

CHAPTER 3: PRODUCT COSTING SYSTEMS

Two costing systems are commonly used in manufacturing and in many service companies; these two systems are known as *process costing* and *job-order costing*.

A **process costing** is used in situations where the company produces many units of a single product for long periods at a time. In this system, the cost object is masses of identical or similar units of a product or service.

A **job-order costing** is used in situations where many different products are produced each period.

JOB ORDER COSTING SYSTEM

Cost Accounting System

- The cost accounting system uses the perpetual inventory system, and achieves greater accuracy in the determination of product costs than is possible with the general accounting system.
- There are two extremes of cost accounting systems for manufacturing operations – job order cost system, and process cost system.
- A job order cost system provides a separate record of the cost of each particular quantity of product that passes through the factory. The system accumulates costs for a particular batch of production, commonly referred as a Job. A job has a definite starting and completion time as would, for example, the production of 10 pieces of windows, or 50 coffee tables.
- In job order costing system, costs are accumulated by job. For each job, the firm maintains a separate job cost sheet, which is a record on which manufacturing costs of the job are accumulated.

Job order costing for manufacturing firms:

An interrelationship exists between the physical flow of production, and the cost accounting cycle. The flow of costs parallels the flow of work in the production settings.

Work and cost flow in job order costing cycle

The physical flow of production is the sequence of operating activity that begins with the decision to order direct materials and ends with finished product being sold to customers. The intervening steps may vary from firm to firm, but they share a common thread. The following may show the steps of the physical flow of production.

- 1. Purchase requisition** - For commonly used direct materials, organizations have a **reorder level**, which is the minimum amount of stock that can be on hand at any given time before another purchase is made to meet the lead time demand. The reason for maintaining such a minimum stock level is to hedge against the risk of stock shortages due to reasons like unexpected heavy usage, delays and other reason that results in stock out situations. When the stock level reaches such a point, the storeroom clerk fills a purchase requisition, a form requesting the purchase of the needed material. After the form is duly filled, it will be sent to the purchasing department.

A sample of purchase requisition form looks like the one as follows:

ALDER Furniture Factory		
Date	January	5, 2004
Requisition no. 121		
Purchase requisition form		
Prepared by:		
Quantity	Description	Date needed
1,000.00 board ft	Lumber (eucalyptus)	January 15, 2004
5 gallons	Glue	January 15, 2004
50 boxes	Nails	January 15, 2004

 *No journal entry is required when a purchase requisition is prepared.*

- 2. Purchase order** - the purchasing department following purchase requisitions from the storeroom clerk will prepare a purchase order. A purchase order is a document that authorizes the supplier to ship the specified merchandise ordered. A typical purchase order may contain the following:

A sample purchase order looks the following:

ALDER Furniture Factory				
Purchase order form				
Date January 6, 2004				Purchase
No. 496				
<u>Vendor</u>				
Gentle lumber processing				
Arat Kilo, Close to AAU, Science faculty				
F.O.B	Ship Via	Terms	Delivery	Requisitio

point			date	n no.
Factory site	Tana Transport PLC	2/10, n/30	Jan. 15, 2003	121
Item no.	Quantity	Description	Unit price	Total
1.	1,000 board ft.	Lumber (eucalyptus)	20	20,000.00

 No journal entry is required when a purchase order is filled.

- 3. Receiving report** - when the ordered materials are received, the receiving department prepares a receiving report, which lists the description, and quantities of goods received. A copy of the document will be sent to the storeroom clerk along with the materials. The receiving report, together with the invoice of the supplier forms the basis for recording the purchase of the materials. The purchase of the lumber in the above example, for instance, would be as follows:

		Dr.	Cr.
January 15, 2003	Direct material Account payable	20,000.00	20,000.00

A sample receiving report is shown below.

ALDER Furniture Factory Receiving report form			
Received from: Gentle lumber processing Arat Kilo Close to AAU, Science faculty		Receiving report No. R 1345	
Freight: Pd ☒ Collec ☐		Purchase order No. 496	
Date received: February 15, 2003		Received by: Abera G.	
Quantity	Description	Weight	
		Gross	Net
1,000 board ft.	Lumber (eucalyptus)		

- 4. Production order** - a manufacturer can produce in response to a customer order or just for stock. Whatsoever, when the

decision to produce is made, productions order will be prepared and approved by the manager in charge.

A sample production order is presented here below.

