

MANAGERIAL ACCOUNTING

Hilton Chapter 4 Adobe Connect – Process Costing

Overview

Chapter 4 introduces another classic cost accounting system, Process Costing. Then, combined with knowledge of Job-Order Costing (Chapter 3), the authors describe a Hybrid method that has aspects of both process costing and job-order costing.

Process cost accounting systems are useful when a product goes through multiple processes or departments in the production process. For example, an item may need to go through three different departments (A, B, and C) before being transferred to finished goods inventory.

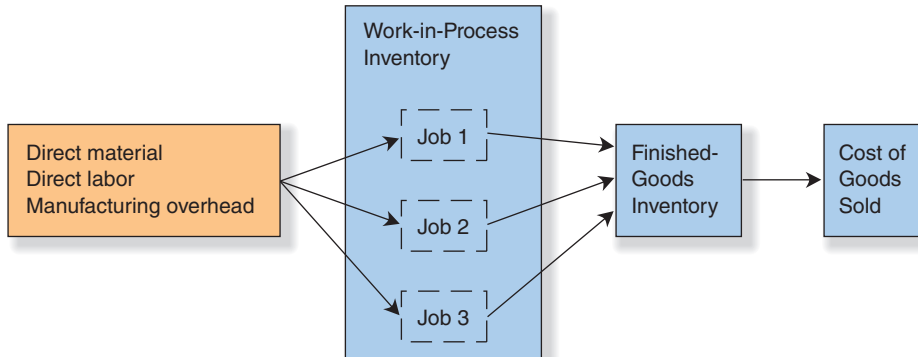
In Chapter 3 (job-order), we assumed a single cost driver and a single plant-wide overhead rate for applying manufacturing overhead to work-in-process (WIP).

In a process system, a different cost driver could be used for each department (or process), e.g., direct labor hours in Department A if it is labor intensive and machine hours in Department B if direct labor is minor.

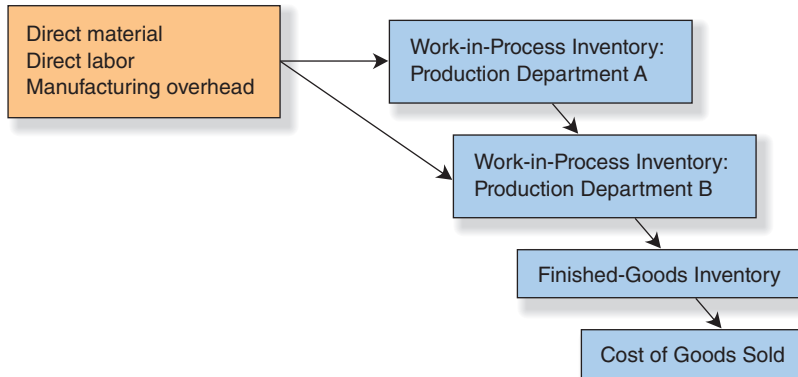
- The mechanics of accumulating overhead costs and applying them is the same, except that we run through multiple departments.
- For our example with three departments, we will have WIP Department A, WIP Department B, and WIP Department C.
- This means that we will have manufacturing overhead accounts for each department, and at the end of the year we will zero out the balance in each account.

In addition, Chapter 4 introduces the topic of **EQUIVALENT UNITS**.

- Manufacturing costs are assigned to WIP based upon equivalent units of production.
- Equivalent units usually are computed separately for Conversion Costs (Direct Labor, Manufacturing OH) and Direct Materials.

A. Job-Order Costing: Accumulates Costs by Job Order**Exhibit 4–2**

Comparison of Job-Order and Process Costing

B. Process Costing: Accumulates Costs by Production Department

These methods have been used for a long time, and they are well-established in companies. In Chapter 5, we will introduce a third method, **Activity Based Costing (ABC)**.

