....	<u>40,000</u>	<u>30,000</u>	<u>24,000</u>
Total units accounted for .....	<u>230,000</u>	<u>220,000</u>	<u>214,000</u>

2.

	<i>Total Cost</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Work in process, April 1.....	\$ 98,000	\$ 67,800	\$ 30,200	
Cost added during the month.....	<u>827,000</u>	<u>579,000</u>	<u>248,000</u>	
Total cost (a).....	<u>\$925,000</u>	<u>\$646,800</u>	<u>\$278,200</u>	
Equivalent units (b).....		220,000	214,000	
Cost per equivalent unit (a) ÷ (b).....		\$2.94 +	\$1.30 =	\$4.24

3.

Total units transferred.....	190,000
Less units in the beginning inventory.....	<u>30,000</u>
Units started and completed during April .....	<u>160,000</u>

**Problem 4-25** (continued)

4. No, the manager should not be rewarded for good cost control. The Mixing Department's low unit cost for April occurred because the costs of the prior month have been averaged in with April's costs. This is a major criticism of the weighted-average method in that the costs computed for product costing purposes can't be used to evaluate cost control or to measure performance for the *current* period.

**Problem 4-26** (90 minutes)

Weighted-Average Method

1. a.	Work in Process—Refining Department .....	495,000	
	Work in Process—Blending Department .....	115,000	
	Raw Materials.....		610,000
b.	Work in Process—Refining Department .....	72,000	
	Work in Process—Blending Department .....	18,000	
	Salaries and Wages Payable .....		90,000
c.	Manufacturing Overhead .....	225,000	
	Accounts Payable.....		225,000
d.	Work in Process—Refining Department.....	181,000	
	Manufacturing Overhead .....		181,000
d.	Work in Process—Blending Department .....	42,000	
	Manufacturing Overhead .....		42,000
e.	Work in Process—Blending Department .....	740,000	
	Work in Process—Refining Department .....		740,000
f.	Finished Goods.....	950,000	
	Work in Process—Blending Department .....		950,000
g.	Accounts Receivable.....	1,500,000	
	Sales .....		1,500,000
	Cost of Goods Sold.....	900,000	
	Finished Goods .....		900,000

**Problem 4-26** (continued)

2.

Accounts Receivable	
(g)	1,500,000

Raw Materials	
Bal.	618,000
	610,000 (a)
Bal.	8,000

Work in Process Refining Department	
Bal.	38,000
(a)	495,000
(b)	72,000
(d)	181,000
Bal.	46,000
	740,000 (e)

Work in Process Blending Department	
Bal.	65,000
(a)	115,000
(b)	18,000
(d)	42,000
(e)	740,000
Bal.	30,000
	950,000 (f)

Finished Goods	
Bal.	20,000
(f)	950,000
Bal.	70,000
	900,000 (g)

Manufacturing Overhead	
(c)	225,000
Bal.	2,000
	223,000 (d)

Accounts Payable	
	225,000 (c)

Salaries and Wages Payable	
	90,000 (b)

Sales	
	1,500,000 (g)

Cost of Goods Sold	
(g)	900,000

**Problem 4-26** (continued)

3. The production report for the refining department follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<i>Equivalent Units (EU)</i>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Gallons to be accounted for:				
Work in process, March 1 (materials 100% complete, labor and overhead 90% complete) .....	20,000			
Started into production.....	<u>390,000</u>			
Total gallons to be accounted for.....	<u>410,000</u>			
Gallons accounted for as follows:				
Transferred to blending*	370,000	370,000	370,000	370,000
Work in process, March 31 (materials 75% complete, labor and overhead 25% complete) .....	<u>40,000</u>	<u>30,000</u>	<u>10,000</u>	<u>10,000</u>
Total gallons accounted for .....	<u>410,000</u>	<u>400,000</u>	<u>380,000</u>	<u>380,000</u>

