Cost Accounting
(1)

Collections

Prepared by

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PhD In Accounting

University of SVU

Year 3

2023/2024

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Chapter one:

An Introduction to Cost Terms And Purposes

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Learning Objectives

- ✓ Define and illustrate a cost object
- ✓ Distinguish between direct costs and indirect costs
- ✓ Explain variable costs and fixed costs
- ✓ Interpret unit costs cautiously
- ✓ Distinguish inventoriable costs from period costs
- ✓ Explain why product costs are computed in different ways for different purposes

1/1 Introduction:

The primary purpose of accounting is to provide financial information relating to an economic entity. Thus, accounting is concerned with measuring, recording, and reporting financial information for various groups of users. ***Financial information*** is required by management to plan and control the activities of

As many of you have already seen in your financial accounting class, accounting systems take economic events and transactions, such as sales and materials purchases, and process the data into information helpful to managers, sales representatives, production supervisors, and others. Processing any economic transaction means collecting, categorizing, summarizing, and analyzing. For example, costs are collected by category, such as materials, labor, and shipping.

These costs are then summarized to determine total costs by month, quarter, or year. The results are analyzed to evaluate, say, how costs have changed relative to revenues from one period to the next. ***Accounting systems*** provide the information found in the income statement, the balance sheet, the statement of cash flow, and in performance reports, such as the

cost of serving customers or running an advertising campaign. Managers use accounting information to administer the activities, businesses, or functional areas they oversee and to coordinate those activities, businesses, or functions within the framework of the organization.

Understanding this information is essential for managers to do their jobs. Individual managers often require the information in an accounting system to be presented or reported differently. Consider, for example, sales order information.

A sales manager may be interested in the total dollar amount of sales to determine the commissions to be paid. A distribution manager may be interested in the sales order quantities by geographic region and by customer-requested delivery dates to ensure timely deliveries.

A manufacturing manager may be interested in the quantities of various products and their desired delivery dates, so that he or she can develop an effective production schedule. To simultaneously serve the needs of all three managers, companies create a database—sometimes called a data warehouse consisting of small, detailed bits of information that can be used for multiple purposes.

For instance, the sales order database will contain detailed information about product, quantity ordered, selling price, and delivery details (place and date) for each sales order. The database stores information in a way that allows different managers to access the information they need. Many companies are building their own Enterprise Resource Planning (ERP) systems, single databases that collect data and feed it into applications that support the company's business activities, such as purchasing, production, distribution, and sales.

Financial accounting and management accounting have different goals. As many of you know, ***financial accounting*** focuses on reporting to external parties such as investors, government agencies, banks, and suppliers. It measures and records business transactions and provides financial statements that are based on generally accepted accounting principles (GAAP). The most important way that financial accounting information affects managers 'decisions and actions is through compensation, which is often, in part, based on numbers in financial statements.

Management accounting measures, analyzes, and reports financial and nonfinancial information that helps managers make decisions to fulfill the goals of an organization. Managers use management accounting information to develop, communicate, and implement strategy. They also use management accounting information to coordinate product design, production, and marketing decisions and to evaluate performance. Management accounting information and reports do not have to follow set principles or rules.

The key questions are always (1) how will this information help managers do their jobs better, and (2) do the benefits of producing this information exceed the costs?

Cost accounting provides information for management accounting and financial accounting. **Cost accounting** measures, analyzes, and reports financial and nonfinancial information relating to the costs of acquiring or using resources in an organization. For example, calculating the cost of a product is a cost accounting function that answers financial accounting's inventory-valuation needs and management accounting’s decision-making needs (such as deciding how to price products and choosing which products to promote). Modern cost accounting takes the perspective that collecting cost information is a function of the management decisions being made.

Thus, the distinction between management accounting and cost accounting is not so clear-cut, and we often use these terms interchangeably in the book.

We frequently hear business people use the term cost management. Unfortunately, that term has no uniform definition. We use cost management to describe the approaches and activities of managers to use resources to increase value to customers and to achieve organizational goals.

Cost management decisions include decisions such as whether to enter new markets, implement new organizational processes, and change product designs. Information from accounting systems helps managers to manage costs, but the information and the accounting systems themselves are not cost management.

Cost management has a broad focus and is not only about reduction in costs. Cost management includes decisions to incur additional costs, for example to improve customer satisfaction and quality and to develop new products, with the goal of enhancing revenues and profits.

This chapter is devoted what does the word cost mean to you? Is it the price you pay for something of value? A cash outflow? Something that affects profitability? There are many different types of costs, and at different times organizations put more or less emphasis on them. When times are good companies often focus on selling as much as they can, with costs taking a backseat. But when times get tough, the emphasis usually shifts to costs and cutting them.

1/2 Costs and Cost Terminology

Accountants define cost as a resource sacrificed or forgone to achieve a specific objective. A cost (such as direct materials or advertising) is usually measured as the monetary amount that must be paid to acquire goods or services. An actual cost is the cost incurred (a historical or past cost), as distinguished from a budgeted cost, which is a predicted or forecasted cost (a future cost).

