

Process Costing in Sequential Production Departments: Weighted-Average Method

to accompany *Managerial Accounting: Creating Value in a Dynamic Business Environment*

In this supplement to *Managerial Accounting*, we cover process costing in sequential production operations. In manufacturing operations with sequential production departments, the costs assigned to the units transferred out of one department remain assigned to those units as they enter the next department. In our illustration, which is a continuation of Chapter 4 in the text, the partially completed baseball gloves transferred out of the Cutting Department go next to the Stitching Department. There the cut-out pieces are stitched together. Since the cost of the thread used in the stitching is very small, it is treated as an indirect-material cost and included in manufacturing overhead. At the end of the process in the Stitching Department, rawhide lacing is woven through the fingers and along some edges of each baseball glove. The rawhide lacing is treated as a direct material.

The cost of goods completed and transferred out of the Cutting Department is transferred as shown below.



Learning Objective

Prepare weighted-average process-costing calculations for a sequential manufacturing process

Work-in-Process Inventory: Cutting Department		Work-in-Process Inventory: Stitching Department	
Direct material	Cost of goods completed and transferred out	Transferred-in costs	
Conversion:			
Direct labor		Direct material	
Manufacturing overhead		Conversion:	
		Direct labor	
		Manufacturing overhead	

As the T-accounts show, the Cutting Department has two cost elements: direct-material and conversion costs. However, the Stitching Department has three cost elements: direct-material, conversion, and *transferred-in costs*. Transferred-in costs are the costs assigned to the units transferred from the Cutting Department to the Stitching Department. Transferred-in costs are conceptually similar to direct-material costs. The only difference is that direct-material costs relate to raw materials, whereas transferred-in costs relate to partially completed products.

Exhibit 1Basic Data for Illustration—
Stitching Department

Work in process, March 1—10,000 units:	
Transferred-in: 100% complete, cost of	\$61,000*
Direct material: none	—0—
Conversion: 20% complete, cost of	<u>7,600*</u>
Balance in work in process, March 1	<u>\$68,600*</u>
Units transferred in from Cutting Department during March	40,000 units
Units completed during March and transferred out to finished-goods inventory	30,000 units
Work in process, March 31	20,000 units
Transferred in: 100% complete	
Direct material: none	
Conversion: 90% complete	
Costs incurred during March:	
Transferred in from Cutting Department (assumes that weighted-average method was used for Cutting Department)	<u>\$290,400</u>
Direct material	<u>\$ 7,500</u>
Conversion costs:	
Direct labor	\$115,000
Applied manufacturing overhead	<u>115,000†</u>
Total conversion costs	<u>\$230,000</u>
*These costs were incurred during the prior month, February.	
† (Predetermined overhead rate) × (Direct-labor cost) = 100% × \$115,000 = \$115,000	

Exhibit 1 presents the basic data for our illustration of process costing in the Stitching Department. The March 1 work-in-process inventory in the department consists of 10,000 units that received some work in the Stitching Department during February but were not completed. The \$61,000 of transferred-in costs in the March 1 work-in-process inventory are costs that were transferred into the Stitching Department's Work-in-Process Inventory account during February. Note that any partially completed baseball glove in the Stitching Department must have received all of its transferred-in input, or it would not have been transferred from the Cutting Department. The March 1 work-in-process inventory has not yet received any direct material in the Stitching Department, because the direct material (rawhide lacing) is not added until the end of the process.

As Exhibit 1 shows, 40,000 units were transferred into the Stitching Department during March. This agrees with Exhibit 4–4 in the textbook, which shows that 40,000 units were completed and transferred out of the Cutting Department during March. The Stitching Department completed 30,000 units during March and transferred them to finished-goods inventory. This left 20,000 units in the Stitching Department's March 31 work-in-process inventory.

Exhibit 1 shows that the costs incurred in the Stitching Department during March were \$7,500 for direct material, \$115,000 for direct labor, and \$115,000 for *applied* manufacturing overhead. The predetermined overhead rate in the Stitching Department is 100 percent of direct-labor cost. Note that the predetermined overhead rates are different in the two production departments.

The March transferred-in cost in the Stitching Department is the cost of goods completed and transferred out of the Cutting Department. The amount shown in Exhibit 1, \$290,400, comes from Exhibit 4–8 in the text book.