\* 410,000 gallons – 40,000 gallons = 370,000 gallons

**Problem 4-26** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, March 1 .....	\$ 38,000	\$ 25,000	\$ 4,000	\$ 9,000	
Cost added during March.....	<u>748,000</u>	<u>495,000</u>	<u>72,000</u>	<u>181,000</u>	
Total cost to be accounted for (a).....	<u>\$786,000</u>	<u>\$520,000</u>	<u>\$76,000</u>	<u>\$190,000</u>	
Equivalent units (b) .....		400,000	380,000	380,000	
Cost per equivalent unit (a) ÷ (b) .....		\$1.30	+ \$0.20	+ \$0.50	= \$2.00

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Cost accounted for as follows:				
Transferred to blending: 370,000 gallons × \$2.00 per gallon .....	<u>\$740,000</u>	370,000	370,000	370,000
Work in process, March 31:				
Materials, at \$1.30 per EU.....	39,000	30,000		
Labor, at \$0.20 per EU .....	2,000		10,000	
Overhead, at \$0.50 per EU.....	<u>5,000</u>			10,000
Total work in process .....	<u>46,000</u>			
Total cost accounted for .....	<u>\$786,000</u>			

**Problem 4-27** (60 minutes)

Weighted-Average Method

1. The equivalent units would be:

	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Units completed during the year.....	900,000	900,000	900,000
Work in process, Dec. 31:			
300,000 units × 100% .....	300,000		
300,000 units × 50%.....	<u>          </u>	<u>150,000</u>	<u>150,000</u>
Total equivalent units (a).....	<u>1,200,000</u>	<u>1,050,000</u>	<u>1,050,000</u>

The costs per equivalent unit would be:

	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Work in process, January 1 .....	\$ 200,000	\$ 315,000	\$ 189,000 *	
Cost added during the year.....	<u>1,300,000</u>	<u>1,995,000</u>	<u>1,197,000 **</u>	
Total costs (b) .....	<u>\$1,500,000</u>	<u>\$2,310,000</u>	<u>\$1,386,000</u>	
Cost per equivalent unit (b) ÷ (a).....	\$1.25 +	\$2.20 +	\$1.32 =	\$4.77

\* 60% × \$315,000 = \$189,000

\*\* 60% × \$1,995,000 = \$1,197,000

**Problem 4-27** (continued)

2. The amount of cost that should be assigned to the ending inventories is:

	<i>Work in Process</i>	<i>Finished Goods</i>	<i>Total</i>
Work in process:			
Materials: 300,000 units × \$1.25 per unit .....	\$375,000		\$ 375,000
Labor: 150,000 EU × \$2.20 per unit.....	330,000		330,000
Overhead: 150,000 EU × \$1.32 per unit.....	198,000		198,000
Finished goods: 200,000 units × \$4.77 per unit...		<u>\$954,000</u>	<u>954,000</u>
Total cost to be assigned to inventories .....	<u>\$903,000</u>	<u>\$954,000</u>	<u>\$1,857,000</u>

3. The necessary adjustments would be:

	<i>Work in Process</i>	<i>Finished Goods</i>	<i>Total</i>
Cost to be assigned to inventories (above) .....	\$903,000	\$ 954,000	\$1,857,000
Year-end balances in the accounts .....	<u>660,960</u>	<u>1,009,800</u>	<u>1,670,760</u>
Difference .....	<u>\$242,040</u>	<u>\$ (55,800)</u>	<u>\$ 186,240</u>

Work in Process Inventory .....	242,040	
Finished Goods Inventory .....		55,800
Cost of Goods Sold .....		186,240



**Problem 4-27** (continued)

4. The simplest computation of the cost of goods sold would be:

Beginning finished goods inventory.....	0
Units completed during the year.....	<u>900,000</u>
Units available for sale.....	900,000
Less units in ending finished goods inventory .....	<u>200,000</u>
Units sold during the year .....	700,000
Cost per equivalent unit (from part 1).....	<u>× \$4.77</u>
Cost of goods sold.....	<u><u>\$3,339,000</u></u>

Alternative computation:

Total manufacturing cost incurred:

Materials (part 1).....	\$1,500,000
Labor (part 1) .....	2,310,000
Overhead (part 1).....	<u>1,386,000</u>
Total manufacturing cost .....	5,196,000
Less cost assigned to inventories (part 2).....	<u>1,857,000</u>
Cost of goods sold.....	<u><u>\$3,339,000</u></u>