When you think of cost, you invariably think of it in the context of finding the cost of a particular thing. We call this thing **a cost object**, which is anything for which a measurement of costs is desired. Suppose that you were a manager at BMW's Spartanburg, South Carolina, plant. BMW makes several different types of cars and sport activity vehicles (SAVs) at this plant. What cost objects can you think of? Now look at figure 1.

Cost Object	Illustration
Product	A BMW X5 sports activity vehicle
Service	Telephone hotline providing information and assistance to BMW dealers
Project	R&D project on enhancing the DVD system in BMW cars
Customer	Herb Chambers Motors, the BMW dealer that purchases a broad range of BMW vehicles
Activity	Setting up machines for production or maintaining production equipment
Department	Environmental, health, and safety department

Figure (1): Examples of Cost Objects at BMW

You will see that BMW managers not only want to know the cost of various products, such as the BMW X5, but they also want to know the costs of things such as projects, services, and departments. Managers use their knowledge of these costs to guide decisions about, for example, product innovation, quality, and customer service.

How does **a cost system** determine the costs of various cost objects? Typically in two basic stages: accumulation, followed by assignment. ***Cost accumulation i***s the collection of cost data in some organized way by means of an accounting system. For example, at its Spartanburg plant, BMW collects (accumulates) costs in various categories such as different types of materials, different classifications of labor, and costs incurred for supervision.

Managers and management accountants then assign these accumulated costs to designated cost objects, such as the different models of cars that BMW manufactures at the plant. BMW managers use this cost information in two main ways:

1. When making decisions, for instance, on how to price different models of cars or how much to invest in R&D and marketing and
2. For implementing decisions, by influencing and motivating employees to act and learn, for example, by rewarding employees for reducing costs.

Now that we know why it is useful to assign costs, we turn our attention to some concepts that will help us do it. Again, think of the different types of costs that we just discussed−materials, labor, and supervision. You are probably thinking that some costs, such as costs of materials, are easier to assign to a cost object than others, such as costs of supervision. As you will see, this is indeed the case.

1/3 Direct Costs and Indirect Costs

We now describe how costs are classified as direct and indirect costs and the methods used to assign these costs to cost objects.

☒ ***Direct costs*** of a cost object are related to the particular cost object and can be traced to it in an economically feasible (cost-effective) way.

For example, the cost of steel or tires is a direct cost of BMW X5s. The cost of the steel or tires can be easily traced to or identified with the BMW X5. The workers on the BMW X5 line request materials from the warehouse and the material requisition document identifies the cost of the materials supplied to the X5. In a similar vein, individual workers record the time spent working on the X5 on time sheets. The cost of this labor can easily be traced to the X5 and is another example of a direct cost. The term cost tracing is used to describe the assignment of direct costs to a particular cost object.

☒ ***Indirect costs*** of a cost object are related to the particular cost object but cannot be traced to it in an economically feasible (cost-effective) way. For example, the salaries of plant administrators (including the plant manager) who oversee production of the many different types of cars produced at the Spartanburg plant are an indirect cost of the X5s. Plant administration costs are related to the cost object (X5s) because plant administration is necessary for managing the production of X5s.

Plant administration costs are indirect costs because plant administrators also oversee the production of other products. Unlike the cost of steel or tires, there is no requisition of plant administration services and it is virtually impossible to trace plant administration costs to the X5 line. The term cost allocation is used to describe the assignment of indirect costs to a particular cost object.

Cost assignment is a general term that encompasses both (1) tracing direct costs to a cost object and (2) allocating indirect costs to a cost object. Figure (2) depicts direct costs and indirect costs and both forms of cost assignment−cost tracing and cost allocation−using the example of the BMW X5.

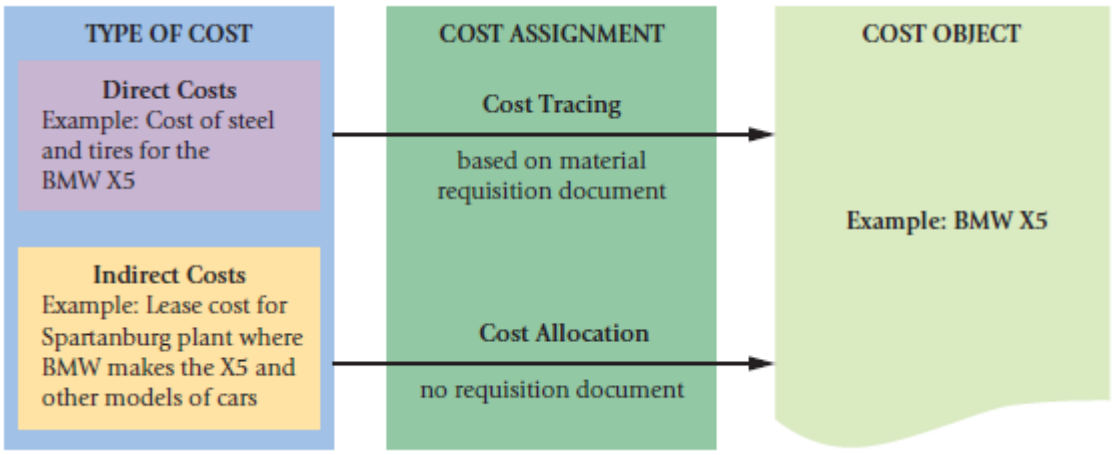


Figure (2): Cost Assignment to a Cost Object

1/4 Factors Affecting Direct/Indirect Cost Classifications

Several factors affect the classification of a cost as direct or indirect:

- **The materiality of the cost in question**. The smaller the amount of a cost−that is, the more immaterial the cost is−the less likely that it is economically feasible to trace that cost to a particular cost object. Consider a mail-order catalog company such as Lands' End. It would be economically feasible to trace the courier charge for delivering a package to an individual customer as a direct cost. In contrast, the cost of the invoice paper included in the package would be classified as an indirect cost. Why? Although the cost of the paper can be traced to each customer, it is not cost-effective to do so.

- **Available information-gathering technology**. Improvements in information-gathering technology make it possible to consider more and more costs as direct costs. Bar codes, for example, allow manufacturing plants to treat certain low-cost materials such as clips and screws, which were previously classified as indirect costs, as direct costs of products.
- **Design of operations**. Classifying a cost as direct is easier if a company's facility (or some part of it) is used exclusively for a specific cost object, such as a specific product or a particular customer. For example, the cost of the General Chemicals facility dedicated to manufacturing soda ash is a direct cost of soda ash.

1/5 Cost-Behavior Patterns: Variable Costs and Fixed Costs

Costing systems record the cost of resources acquired, such as materials, labor, and equipment, and track how those resources are used to produce and sell products or services. Recording the costs of resources acquired and used allows managers to see how costs behave.

Consider two basic types of cost-behavior patterns found in many accounting systems. ***A variable cost*** changes in total in proportion to changes in the related level of total activity or volume. ***A fixed cost*** remains unchanged in total for a given time period, despite wide changes in the related level of total activity or volume.

Costs are defined as variable or fixed with respect to a specific activity and for a given time period. Surveys of practice repeatedly show that identifying a cost as variable or fixed provides valuable information for making many management decisions and is an important input when evaluating performance. To illustrate these two basic types of costs, again consider costs at the Spartanburg, South Carolina, plant of BMW.

❖ **Variable Costs:** If BMW buys a steering wheel at $60 for each of its BMW X5 vehicles then the total cost of steering wheels is $60 times the number of vehicles produced, as the following table illustrates.

Number of X5s Produced (1)	Variable Cost per Steering Wheel (2)	Total Variable Cost of Steering Wheels (3) = (1) × (2)
1	$60	$ 60
1,000	60	60,000
3,000	60	180,000

The steering wheel cost is an example of **a variable cost** because total cost changes in proportion to changes in the number of vehicles produced. The cost per unit of a variable cost is constant. It is precisely because the variable cost per steering wheel in column 2 is the same for each steering wheel that the total variable cost of steering wheels in column 3 changes proportionately with the number of X5s produced in column 1. When considering how variable costs behave, always focus on total costs.

❖ **Fixed Costs:** Suppose BMW incurs a total cost of $2,000,000 per year for supervisors who work exclusively on the X5 line. These costs are unchanged in total over a designated range of the number of vehicles produced during a given time span. Fixed costs become smaller and smaller on a per unit basis as the number of vehicles assembled increases, as the following table shows.

Annual Total Fixed Supervision Costs for BMW X5 Assembly Line (1)	Number of X5s Produced (2)	Fixed Supervision Cost per X5 (3) = (1) ÷ (2)
$2,000,000	10,000	$200
$2,000,000	25,000	80
$2,000,000	50,000	40

Unlike variable costs, fixed costs of resources (such as for line supervision) cannot be quickly and easily changed to match the resources needed or used. Over time, however, managers can take actions to reduce fixed costs. For example, if the X5 line needs to be run for fewer hours because of low demand for X5s, BMW may lay off supervisors or move them to another production line. Unlike variable costs that go away automatically if the resources are not used, reducing fixed costs requires active intervention on the part of managers.

A particular cost item could be variable with respect to one level of activity and fixed with respect to another. Consider annual registration and license costs for a fleet of planes owned by an airline company. Registration and license costs would be a variable cost with respect to the number of planes owned. But registration and license costs for a particular plane are fixed with respect to the miles flown by that plane during a year.

To focus on key concepts, we have classified the behavior of costs as variable or fixed. Some costs have both fixed and variable elements and are called mixed or semivariable costs. For example, a company's telephone costs may have a fixed monthly payment and a charge per phone-minute used.

1/6 Relationships of Types of Costs

We have introduced two major classifications of costs: direct/indirect and variable/fixed. Costs may simultaneously be as follows:

- Direct and variable
- Direct and fixed
- Indirect and variable
- Indirect and fixed

Figure 3 shows examples of costs in each of these four cost classifications for the BMW X5.