Exhibit 2 presents a completed production report for the Stitching Department using weighted-average process costing. Steps 1 through 4 are identified in the exhibit. The process-costing procedures used for the Stitching Department are identical to those used for the Cutting Department, except for one important difference. While there were only two cost elements (direct material and conversion) in the

MVP SPORTS EQUIPMENT COMPANY					
Production Report: Stitching Department					
	Step 1		Step 2		
	Physical Units	Percentage of Completion with Respect to Conversion	Equivalent Units		
			Transferred in	Direct Material	Conversion
Work in process, March 1	10,000	20%			
Units transferred in during March.....	<u>40,000</u>				
Total units to account for	<u>50,000</u>				
Units completed and transferred out during March.....	30,000		30,000	30,000	30,000
Work in process, March 31	<u>20,000</u>	90%	20,000	—0—	18,000
Total units accounted for	<u>50,000</u>				
Total equivalent units			<u>50,000</u>	<u>30,000</u>	<u>48,000</u>

Step 3				
	Transferred in	Direct Material	Conversion	Total
Work in process, March 1 (from Exhibit 1).....	\$ 61,000	—0—	\$ 7,600	\$ 68,600
Costs incurred during March (from Exhibit 1).....	<u>290,400*</u>	<u>\$ 7,500</u>	<u>230,000</u>	<u>527,900</u>
Total costs to account for.....	<u>\$351,400</u>	<u>\$ 7,500</u>	<u>\$237,600</u>	<u>\$596,500</u>
Equivalent units.....	50,000	30,000	48,000	
Costs per equivalent unit.....	\$ 7.028	\$.25	\$ 4.95	\$ 12.228
	↑	↑	↑	↑
	<u>\$351,400</u>	<u>\$7,500</u>	<u>\$237,600</u>	<u>\$7,028</u>
	50,000	30,000	48,000	+\$.25
				+\$4.95

Step 4			
Cost of goods completed and transferred out of the Stitching Department during March:			
(Number of units transferred out) × (Total cost per equivalent unit)	30,000 × \$12.228		<u>\$366,840</u>
Cost remaining in March 31 work-in-process inventory in the Stitching Department:			
Transferred-in costs:			
(Number of equivalent units of transferred-in costs) × (Cost per equivalent unit of transferred-in cost)	20,000 × \$7.028		\$140,560
Direct material:			
None			
Conversion:			
(Number of equivalent units of conversion) × (Cost per equivalent unit of conversion)	18,000 × \$4.95		89,100
Total			<u>\$229,660</u>

*Cost of goods completed and transferred out of Cutting Department during March, under the *weighted-average* method (calculated in Exhibit 4–8 in the textbook).

Check: Cost of goods completed and transferred out	\$366,840
Cost of March 31 work-in-process inventory	<u>229,660</u>
Total costs accounted for	<u>\$596,500</u>

Exhibit 2
Production Report—Stitching Department (weighted-average method)



Cutting Department, there are three cost elements in the Stitching Department. In each of the four steps in Exhibit 2, transferred-in costs are listed along with direct material and conversion as a separate cost element.

The analysis of the physical flow of units (step 1 in Exhibit 2) is like the analysis for the Cutting Department. Now focus on step 2. In calculating equivalent units, we add a “transferred-in” column. Both the 30,000 units completed and transferred out of the Stitching Department and the March 31 work-in-process inventory are 100 percent complete as to transferred-in activity. Thus, the number of equivalent units is the same as the number of physical units. The calculation yields 50,000 total equivalent units of transferred-in activity for March. The equivalent units of direct material and conversion are determined as described earlier for the Cutting Department.

Costs per equivalent unit are computed in step 3. Since we are using the weighted-average method, the transferred-in costs in the March 1 work-in-process inventory are added to the March transferred-in costs before dividing by the equivalent units. Direct material and conversion costs are handled like those for the Cutting Department.

The analysis of total costs is done in step 4. The 30,000 units completed and transferred out of the Stitching Department are assigned a total weighted-average cost per unit of \$12.228. This unit cost includes the transferred-in cost per equivalent unit of \$7.028 calculated in step 3. The cost remaining in the work-in-process inventory on March 31 consists of two cost elements: transferred-in costs (20,000 equivalent units \times \$7.028 per equivalent unit) and conversion costs (18,000 equivalent units \times \$4.95 per equivalent unit). The March 31 work-in-process inventory has not yet received any direct material in the Stitching Department.