ALDER Furniture Factory Production Order		
Date:	January	19, 2003
Job No. 365		
Manufactured for: Stock		
Date needed: March 20, 2003		
Quantity	Model number	Description
150	F. 4152	Coffee table
Authorized by: Dereje Demissie		

 *No journal entries are required on the company's books when the production order is issued.*

5. Material requisition - to commence production, evidently the production department needs direct materials. The materials required for production are requested through a document called ***material requisition form***. The material requisition form should contain specific description of the direct and indirect materials required for production.

A sample material requisition form is shown below:

Material requisition No. 906				Date:
January 28, 2003				
Job No. to be charged: 365				
Quantity	Description	Unit cost	Total cost	Classification
500 board ft.	Lumber	20	10,000.00	Direct
1 box	Nail	22	22	Indirect
1 Gallon	Glue	30	<u>30</u> 10,052.00	Indirect
Authorized signature			Direct materials -----10,000.00	
			Indirect materials -----52.00	

At the time the materials are issued from the storeroom, the following entry is made:

Jan. 28, 2003	Work in process	10,000.00	
	Manufacturing overhead	52.00	

	Raw materials		10,052.00
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- o *Direct materials that are sent for manufacturing process are no more direct materials since they are soon to be processed to become finished goods Thus, the cost is charged to work in process account.*

Job Cost Sheet

- Right after the materials are received from store, a **job cost sheet** will be prepared. The job cost sheet is used to accumulate the manufacturing costs incurred in producing that particular job.
- The key source document in a job costing system is a **job cost record**, also called a **job cost sheet**, a document that records and accumulates all the costs assigned to a specific job. The job cost record is started as soon as work begins in a particular job.
- After being notified that the production order had been issued, the Accounting Department prepares a job cost sheet. A **job cost sheet** is a form prepared for each separate job that records the materials, labor, and overhead costs charged to the job.
- In addition to serving as a means for charging costs to jobs, the job cost sheet also serves as a key part of a firm's accounting records. The job cost sheet forms a subsidiary ledger to the Work in Process account. A separate cost sheet is maintained for each job. Thus, the value of work in process at any time can be found by adding the different job cost sheets.

The following is a sample job cost sheet:

Job Cost sheet									
Job No. 365					Date started: Jan. 29, 2003 Date completed: March 20, 2003				
Item 4152 - coffee tables For stock									
Direct material			Direct labor			Manufacturing overhead			
Date	Req.	Amou	Date	Hour	Amou	Dat	DL	Rat	Amou

	No.	nt		s	nt	e	H	e	nt
Jan. 28 2003	906	10,00 0							
Cost summary									
Cost item				Amount					
Total direct material									
Total direct labor									
Total manufacturing overhead applied									
Shipping summary									
Date	Number of units shipped			Cost balance					

6. Job time ticket - the second cost category of manufacturing firms is the direct labor employed. A **job time ticket** is used to record how much time is spent on a particular job. When a particular job is started, the employee fills the time the job is started on the job time ticket, and he punch out the card and fills the time he stopped when he left the job. Suppose analysis of the job time ticket showed direct labor of 9,600.00 and indirect labor of 4,800.00, the journal entry to record the cost of direct and indirect labor looks like the following:

Jan. 28, 2003	Work in process Manufacturing overhead Wages payable	9,600.00 4,800.00	14,400.00
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A sample of job time ticket is shown below

Job time ticket			
Employee's Name:		Date: March 5	
Department: Sanding		Time started: 8:30 am Time completed: 11:30	
Operation: Sanding		Job no. 365	
Hours	Rate of pay	Direct labor	Comment
3 hrs.	8	24	

Idle time may exist because of machine breakdown, or when there is material shortage or time lost while the employee shifts from one job to another. The cost of idle time should be absorbed by all units produced in the year instead of cost of a specified product. Thus, cost of idle time is debited to overhead.

7. Manufacturing overhead - costs other than direct material and direct labor that are necessary to transform the raw materials into finished goods are called **manufacturing overhead**.