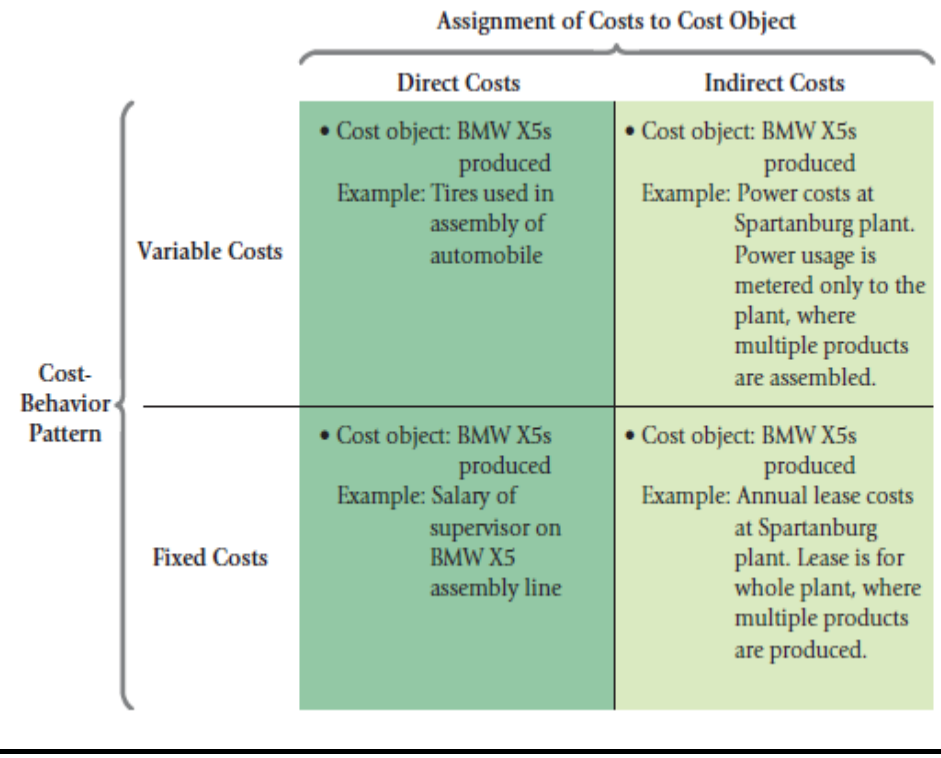


Figure 3 Examples of Costs in Combinations of the Direct/Indirect and Variable/Fixed Cost Classifications for a Car Manufacturer

1/7 Total Costs and Unit Costs

The preceding section concentrated on the behavior patterns of total costs in relation to activity or volume levels. We now consider unit costs.

❖ Unit Costs

Generally, the decision maker should think in terms of total costs rather than unit costs. In many decision contexts, however, calculating a unit cost is essential. Consider the booking agent who has to make the decision to book Paul McCartney to play at Shea Stadium. She estimates the cost of the event to be $4,000,000. This knowledge is helpful for the decision, but it is not enough.

Before a decision can be reached, the booking agent also must predict the number of people who will attend. Without knowledge of both total cost and number of attendees, she cannot make an informed decision on a possible admission price to recover the cost of the event or even on whether to have the event at all. So she computes the unit cost of the event by dividing the total cost ($4,000,000) by the expected number of people who will attend. If 50,000 people attend, the unit cost is $80 ($4,000,000 ÷ 50,000) per person; if 20,000 attend, the unit cost increases to $200 ($4,000,000 ÷ 20,000).

Unless the total cost is "unitized" (that is, averaged with respect to the level of activity or volume), the $4,000,000 cost is difficult to interpret. The unit cost combines the total cost and the number of people in a handy, communicative way.

Accounting systems typically report both total-cost amounts and average-cost-per unit amounts. **A unit cost**, also called an average cost, is calculated by dividing total cost by the related number of units. The units might be expressed in various ways. Examples are automobiles assembled, packages delivered, or hours worked. Suppose that, in 2011, its first year of operations, $40,000,000 of manufacturing costs are incurred to produce 500,000 speaker systems at the Memphis plant of Tennessee Products. Then the unit cost is $80:

$$\frac{\text{Total manufacturing costs}}{\text{Number of units manufactured}} = \frac{\$40,000,000}{500,000 \text{ units}} = \$80 \text{ per unit}$$

If 480,000 units are sold and 20,000 units remain in ending inventory, the unit-cost concept helps in the determination of total costs in the income statement and balance sheet and, hence, the financial results reported by Tennessee Products to shareholders, banks, and the government.

Cost of goods sold in the income statement, 480,000 units × $80 per unit	$38,400,000
Ending inventory in the balance sheet, 20,000 units × $80 per unit	1,600,000
Total manufacturing costs of 500,000 units	$40,000,000

Unit costs are found in all areas of the value chain–for example, unit cost of product design, of sales visits, and of customer-service calls. By summing unit costs throughout the value chain, managers calculate the unit cost of the different products or services they deliver and determine the profitability of each product or service. Managers use this information, for example, to decide the products in which they should invest more resources, such as R&D and marketing, and the prices they should charge.