INVENTORIES

For manufacturing firms, the following are costs are accumulated:

- Raw materials inventory
- Work-in-process inventory
 - Direct materials
 - Direct labor
 - Manufacturing overhead
 - Indirect materials
 - Indirect labor
 - Other
- Finished-goods inventory
- Cost of goods sold

With a **PROCESS-COSTING SYSTEM**, a company works in a **repetitive production environment**, *manufacturing a large number of like units in a continuous flow*.

IN PROCESS COSTING, COSTS ARE NORMALLY ACCUMULATED BY DEPARTMENT.

In Job Order Costing, costs are accumulated by job.

Conversion costs: Direct Labor + Manufacturing Overhead Costs

EQUIVALENT UNITS

In a manufacturing process with continuous production, some units are unfinished at period-end.

Processing costing uses the concept of *equivalent units*.

- The term refers to the amount of manufacturing activity that has been applied to a batch of physical units after adjusting for the stage of completion.

Equivalent-unit calculations are made for:

- Direct materials
- Conversion cost (direct labor and overhead)

When *computing the cost of a unit*, *we base the related calculations on equivalent units, not physical units.*

Equivalent units is a key concept in process costing.

- If a batch of goods has been completed, the *number of physical units and equivalent units will be the same.*
- Units in the ending Work-in-Process Inventory are only partially completed and may be in different stages of production.
 - For example, 100% of the materials may be present in the product, but only 50% of the conversion work (labor and overhead) may have been performed.
- **Conversion costs are usually assumed to be added continuously throughout the process in text problems.** Thus, if 100 units are 60% of the way through the process, the company is said to have performed 60 equivalent units of work during the period.
 - *Make the assumption if information to the contrary is not provided*
- **Direct materials, in contrast, are usually added at discrete points in text problems.** When considering materials, determine at what point the ending in-process units are and then evaluate whether the materials have been added.
 - If materials have been added, the units are 100% complete with respect to materials; if not, the units are 0% complete.

Microsoft Excel - Basic Data for Illustration - Cutting Department			
File Edit View Insert Format Tools Data Window Help			
Type a question for help			
B22	=SUM(B20:B21)		
	A	B	C
1	Information for Illustration	Amount	
2			
3	Work in process, March 1 - 20,000 units		
4	Direct material: 100% complete, cost of*	\$ 50,000	
5	Conversion: 10% complete, cost of*	7,200	
6	Balance in work in process, March 1*	\$ 57,200	
7			
8	Units started during March	30,000	units
9			
10	Units completed during March and transferred out of the Cutting Department	40,000	units
11			
12	Work in process, March 31	10,000	units
13	Direct material: 100% complete		
14	Conversion: 50% complete		
15			
16	Costs Incurred during March:		
17	Direct material	\$ 90,000	
18			
19	Conversion costs:		
20	Direct labor	\$ 86,000	
21	Applied manufacturing overhead**	107,500	
22	Total conversion costs	\$ 193,500	
23			
24	*These costs were incurred during the prior month, February		
25			
26	**(Predetermined overhead rate) x (Direct labor cost) = 125% x \$86,000 = \$107,500		
Sheet1 / Sheet2 / Sheet3 /			
Ready			

Exhibit 4-4
Basic Data for Illustration—
Cutting Department



$$\begin{array}{c}
 \text{Weights} \\
 \swarrow \quad \searrow \\
 \left[\$2.50 \times \left(\frac{20,000}{20,000 + 30,000} \right) \right] + \left[\$3.00 \times \left(\frac{30,000}{20,000 + 30,000} \right) \right] = \$2.80
 \end{array}$$

↑ ↑ ↑ ↑ ↑
 Direct-material cost per equivalent unit in February Proportion of total equivalent units of direct material in the beginning work-in-process inventory Direct-material cost per equivalent unit in March Proportion of total equivalent units of direct material added during March Weighted-average cost per equivalent unit of direct material

Exhibit 4–9

March Production Report:
Cutting Department
(weighted-average method)