- Such Manufacturing costs are common costs – costs shared by more than one cost object- that should be apportioned among the cost objects sharing the cost.
- However, the total overhead costs cannot be known exactly until the end of the year. Thus, organizations should wait up to the end of the year if they are to charge the actual amount.
- Yet, many jobs are completed but the job cost sheet remains open waiting for the actual overhead cost. Thus, interim financial statements are impossible which in turn affect managerial decision purposes.
- A predetermined overhead rate is determined to allocate such costs to individual jobs, which is found by dividing estimated overhead cost to the estimated amount of allocation base.
- The allocation base is assumed to be a cost driver of manufacturing overhead costs.
- In other words, there has to be a cause and effect relationship between the allocation base and manufacturing overhead costs. For instance, a labor intensive firm should use a labor oriented base, and a machine base should use a machine oriented base since most these overhead costs may respond to a change to the allocation base.
- o Costs include factory rent, electricity, and depreciation on machinery. Most of these costs are common to more than one batch of job and hence cannot be directly traced to a specific job.
- o Thus, such costs must be assigned to the different cost objects in some way. However, assigning MO to units of product is a difficult task; because of three reasons:
 1. *MO is an indirect cost, it is difficult to trace to a particular job.*
 2. *MO consists of many different items ranging from the grease used in machines to the annual salary of production manager.*
 3. *MO costs tend to remain relatively constant due to the presence of fixed costs.*
- ❖ Therefore, the only way to assign overhead costs to products is to use an **allocation process**. This allocation overhead cost is accomplished by selecting an allocation base that is common to all of the company's products and services.
- ❖ An **allocation base** is a measure such as direct labor hours (DLH) or machine hours (MH) that is used to assign overhead costs to products and services. The allocation base is used to compute the predetermined overhead rate:

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total units in the allocation base}}$$

- The predetermined overhead rate is based on estimated rather than an actual figure. This is because the predetermined overhead rate is computed before the period begins and is used to apply overhead cost to jobs throughout the period. The process of assigning overhead cost to jobs is called **overhead application**.

$$\text{Overhead applied to a particular job} = \text{Predetermined} * \text{Amount of the allocation base incurred by the job}$$

Overhead rate

- o A predetermined overhead rate is calculated using the projected overhead cost and some activity base that has a cause and effect relationship with manufacturing overhead costs. **For instance**, assume that the projected overhead cost for the upcoming year is Birr 80,000.00, and the direct labor hour is estimated to be 4,000 hrs, the predetermined overhead rate can thus be calculated as follows:

$$\text{Predetermined overhead cost base (direct labor hr)} = \frac{\text{Estimated overhead cost}}{\text{Estimated activity}}$$

POR = 80,000 = 20 per direct labor hour.

If we assume that the direct labor hours spent on the job are 90, the manufacturing over head applied will therefore be **90 X 20 =1800**. The entry to record the manufacturing overhead applied is as follows:

March 18, 2003	Work in process Manufacturing overhead applied	1,800.00	1,800.00
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- *The manufacturing overhead applied is a contra account to the actual manufacturing cost.*
- Although actual costs are not assigned, they should be recorded as incurred. Suppose that factory rent, utilities, and other manufacturing costs totaled Birr 22,000.00. The following entry is required to record the actual manufacturing cost.

March 20, 2003	Manufacturing over head Various accounts	22,000.00	22,000.00
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8. Finished good inventory ledger card - when work in process is completed and transferred to the finished good inventory warehouse, the following journal entry is required:

March 20, 2003	Finished goods Work in process	21,400.00	21,400.00
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9. Cost of goods sold - two records are maintained when sale is made under the perpetual inventory system: one for sales and the other for cost of goods sold. Assume that half of the coffee tables produced are sold for birr 180 each on with a 40% down payment. The entry to record the sales looks the following:

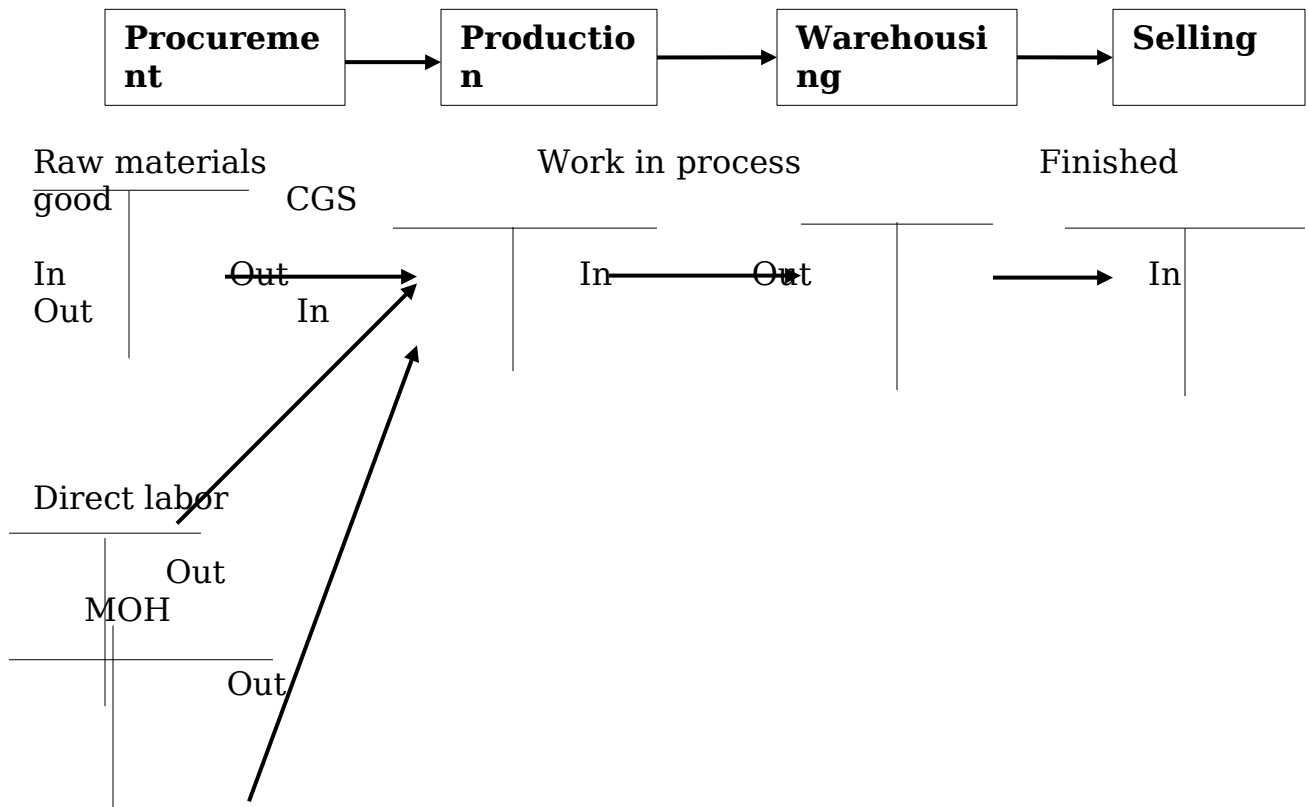
April 10, 2003	Cash	5,400.00	
	Account receivable	8,100.00	
	Sales		13,500.00

- The total units produced are 150 as shown in the production order. Half of that amount is 75, and 75 units at 180 is equal to 13,500.00. When we come to the cost of goods sold, the total cost of goods produced is Birr 21,400.00. Thus, the unit cost of each coffee table is Birr 142.67. The cost of the 75 units that are sold is Birr 10,700.00.
- The following entry is necessary to record the cost of goods sold.

April 10, 2003	Cost of goods sold Finished goods	10,700.00	10,700.00
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- In general, a firm's cost accounting system parallels its flow of operation. The nine steps followed in the previous illustration are summarized below in a concise manner.
 1. *Procurement* - raw materials and supplies needed for manufacturing are ordered, received, and stored.
 2. *Production* - raw materials are transferred from storeroom to factory. Labor, tools, machines, power, and other costs are applied to transform the raw material into finished product.
 3. *Warehousing* - finished goods are moved from the factory to the ware house to be held until they are sold.
 4. *Selling* - customers are found. Merchandises are shipped from the warehouse, and customer accounts are charged.

The following diagram shows the above points:



As shown in the table cost flow parallels with the physical flow of production.

Actual Costing versus Normal costing

The use of an applied overhead instead of an actual overhead has the advantage of timeliness, and hence relevance for timely decision making. However, the amount may not be as accurate as the actual overhead cost. But the actual cost is known only at the end of the period, and thus product costing is impossible before the year ends. Actual costing thus makes product costing untimely, and this in turn affect decisions like product pricing, and controlling operations. Therefore, most firms use an applied overhead cost than actual cost for indirect manufacturing costs.

- **Normal costing** is a costing system where the actual direct material and direct labor are added to the work in process inventory at the actual amount, and overhead costs are applied to the work in process inventory using a predetermined overhead rate. The term normal comes from the idea that the rate is normalized over a long period of time.
- **Actual costing** is a costing system where direct material and direct labor costs are traced to the job at their actual amounts,

The table below shows summary of actual and normal costing

Disposition of over and under applied overhead

- If the amount of manufacturing overhead is less than the actual amount, the difference is said ***underapplied overhead*** or ***under absorbed overhead***. When the reverse is true, the difference is said ***overapplied overhead*** or ***over absorbed overhead***.
- Under and overapplied overhead at the end of one fiscal year should not be carried to the upcoming periods; rather they should be disposed off in the year the difference occurs. The disposition of under and over applied overhead costs can take one of the following two ways.
 - Closed out to Cost of Goods Sold.
 - Allocated between Work in Process, Finished Goods, and Cost of Goods Sold in proportion to the overhead applied during the current period in the ending balances of these accounts.