❖ Use Unit Costs

Although unit costs are regularly used in financial reports and for making product mix and pricing decisions, managers should think in terms of total costs rather than unit costs for many decisions. Consider the manager of the Memphis plant of Tennessee Products. Assume the $40,000,000 in costs in 2011 consist of $10,000,000 of fixed costs and $30,000,000 of variable costs (at $60 variable cost per speaker system produced). Suppose the total fixed cost and the variable cost per speaker system in 2012 are expected to be unchanged from 2011. The budgeted costs for 2012 at different production levels, calculated on the basis of total variable costs, total fixed costs, and total costs, are as follows:

Units Produced (1)	Variable Cost per Unit (2)	Total Variable Costs (3) = (1) × (2)	Total Fixed Costs (4)	Total Costs (5) = (3) + (4)	Unit Cost (6) = (5) ÷ (1)
100,000	$60	$ 6,000,000	$10,000,000	$16,000,000	$160.00
200,000	$60	$12,000,000	$10,000,000	$22,000,000	$110.00
500,000	$60	$30,000,000	$10,000,000	$40,000,000	$ 80.00
800,000	$60	$48,000,000	$10,000,000	$58,000,000	$ 72.50
1,000,000	$60	$60,000,000	$10,000,000	$70,000,000	$ 70.00

A plant manager who uses the 2011 unit cost of $80 per unit will underestimate actual total costs if 2012 output is below the 2011 level of 500,000 units. If actual volume is 200,000 units due to, say, the presence of a new competitor, actual costs would be $22,000,000. The unit cost of $80 times 200,000 units equals $16,000,000, which underestimates the actual total costs by $6,000,000 ($22,000,000 – $16,000,000). The unit cost of $80 applies only when 500,000 units are produced.

An overreliance on unit cost in this situation could lead to insufficient cash being available to pay costs if volume declines to 200,000 units. As the table indicates, for making this decision, managers should think in terms of total variable costs, total fixed costs, and total costs rather than unit cost. As a general rule, first calculate total costs, then compute a unit cost, if it is needed for a particular decision.

1/8 Business Sectors, Types of Inventory, Inventoriable Costs, and Period Costs

In this section, we describe the different sectors of the economy, the different types of inventory that companies hold, and some commonly used classifications of manufacturing costs.

❖ Manufacturing, Merchandising, and Service-Sector Companies

We define three sectors of the economy and provide examples of companies in each sector.

1. **Manufacturing-sector companies** purchase materials and components and convert them into various finished goods. Examples are automotive companies such as Jaguar, cellular phone producers such as Nokia, food-processing companies such as Heinz, and computer companies such as Toshiba.

2. **Merchandising-sector companies** purchase and then sell tangible products without changing their basic form. This sector includes companies engaged in retailing (for example, bookstores such as Barnes and Noble or department stores such as Target), distribution (for example, a supplier of hospital products, such as Owens and Minor), or wholesaling (for example, a supplier of electronic components, such as Arrow Electronics).

3. **Service-sector companies** provide services (intangible products)−for example, legal advice or audits−to their customers. Examples are law firms such as Wachtell, Lipton, Rosen & Katz, accounting firms such as Ernst and Young, banks such as Barclays, mutual fund companies such as Fidelity, insurance companies such as Aetna, transportation companies such as Singapore Airlines, advertising agencies such as

Saatchi & Saatchi, television stations such as Turner Broadcasting, Internet service providers such as Comcast, travel agencies such as American Express, and brokerage firms such as Merrill Lynch.

❖ **Types of Inventory**

Manufacturing-sector companies purchase materials and components and convert them into various finished goods. These companies typically have one or more of the following three types of inventory:

1. **Direct materials inventory**. Direct materials in stock and awaiting use in the manufacturing process (for example, computer chips and components needed to manufacture cellular phones).
2. **Work-in-process inventory**. Goods partially worked on but not yet completed (for example, cellular phones at various stages of completion in the manufacturing process). This is also called work in progress.
3. **Finished goods inventory**. Goods (for example, cellular phones) completed but not yet sold.

Merchandising-sector companies purchase tangible products and then sell them without changing their basic form. They hold only one type of inventory, which is products in their original purchased form, called merchandise inventory. Service-sector companies provide only services or intangible products and so do not hold inventories of tangible products.

1/9 Commonly Used Classifications of Costs

Three terms commonly used when describing costs are direct material costs, direct labor costs, and indirect costs. These terms build on the direct versus indirect cost distinction we had described earlier, in the context of manufacturing costs.

1. **Direct material costs** are the acquisition costs of all materials that eventually become part of the cost object (work in process and then finished goods) and can be traced to the cost object in an economically feasible way. Acquisition costs of direct materials include freight-in (inward delivery) charges, sales taxes, and custom duties.

   Examples of direct material costs are the steel and tires used to make the BMW X5, and the computer chips used to make cellular phones.

2. **Direct labor costs** include the compensation of all labor that can be traced to the cost object (work in process and then finished goods) in an economically feasible way. Examples include wages and fringe benefits paid to machine operators and assembly-line workers who convert direct materials purchased to finished goods.