MVP SPORTS EQUIPMENT COMPANY March Production Report: Cutting Department				
	Physical Units	Percentage of Completion with Respect to Conversion	Equivalent Units	
			Direct Material	Conversion
Work in process, March 1	20,000	10%		
Units started during March	30,000			
Total units to account for	50,000			
Units completed and transferred out during March	40,000	100%	40,000	40,000
Work in process, March 31	10,000	50%	10,000	5,000
Total units accounted for	50,000			
Total equivalent units			50,000	45,000

	Direct Material	Conversion	Total
Work in process, March 1 (from Exhibit 4–4)	\$ 50,000	\$ 7,200	\$ 57,200
Costs incurred during March (from Exhibit 4–4)	90,000	193,500	283,500
Total costs to account for	<u>\$140,000</u>	<u>\$200,700</u>	<u>\$340,700</u>
Equivalent units (from step 2, Exhibit 4–6)	50,000	45,000	
Costs per equivalent unit	\$2.80	\$4.46	\$7.26

	↑	↑	↑
	<u>\$140,000</u>	<u>\$200,700</u>	<u>\$2.80 + \$4.46</u>
	50,000	45,000	

Cost of goods completed and transferred out of the Cutting Department during March:

(Number of units transferred out) × (Total cost per equivalent unit)	40,000 × \$7.26	<u>\$290,400</u>
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Cost remaining in March 31 work-in-process inventory in the Cutting Department:

Direct material:

(Number of equivalent units of direct material) × (Cost per equivalent unit of direct material)	10,000 × \$2.80	\$ 28,000
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Conversion:

(Number of equivalent units of conversion) × (Cost per equivalent unit of conversion)	5,000 × \$4.46	<u>22,300</u>
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Total cost of March 31 work in process	<u>\$ 50,300</u>
Check: Cost of goods completed and transferred out	\$290,400
Cost of March 31 work-in-process inventory	<u>50,300</u>
Total costs accounted for	<u>\$340,700</u>

Step 1: Flow of Physical Goods

	Whole Units	Materials*	Conversion*
Beginning WIP		XXXX	XXXX
Units started			
Total to account for	0		
Units Finished			
Ending WIP			
Total accounted for	0		

Step 2: Computing Equivalent Units

Completed Units	0	0
Eq Units in Ending WIP inventory:		
Materials	0	
Conversion		0
Eq units produced--Wtd avg method	0	0

Step 3: Costs per Equivalent Unit

	Materials	Conversion	Total
Beginning WIP			\$ -
Current Costs			\$ -
TOTAL	\$ -	\$ -	\$ -
Cost per Equiv Unit	<u>#DIV/0!</u>	<u>#DIV/0!</u>	<u>#DIV/0!</u>

Step 4: Cost assigned to inventories

Finished Goods		units	#DIV/0!
Ending WIP		units	
Materials		#DIV/0!	
Conversion		#DIV/0!	#DIV/0!
Total Costs Accounted For			<u>#DIV/0!</u>

TRACKING COSTS

Departmental production reports are completed to disclose equivalent units and unit costs, along with the cost of completed production and the cost of the ending work-in-process inventory.

- The text focuses on the **weighted-average method** of process costing because of the method's popularity in practice. **Assume Unless Otherwise Indicated.**
- *All units completed during a period are assumed to be started and completed during that period.*
- *Equivalent units are calculated without distinguishing as to whether the manufacturing activity occurred in current period or the preceding period.*

OVERHEAD ALLOCATION

Assigning Overhead

- ***Actual versus normal costing:*** Either actual overhead or applied overhead (i.e., actual costing or normal costing) may be used with process costing.
 - The use of applied overhead smooths per-unit cost fluctuations
 - Uses an appropriate cost driver to apply overhead
 - We assume that companies will use applied overhead.

Cost drivers

- As in job costing, cost drivers should be chosen to provide an equitable allocation of overhead to products.

HYBRID PRODUCT-COSTING SYSTEMS

Some processes have elements of both the job-cost (Chapter 3) environment and the process-cost (Chapter 4) environment.