The following journal entry is made to transfer the cost of the units completed to the Finished-Goods Inventory account.

Finished-Goods Inventory	366,840	
Work-in-Process Inventory: Stitching Department		366,840
To transfer the cost of goods completed, as computed under the weighted-average method.		

Summary of Transferred-in Costs

When manufacturing is done in sequential production departments, the cost assigned to the units completed in each department is transferred to the next department’s Work-in-Process Inventory account. This cost is termed *transferred-in cost*, and it is handled as a distinct cost element in the process-costing calculations. In this way, the final cost of the product is built up cumulatively as the product progresses through the production sequence.

Review Questions

1. Explain the concept of *transferred-in costs* in sequential production departments.
2. Referring to Exhibit 1, explain why the cost of direct material in the March 1 work in process is zero.

Exercises

Exercise 3

Cost Flows in Sequential
Production: Journal Entries

Biloxi Block Company produces cement blocks used in the foundations for buildings. The process takes place in two sequential departments. The following cost data pertain to the month of October.

	Pouring Department	Finishing Department
Direct material entered into production	\$ 70,000	\$ 25,000
Direct labor	340,000	280,000
Applied manufacturing overhead	680,000	420,000
Cost of goods completed and transferred out	900,000*	400,000†

*Cost of goods transferred to the Finishing Department.

†Cost of goods transferred to finished goods.

Required: Prepare journal entries to record the following events.

1. Incurrence of costs for direct material and direct labor and application of manufacturing overhead in the Pouring Department.
2. Transfer of goods from Pouring to Finishing.
3. Incurrence of costs for direct material and direct labor and application of manufacturing overhead in the Finishing Department.
4. Transfer of goods from the Finishing Department to finished-goods inventory.

Toledo Tile Company produces ceramic tile used in the housing industry. The process takes place in two sequential departments. The following cost data pertain to the month of October.

Exercise 4
Cost Flows in Sequential Production: Journal Entries

	Preparation Department	Finishing Department
Direct material entered into production	\$ 105,000	\$ 37,500
Direct labor	510,000	420,000
Applied manufacturing overhead	1,020,000	630,000
Cost of goods completed and transferred out	1,350,000*	600,000†

*Cost of goods transferred to the Finishing Department.

†Cost of goods transferred to finished goods.

Required: Prepare journal entries to record the following events.

1. Incurrence of costs for direct material and direct labor and application of manufacturing overhead in the Preparation Department.
2. Transfer of goods from Preparation to Finishing.
3. Incurrence of costs for direct material and direct labor and application of manufacturing overhead in the Finishing Department.
4. Transfer of goods from the Finishing Department to finished-goods inventory.

Problems

Toronto AutoFab, Inc. manufactures a variety of aluminium parts for the automotive industry. The company uses a weighted-average process-costing system. A unit of product passes through three departments—molding, assembly, and finishing—before it is completed.

Problem 5
Transferred-in Costs; Weighted-Average Method

The following activity took place in the Finishing Department during February.

	Units
Work-in-process Inventory, February 1	700
Units transferred in from the Assembly Department	7,000
Units completed and transferred out to finished-goods inventory	5,950

Raw material is added at the beginning of processing in the Finishing Department. The work-in-process inventory was 60 percent complete as to conversion on February 1 and 30 percent complete

as to conversion on February 28. The equivalent units and current period costs per equivalent unit of production for each cost factor are as follows for the Finishing Department.

	Equivalent Units	Current Period Costs per Equivalent Unit
Transferred-in costs	7,700	\$ 6.00
Raw material	7,700	3.00
Conversion cost	6,475	<u>7.00</u>
Total		<u>\$16.00</u>

Required:

- Calculate the following amounts:
 - Cost of units completed and transferred out to finished-goods inventory during February.
 - Cost of the Finishing Department's work-in-process inventory on February 28.
- The total costs of prior departments included in the work-in-process inventory of the Finishing Department on February 1 amounted to \$14,500. Prepare the journal entry to record the transfer of goods from the Assembly Department to the Finishing Department during February.