3. **Indirect costs** are all costs that are related to the cost object (work in process and then finished goods) but cannot be traced to that cost object in an economically feasible way. Examples include supplies, indirect materials such as lubricants, indirect labor such as plant maintenance and cleaning labor, plant rent, plant insurance, property taxes on the plant, plant depreciation, and the compensation of plant managers. This cost category is also referred to as overhead costs or factory overhead costs. We use indirect costs and overhead costs interchangeably in this book.

❖ **We now describe the distinction between inventoriable costs and period costs.**

1) Inventoriable Costs

Inventoriable costs are all costs of a product that are considered as assets in the balance sheet when they are incurred and that become cost of goods sold only when the product is sold. For manufacturing-sector companies, all manufacturing costs are inventoriable costs. Consider Cellular Products, a manufacturer of cellular phones.

Costs of direct materials, such as computer chips, issued to production (from direct material inventory), direct manufacturing labor costs, and manufacturing overhead costs create new assets, starting as work in process and becoming finished goods (the cellular phones). Hence, manufacturing costs are included in work-in-process inventory and in finished goods inventory (they are "inventoried") to accumulate the costs of creating these assets.

When the cellular phones are sold, the cost of manufacturing them is matched against revenues, which are inflows of assets (usually cash or accounts receivable) received for products or services provided to customers. The cost of goods sold includes all manufacturing costs (direct materials, direct manufacturing labor, and manufacturing overhead costs) incurred to produce them. The cellular phones may be sold during a different accounting period than the period in which they were manufactured. Thus, inventorying manufacturing costs in the balance sheet during the accounting period when goods are manufactured and expensing the manufacturing costs in a later income statement when the goods are sold matches revenues and expenses.

For merchandising-sector companies such as Wal-Mart, inventoriable costs are the costs of purchasing the goods that are resold in their same form. These costs comprise the costs of the goods themselves plus any incoming freight, insurance, and handling costs for those goods. Service-sector companies provide only services or intangible products. The absence of inventories of tangible products for sale means there are no inventoriable costs.

2) Period Costs

Period costs are all costs in the income statement other than cost of goods sold. Period costs, such as marketing, distribution and customer service costs, are treated as expenses of the accounting period in which they are incurred because they are expected to benefit revenues in that period and are not expected to benefit revenues in future periods. Some costs such as R&D costs are treated as period costs because, although these costs may benefit revenues in a future period if the R&D efforts are successful, it is highly uncertain if and when these benefits will occur. Expensing period costs as they are incurred best matches expenses to revenues.

For manufacturing-sector companies, period costs in the income statement are all nonmanufacturing costs (for example, design costs and costs of shipping products to customers). For merchandising-sector companies, period costs in the income statement are all costs not related to the cost of goods purchased for resale. Examples of these period costs are labor costs of sales floor personnel and advertising costs. Because there are no inventoriable costs for service-sector companies, all costs in the income statement are period costs.

Figure 4 showed examples of inventoriable costs in direct/indirect and variable/fixed cost classifications for a car manufacturer. Figure 4 shows examples of period costs in direct/indirect and variable/fixed cost classifications at a bank.