A third (hybrid) system known as **operation costing** may be used.

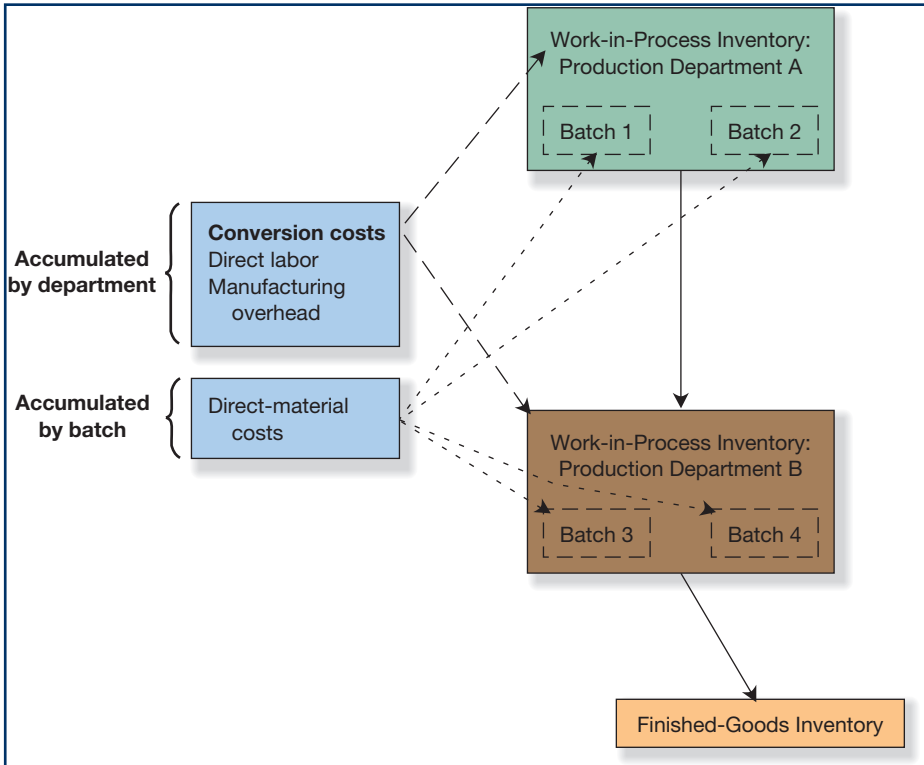
Characteristics

- Batch environment
- Conversion costs similar across product lines,
- Direct materials and direct labor significantly different across product lines

Conversion costs are usually applied to products by using a predetermined application rate.

Direct materials would be tracked by job, but the other cost elements would be more efficiently tracked by process.

Chapter 4 Process Costing and Hybrid Product-Costing Systems



Equivalent Units Example: Direct Materials & Direct Labor Separated

Assume: Overhead added evenly.

Direct Materials and Direct Labor added at different points in time.

JUNE	Direct Materials	Direct Labor	Overhead
Beginning Inventory			
Number units	1,000	1,000	1,000
Percent Complete	0.8	0.6	0.4
Inventory cost	24,000	10,800	2,400
June Activity			
Units started	35,000	35,000	35,000
Units completed	32,000	32,000	32,000
Ending units	4,000	4,000	4,000
Percent Complete	0.65	0.4	0.25
Equivalent Units			
Ending inventory (4,000 units)	2,600	1,600	1,000
Completed, 100% (32,000 units)	32,000	32,000	32,000
June Equivalent Units	34,600	33,600	33,000
June costs incurred	1,365,000	682,500	560,000
Beginning inventory	24,000	10,800	2,400
Total Costs	1,389,000	693,300	562,400
(this is the weighted average method)			
Cost per equivalent unit	40.145	20.634	17.042
Ending Inventory			
Number of units	4,000	4,000	4,000
Percent complete	0.65	0.4	0.25
Ending inventory cost	104,376	33,014	17,042