(CMA, adapted)

Problem 6

Transferred-in Costs;
Weighted-Average Method

Ontario Aluminum Company manufactures a variety of aluminum parts for the automotive industry. The company uses a weighted-average process-costing system. A unit of product passes through three departments—molding, assembly, and finishing—before it is completed.

The following activity took place in the Finishing Department during May.

	Units
Work-in-process inventory, May 1	1,400
Units transferred in from the Assembly Department	14,000
Units completed and transferred out to finished-goods inventory	11,900

Raw material is added at the beginning of processing in the Finishing Department. The work-in-process inventory was 70 percent complete as to conversion on May 1 and 40 percent complete as to conversion on May 31. The equivalent units and current period costs per equivalent unit of production for each cost factor are as follows for the Finishing Department.

	Equivalent Units	Current Period Costs per Equivalent Unit
Transferred-in costs	15,400	\$5.00
Raw material	15,400	1.00
Conversion cost	13,300	<u>3.00</u>
Total		<u>\$9.00</u>

Required:

- Calculate the following amounts:
 - Cost of units completed and transferred out to finished-goods inventory during May.
 - Cost of the Finishing Department's work-in-process inventory on May 31.
- The total costs of prior departments included in the work-in-process inventory of the Finishing Department on May 1 amounted to \$6,750. Prepare the journal entry to record the transfer of goods from the Assembly Department to the Finishing Department during May.

(CMA, adapted)

Cases

Home Garden Company manufactures a plant nutrient known as Garden Pride. The manufacturing process begins in the Grading Department when raw materials are started in process. Upon completion of processing in the Grading Department, the output is transferred to the Finishing Department for the final phase of production. Here the product is saturated with water and then dried again. There is no weight gain in the process, and the water is virtually cost-free. The following information is available for the month of November.

Case 7
Sequential Production
Departments:
Weighted-Average

	November 1		November 30 Quantity (pounds)
	Quantity (pounds)	Cost	
Work-in-Process Inventories			
Grading Department	None	—	None
Finishing Department	1,600	\$17,600*	2,000

*Includes \$3,750 in Finishing Department conversion costs.

The work-in-process inventory in the Finishing Department is estimated to be 50 percent complete both at the beginning and end of November. Costs of production for November are as follows:

	Materials Used	Conversion
Grading Department	\$265,680	\$86,400
Finishing Department	—	85,920

The material used in the Grading Department weighed 36,000 pounds.

Required: Use the weighted-average method to prepare production reports for both the Grading and Finishing Departments for the month of November. In calculating unit costs, round your answer to four decimal places. The answer should include the following:

1. Equivalent units of production (in pounds).
2. Total manufacturing costs.
3. Cost per equivalent unit (pounds).
4. Cost of ending work-in-process inventory.
5. Cost of goods completed and transferred out.

(CPA, adapted)

AgriTech, Inc. manufactures a canine nutrient known as Healthy Pet, which is then sold to dog food manufacturers. The manufacturing process begins in the Mixing Department when raw materials are started in process. Upon completion of processing in the Mixing Department, the output is transferred to the Saturating Department for the final phase of production. Here the product is saturated with water and then dried again. There is no weight gain in the process, and the water is virtually cost-free. The following information is available for the month of September.

Case 8
Sequential Production
Departments:
Weighted-Average

	September 1		September 30 Quantity (pounds)
	Quantity (pounds)	Cost	
Work-in-Process Inventories			
Mixing Department	None	—	None
Saturating Department	2,000	\$65,600*	3,000

*Includes \$24,600 in Saturating Department conversion costs.

The work-in-process inventory in the Saturating Department is estimated to be 40 percent complete both at the beginning and end of September. Costs of production for September are as follows:

	Material Used	Conversion
Mixing Department	\$304,000	\$95,000
Saturating Department	—	90,000

The material used in the Mixing Department weighed 38,000 pounds.

Required: Use the weighted-average method to prepare production reports for both the Mixing and Saturating Departments for the month of September. The answer should include the following:

1. Equivalent units of production (in pounds)
2. Total manufacturing costs
3. Cost per equivalent unit (pounds)
4. Cost of ending work-in-process inventory
5. Cost of goods completed and transferred out

(CPA, adapted)