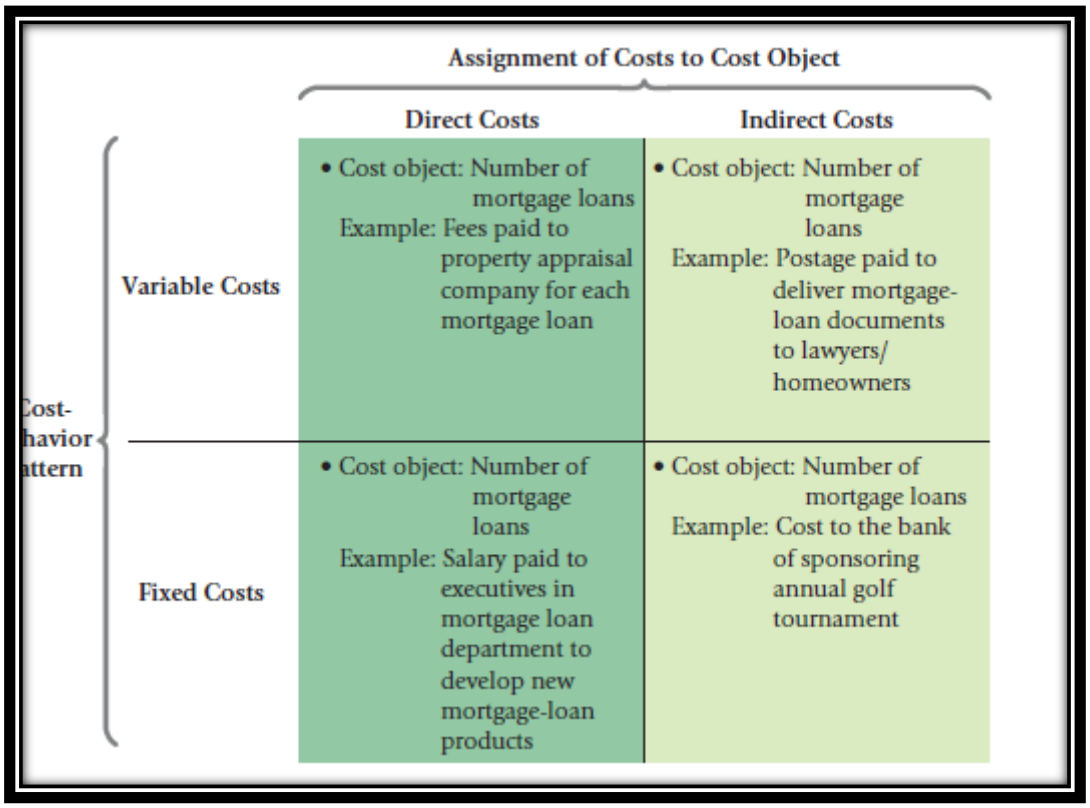


Figure 4 Examples of Period Costs in Combinations of the Direct/Indirect and Variable/Fixed Cost Classifications at a Bank

1/10 Illustrating the Flow of Inventoriable Costs and Period Costs

We illustrate the flow of inventoriable costs and period costs through the income statement of a manufacturing company, for which the distinction between inventoriable costs and period costs is most detailed.

❖ Manufacturing-Sector Example

Follow the flow of costs for Cellular Products in figure 5 and figure 6. Figure 5 visually highlights the differences in the flow of inventoriable and period costs for a manufacturing-sector company. Note how, as described in the previous section, inventoriable costs go through the balance sheet accounts of work-in-process inventory and finished goods inventory before entering cost of goods sold in the income statement. Period costs are expensed directly in the income statement. Figure 5 takes the visual presentation in figure 6 and shows how inventoriable costs and period expenses would appear in the income statement and schedule of cost of goods manufactured of a manufacturing company.

We start by tracking the flow of direct materials shown on the left of figure 5 and figure 6.

Step 1: Cost of direct materials used in 2011. Note how the arrows in figure 5 for beginning inventory, $11,000 (all numbers in thousands), and direct material purchases, $73,000, "fill up" the direct material inventory box and how direct material used, $76,000 "empties out" direct material inventory leaving an ending inventory of direct materials of $8,000 that becomes the beginning inventory for the next year. The cost of direct materials used is calculated in figure 6, Panel B (light blue shaded area) as follows:

Beginning inventory of direct materials, January 1, 2011	$11,000
+ Purchases of direct materials in 2011	73,000
– Ending inventory of direct materials, December 31, 2011	8,000
= Direct materials used in 2011	$76,000

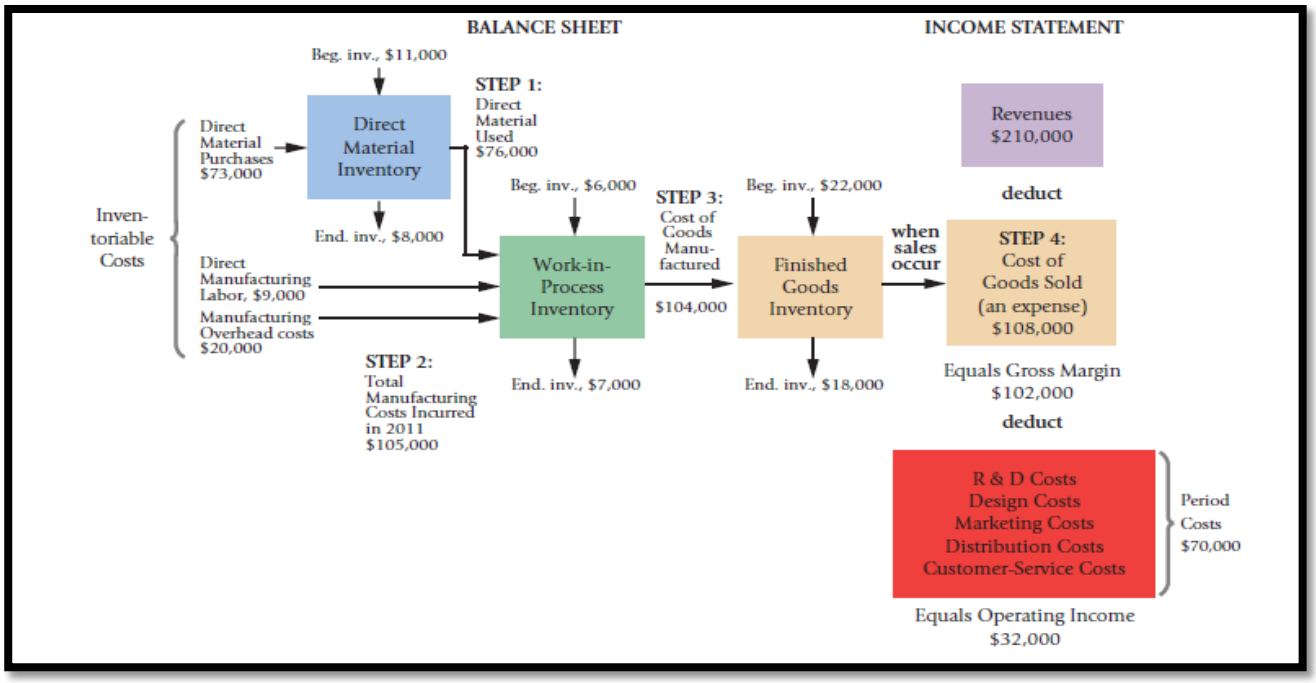


Figure 5: Flow of Revenue and Costs for a Manufacturing-Sector Company, Cellular Products (in thousands)