**Problem 4-28** (90 minutes)

Weighted-Average Method

1. a.	Work in Process—Cooking Department .....	570,000	
	Work in Process—Bottling Department.....	130,000	
	Raw Materials.....		700,000
b.	Work in Process—Cooking Department .....	100,000	
	Work in Process—Bottling Department.....	80,000	
	Salaries and Wages Payable .....		180,000
c.	Manufacturing Overhead .....	400,000	
	Accounts Payable .....		400,000
d.	Work in Process—Cooking Department .....	235,000	
	Work in Process—Bottling Department.....	158,000	
	Manufacturing Overhead .....		393,000
e.	Work in Process—Bottling Department.....	900,000	
	Work in Process—Cooking Department ..		900,000
f.	Finished Goods .....	1,300,000	
	Work in Process—Bottling Department...		1,300,000
g.	Accounts Receivable.....	2,000,000	
	Sales .....		2,000,000
	Cost of Goods Sold.....	1,250,000	
	Finished Goods .....		1,250,000

**Problem 4-28** (continued)

2.

Accounts Receivable	
(g) 2,000,000	

Raw Materials	
Bal. 710,000	700,000 (a)
Bal. 10,000	

Work in Process Cooking Department	
Bal. 61,000	900,000 (e)
(a) 570,000	
(b) 100,000	
(d) 235,000	
Bal. 66,000	

Work in Process Bottling Department	
Bal. 85,000	1,300,000 (f)
(a) 130,000	
(b) 80,000	
(d) 158,000	
(e) 900,000	
Bal. 53,000	

Finished Goods	
Bal. 45,000	1,250,000 (g)
(f) 1,300,000	
Bal. 95,000	

Manufacturing Overhead	
(c) 400,000	393,000 (d)
Bal. 7,000	

Accounts Payable	
	400,000 (c)

Salaries and Wages Payable	
	180,000 (b)

Sales	
	2,000,000 (g)

Cost of Goods Sold	
(g) 1,250,000	

**Problem 4-28** (continued)

3. The production report for the cooking department follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<i>Equivalent Units (EU)</i>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Quarts to be accounted for:				
Work in process, May 1 (materials 60% complete, labor and overhead 30% complete) .....	70,000			
Started into production* .....	<u>380,000</u>			
Total quarts accounted for .....	<u>450,000</u>			
Quarts accounted for as follows:				
Transferred to bottling: .....	400,000	400,000	400,000	400,000
Work in process, May 31 (materials 70% complete, labor and overhead 40% complete) .....	<u>50,000</u>	<u>35,000</u>	<u>20,000</u>	<u>20,000</u>
Total quarts accounted for .....	<u>450,000</u>	<u>435,000</u>	<u>420,000</u>	<u>420,000</u>

\*  $(400,000 + 50,000) - 70,000 = 380,000$

**Problem 4-28** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, May 1 .....	\$ 61,000	\$ 39,000	\$ 5,000	\$ 17,000	
Cost added during May.....	<u>905,000</u>	<u>570,000</u>	<u>100,000</u>	<u>235,000</u>	
Total cost to be accounted for (a).....	<u>\$966,000</u>	<u>\$609,000</u>	<u>\$105,000</u>	<u>\$252,000</u>	
Equivalent units (b) .....		435,000	420,000	420,000	
Cost per equivalent unit (a) ÷ (b) .....		\$1.40 +	\$0.25 +	\$0.60 =	\$2.25

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>		
		<i>Materials</i>	<i>Labor</i>	<i>Overhead</i>
Cost accounted for as follows:				
Transferred to bottling: 400,000 quarts @ \$2.25 per quart.....	<u>\$900,000</u>	400,000	400,000	400,000
Work in process, May 31:				
Materials @ \$1.40 per EU .....	49,000	35,000		
Labor @ \$0.25 per EU .....	5,000		20,000	
Overhead @ \$0.60 per EU .....	<u>12,000</u>			20,000
Total work in process .....	<u>66,000</u>			
Total cost accounted for .....	<u>\$966,000</u>			

**Case 4-29** (90 minutes)

- This case is difficult—particularly part 3, which requires analytical skills.
- Since there are no beginning inventories, it makes no difference whether the weighted-average or FIFO method is used by the company. You may choose to assign the problem specifying that the FIFO method be used rather than the weighted-average method.