Cost of Goods Sold xxx
Manufacturing Overhead xxx
 (If the actual cost > overhead applied = Underapplied)

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- (If the actual cost < overhead applied = Overapplied)
- Suppose that the manufacturing overhead - control has a debit balance of Birr 607,500, and the manufacturing costs applied is Birr 540,000. The under applied manufacturing overhead cost can thus be disposed to cost of goods sold in the following manner:

	Debit	Credit
Cost of goods sold	67,500.00	
Manufacturing overhead applied	540,000.00	
Manufacturing overhead - control		607,500.00

OR

	Debit	Credit
Cost of goods sold	67,500.00	
Manufacturing overhead		67,500

- The applied manufacturing overhead is a contra account to manufacturing overhead control, and thus, the normal balance for the applied manufacturing overhead is credit.
- At the end of the period both must be closed. The applied manufacturing overhead is debited and the manufacturing overhead is credited, and any difference is closed to cost of goods sold.

Allocated Between Accounts (Proration Approach)

Under and over applied overhead costs can also be disposed off by prorating to work in process, finished good inventory and cost of goods sold. Assume the following information is pertaining to Awash Manufacturing Company:

	End of year balance before proration	Manufacturing overhead allocated component of year-end-balances (before proration)
Work in process	11,400.00	3,907.00
Finished good	18,600.00	7,814.00
Cost of goods sold	427,500.00	183,629.00
Total	457,500.00	195,350.00

- Further, assume that the manufacturing overhead control account shows a debit balance of Birr 192,650.00, which shows an *overapplied* balance of Birr 2,700.00. The over

applied amount of manufacturing overhead will be prorated to work in process, finished good, and cost of goods sold.

- o The proration base may be on the basis of the manufacturing overhead applied to the three accounts, or on the respective balance of the three accounts. Prorating on the basis of the manufacturing overhead applied is theoretical sound than using the year-end balance. The table below shows the proration process:

Account	Account balance	Manufacturing overhead applied (%)	Proration of the over allocated overhead	Account balance after proration
Work in process	11,400.00	3,907.00 = 2%	2% X 2,700.00 = 54	11,346.00
Finished good	18,600.00	7,814.00 = 4%	4% X 2,700.00 = 108	18,492.00
Cost of goods sold	427,500.00	183,629.00 = 94%	94% X 2,700 = 2,538.00	424,962.00
Total	457,500.00	195,350.00	2,700.00	454,800.00

The following journal entry is required to show the proration of the over allocated overhead.

	Debit	Credit
Manufacturing overhead applied	195,350.00	
Work in process		54.00
Finished good		108.00
Cost of goods sold		2,538.00
Manufacturing overhead - control		192,650.00

	Debit	Credit
Manufacturing overhead	2700.00	
Work in process		54.00
Finished good		108.00
Cost of goods sold		2,538.00

- The over allocated amount is prorated and the balance of work in process, finished good, and cost of goods sold is reduced. The amount is reduced because the costs of the three accounts initially charged higher than the actual, and thus the balance must be reduced.
- The over allocated amount can be prorated on the basis of the year-end balance of the respective accounts as well. The following table shows the proration of the over allocated cost on the basis of the year-end balance of the three accounts.

Account	Account balance	Proration of the over allocated overhead	Account balance after proration
Work in process	11,400.00	$11,400/457,500.00 = 2.5\%$ $2.5\% \times 2,700.00 = 67.5$	11,332.50
Finished good	18,600.00	$18,600.00/457,500.00 = 4\%$ $4\% \times 2,700.00 = 108$	18,492.00
Cost of goods sold	427,500.00	$427,500.00/457,500.00 = 93.5\%$ $93.5\% \times 2,700.00 = 2,524.5$	424,975.50
Total	457,500.00	2,700.00	454,800.00

The journal entry is the same except that the amount is different. The journal entry looks the following:

	Debit	Credit
Manufacturing overhead applied	195,350.00	67.50
Work in process		108.00
Finished good		2,524.50
Cost of goods sold		192,650.00
Manufacturing overhead - control		

	Debit	Credit
Manufacturing overhead	2700.00	67.50
Work in process		108.00
Finished good		2,524.50
Cost of goods sold		