1. The computation of the cost of goods sold follows:

	<i>Transferred In</i>	<i>Conversion</i>
Estimated completion .....	100%	30%
Computation of equivalent units:		
Completed and transferred out ...	200,000	200,000
Work in process, ending:		
Transferred in,		
10,000 units × 100% .....	10,000	
Conversion,		
10,000 units × 30% .....		<u>3,000</u>
Total equivalent units .....	<u>210,000</u>	<u>203,000</u>

	<i>Transferred In</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:			
Work in process .....	0	0	
Cost added during the month...	<u>\$39,375,000</u>	<u>\$20,807,500</u>	
Total cost to be accounted for			
(a) .....	<u>\$39,375,000</u>	<u>\$20,807,500</u>	
Equivalent units (above) (b) .....	210,000	203,000	
Cost per equivalent unit, (a) ÷			
(b) .....	\$187.50	+ \$102.50	= \$290.00

Cost of goods sold = 200,000 units × \$290 per unit = \$58,000,000

**Case 4-29** (continued)

2. The estimate of the percentage completion of ending work in process inventories affects the unit costs of finished goods and therefore of the cost of goods sold. Gary Stevens would like the estimated percentage completion figures to be increased for the ending work in process. The higher the percentage of completion of ending work in process, the higher the equivalent units for the period and the lower the unit costs.
3. Increasing the percentage of completion can increase net operating income by reducing the cost of goods sold. To increase net operating income by \$200,000, the cost of goods sold would have to be decreased by \$200,000 from \$58,000,000 down to \$57,800,000.

The percentage of completion,  $X$ , affects the cost of goods sold by its effect on the unit cost, which can be determined as follows:

$$\text{Unit cost} = \$187.50 + \frac{\$20,807,500}{200,000 + 10,000X}$$

And the cost of goods sold can be computed as follows:

$$\text{Cost of goods sold} = 200,000 \times \text{Unit cost}$$

Since cost of goods sold must be reduced down to \$57,800,000, the unit cost must be \$289.00 ( $\$57,800,000 \div 200,000$  units). Thus, the required percentage completion,  $X$ , to obtain the \$200,000 reduction in cost of goods sold can be found by solving the following equation:

$$\$187.50 + \frac{\$20,807,500}{200,000 + 10,000X} = \$289.00$$

**Case 4-29** (continued)

$$\frac{\$20,807,500}{200,000 + 10,000X} = \$289.00 - \$187.50$$

$$\frac{\$20,807,500}{200,000 + 10,000X} = \$101.50$$

$$\frac{200,000 + 10,000X}{\$20,807,500} = \frac{1}{\$101.50}$$

$$200,000 + 10,000X = \frac{\$20,807,500}{\$101.50}$$

$$200,000 + 10,000X = 205,000$$

$$10,000X = 205,000 - 200,000$$

$$10,000X = 5,000$$

$$X = \frac{5,000}{10,000} = 50\%$$

Thus, changing the percentage completion to 50% will decrease cost of goods sold and increase net operating income by \$200,000 as verified on the next page.



**Case 4-29** (continued)

3. (continued)

	<i>Transferred In</i>	<i>Conversion</i>	
Estimated completion .....	100%	50%	
Computation of equivalent units:			
Completed and transferred out .....	200,000	200,000	
Work in process, ending: .....			
Transferred in, 10,000 units × 100% .....	10,000		
Conversion, 10,000 units × 50% .....		<u>5,000</u>	
Total equivalent units.....	<u>210,000</u>	<u>205,000</u>	
	<i>Transferred In</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:			
Work in process .....	0	0	
Cost added during the month.....	<u>\$39,375,000</u>	<u>\$20,807,500</u>	
Total cost to be accounted for (a) .....	<u>\$39,375,000</u>	<u>\$20,807,500</u>	
Equivalent units (above) (b) .....	210,000	205,000	
Cost per equivalent unit, (a) ÷ (b) .....	\$187.50	+ \$101.50	=\$289.00

Cost of goods sold = 200,000 units × \$289 per unit = \$57,800,000

### Case 4-29 (continued)

#### 3. (continued)

The following is an alternative approach to solving this problem:

- o The additional income needed =  $\$200,000 \div 200,000 \text{ units} = \$1 \text{ per unit}$
- o The cost transferred in cannot be changed, so the conversion cost must be reduced from \$102.50 to \$101.50 per EU.
- o Therefore, the equivalent units for conversion need to be:  
 $\$20,807,500 \div \$101.50 \text{ per EU} = 205,000 \text{ EUs.}$
- o  $205,000 \text{ EUs} - 200,000 \text{ units transferred out} = 5,000 \text{ EU in WIP}$
- o  $5,000 \text{ EU} \div 10,000 \text{ units in WIP} = 50\% \text{ complete}$

## Case 4-29 (continued)

4. Mary is in a very difficult position. Collaborating with Gary Stevens in subverting the integrity of the accounting system is unethical by almost any standard. To put the situation in its starkest light, Stevens is suggesting that the production managers lie to get their bonus. Having said that, the peer pressure to go along in this situation may be intense. It is difficult on a personal level to ignore such peer pressure. Moreover, Mary probably prefers not to risk alienating people she might need to rely on in the future. On the other hand, Mary should be careful not to accept at face value Gary Stevens' assertion that all of the other managers are "doing as much as they can to pull this bonus out of the hat." Those who engage in unethical or illegal acts often rationalize their own behavior by exaggerating the extent to which others engage in the same kind of behavior. Other managers may actually be very uncomfortable "pulling strings" to make the target profit for the year.

From a broader perspective, if the net profits reported by the managers in a division cannot be trusted, then the company would be foolish to base bonuses on the net profit figures. A bonus system based on divisional net profits presupposes the integrity of the accounting system. However, the company should perhaps reconsider how it determines the bonus. It is quite common for companies to pay an "all or nothing" bonus contingent on making a particular target. This inevitably creates powerful incentives to bend the rules when the target has not quite been attained. It might be better to have a bonus without this "all or nothing" feature. For example, managers could be paid a bonus of  $x\%$  of profits above target profits rather than a bonus that is a preset percentage of their base salary. Under such a policy, the effect of adding that last dollar of profits that just pushes the divisional net profits over the target profit will add a few pennies to the manager's compensation rather than thousands of dollars. Therefore, the incentives to misstate the net operating income are reduced. Why tempt people unnecessarily?

**Case 4-30** (45 minutes)

Weighted-Average Method

1. The production report follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units (EU)</i></u>		
		<i>Transferred In</i>	<i>Materials</i>	<i>Conversion</i>
Units to be accounted for:				
Work in process, April 1 (materials 100% complete, conversion 60% complete) .....	450			
Received from the preceding department ...	<u>1,950</u>			
Total units accounted for .....	<u>2,400</u>			
Units accounted for as follows:				
Transferred to finished goods .....	1,800	1,800	1,800	1,800
Work in process, April 30 (materials 0% complete, conversion 35% complete) .....	<u>600</u>	<u>600</u>	<u>0</u>	<u>210</u>
Total units accounted for .....	<u>2,400</u>	<u>2,400</u>	<u>1,800</u>	<u>2,010</u>

**Case 4-30** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Transferred In</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, April 1 .....	\$ 8,208	\$ 4,068	\$1,980	\$ 2,160	
Cost transferred in or added.....	<u>38,070</u>	<u>17,940</u>	<u>6,210</u>	<u>13,920</u>	
Total cost to be accounted for (a) ..	<u>\$46,278</u>	<u>\$22,008</u>	<u>\$8,190</u>	<u>\$16,080</u>	
Equivalent units (b) .....		2,400	1,800	2,010	
Cost per equivalent unit (a) ÷ (b)...		\$9.17	+ \$4.55	+ \$8.00	= \$21.72

**Case 4-30** (continued)

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Transferred In</i>	<i>Materials    Conversion</i>
Cost accounted for as follows:			
Transferred to finished goods:			
1,800 units × \$21.72 per unit .....	<u>\$39,096</u>	1,800	1,800    1,800
Work in process, April 30:			
Transferred in cost, at \$9.17 per EU .....	5,502	600	
Materials, at \$4.55 per EU .....	0		0
Conversion, at \$8.00 per EU .....	<u>1,680</u>		210
Total work in process.....	<u>7,182</u>		
Total cost accounted for .....	<u>\$46,278</u>		

2. The unit cost figure in the report prepared by the new assistant controller is high because none of the cost incurred during the month was assigned to the units in the ending work in process inventory.

**Case 4-31** (60 minutes)

1. The production report follows:

*Quantity Schedule and Equivalent Units*

	<i>Quantity Schedule</i>	<u><i>Equivalent Units (EU)</i></u>		
		<i>Transferred In</i>	<i>Materials</i>	<i>Conversion</i>
Units to be accounted for:				
Work in process, April 1 (materials 100% complete, conversion 60% complete) .....	450			
Received from the preceding dept.	<u>1,950</u>			
Total units to be accounted for .....	<u>2,400</u>			
Units accounted for as follows:				
Transferred to finished goods:				
From the beginning inventory.....	450		0	180*
Received and completed this month** .....	1,350	1,350	1,350	1,350
Work in process, April 30 (materials 0% complete, conversion 35% complete) .....	<u>600</u>	<u>600</u>	<u>0</u>	<u>210</u>
Total units accounted for .....	<u>2,400</u>	<u>1,950</u>	<u>1,350</u>	<u>1,740</u>

\*  $450 \times (100\% - 60\%) = 180$

\*\*  $1,950 \text{ units} - 600 \text{ units} = 1,350 \text{ units}$

**Case 4-31** (continued)

*Costs per Equivalent Unit*

	<i>Total Cost</i>	<i>Transferred In</i>	<i>Materials</i>	<i>Conversion</i>	<i>Whole Unit</i>
Cost to be accounted for:					
Work in process, April 1 .....	\$ 8,208				
Cost transferred in or added (a) .....	<u>38,070</u>	\$17,940	\$6,210	\$13,920	
Total cost to be accounted for .....	<u>\$46,278</u>				
Equivalent units (b) .....		1,950	1,350	1,740	
Cost per equivalent unit (a) ÷ (b) .....		\$9.20	+	\$4.60	+
				\$8.00	= \$21.80



**Case 4-31** (continued)

*Cost Reconciliation*

	<i>Total Cost</i>	<u><i>Equivalent Units (EU)</i></u>	
		<i>Transferred In</i>	<i>Materials    Conversion</i>
Cost accounted for as follows:			
Transferred to finished goods:			
From the beginning inventory:			
Cost in the beginning inventory.....	\$ 8,208		
Cost to complete these units:			
Conversion, at \$8 per EU .....	<u>1,440</u>		180
Total cost from beginning inventory..	9,648		
Units started and completed: 1,350			
units × \$21.80 per unit .....	<u>29,430</u>	1,350	1,350    1,350
Total cost transferred to finished			
goods.....	<u>39,078</u>		
Work in process, April 30:			
Transferred in, at \$9.20 per EU .....	5,520	600	
Materials, at \$4.60 per EU.....	0		0
Conversion, at \$8.00 per EU.....	<u>1,680</u>		210
Total work in process .....	<u>7,200</u>		
Total cost accounted for .....	<u>\$46,278</u>		

### Case 4-31 (continued)

2. The effects of the cost-cutting will tend to show up more under the FIFO method. The reason is that the FIFO method keeps the costs of the current period separate from the costs of prior periods. Thus, under the FIFO method, management will be able to see the effect of price increases on unit costs without any distorting influence from what has happened in the past.

Under the weighted-average method, however, costs carried over from the prior period are averaged in with costs of the current period, which will tend to reduce somewhat the impact of increased materials prices on current period unit costs.

### **Group Exercise 4-32**

The answer to this exercise will depend on the industry that the students select to study.