Cellular Products			
Income Statement			
For the Year Ended December 31, 2011 (in thousands)			
Revenues		$210,000	
Cost of goods sold:			
Beginning finished goods inventory, January 1, 2009	$ 22,000		
Cost of goods manufactured (see Panel B)	104,000		
Cost of goods available for sale	126,000		
Ending finished goods inventory, December 31, 2009	18,000		
Cost of goods sold		108,000	
Gross margin (or gross profit)		102,000	
Operating costs:			
R&D, design, mktg., dist., and cust.-service cost	70,000		
Total operating costs		70,000	
Operating income		$ 32,000	

Cellular Products		
Schedule of Cost of Goods Manufactured[a]		
For the Year Ended December 31, 2009 (in thousands)		
Direct materials:		
Beginning inventory, January 1, 2009	$11,000	
Purchases of direct materials	73,000	
Cost of direct materials available for use	84,000	
Ending inventory, December 31, 2009	8,000	
Direct materials used		$ 76,000
Direct manufacturing labor		9,000
Manufacturing overhead costs:		
Indirect manufacturing labor	$ 7,000	
Supplies	2,000	
Heat, light, and power	5,000	
Depreciation—plant building	2,000	
Depreciation—plant equipment	3,000	
Miscellaneous	1,000	
Total manufacturing overhead costs		20,000
Manufacturing costs incurred during 2009		105,000
Beginning work-in-process inventory, January 1, 2009		6,000
Total manufacturing costs to account for		111,000
Ending work-in-process inventory, December 31, 2009		7,000
Cost of goods manufactured (to income statement)		$104,000

Figure (6) Income Statement and Schedule of Cost of Goods Manufactured of a Manufacturing-Sector Company, Cellular Products

Step 2: Total manufacturing costs incurred in 2011. Total manufacturing costs refers to all direct costs and overhead costs incurred during 2011 for all goods worked on during the year. Cellular Products classifies its manufacturing costs into the three categories described earlier.

(i) Direct materials used in 2011 (shaded light blue in Exhibit 2-8, Panel B)	$ 76,000
(ii) Direct manufacturing labor in 2011 (shaded blue in Exhibit 2-8, Panel B)	9,000
(iii) Manufacturing overhead costs in 2011 (shaded dark blue in Exhibit 2-8, Panel B)	20,000
Total manufacturing costs incurred in 2011	$105,000

Note how in figure 5, these costs increase work-in-process inventory.

Step 3: **Cost of goods manufactured** in 2011. Cost of goods manufactured refers to the cost of goods brought to completion, whether they were started before or during the current accounting period.

Note how the work-in-process inventory box in figure 5 has a very similar structure to the direct material inventory box described in Step 1. Beginning work-in-process inventory of $6,000 and total manufacturing costs incurred in 2011 of $105,000 "fill-up" the work-in-process inventory box. Some of the manufacturing costs incurred during 2011 are held back as the cost of the ending work-in-process inventory. The ending workin- process inventory of $7,000 becomes the beginning inventory for the next year, and the cost of goods manufactured during 2011 of $104,000 "empties out" the work-in-process inventory while "filling up" the finished goods inventory box.

The cost of goods manufactured in 2011 (shaded green) is calculated in figure 6, as follows:

Beginning work-in-process inventory, January 1, 2011	$ 6,000
+ Total manufacturing costs incurred in 2011	105,000
= Total manufacturing costs to account for	111,000
– Ending work-in-process inventory, December 31, 2011	7,000
= Cost of goods manufactured in 2011	$104,000

Step 4: **Cost of goods sold** in 2011. The cost of goods sold is the cost of finished goods inventory sold to customers during the current accounting period. Looking at the finished goods inventory box in figure 5, we see that the beginning inventory of finished goods of $22,000 and cost of goods manufactured in 2011 of $104,000 "fill up" the finished goods inventory box. The ending inventory of finished goods of $18,000 becomes the beginning inventory for the next year, and the cost of goods sold during 2011 of $108,000 "empties out" the finished goods inventory.

This cost of goods sold is an expense that is matched against revenues. The cost of goods sold for Cellular Products (shaded brown) is computed in figure 6, as follows:

Beginning inventory of finished goods, January 1, 2011	$ 22,000
+ Cost of goods manufactured in 2011	104,000
– Ending inventory of finished goods, December 31, 2011	18,000
= Cost of goods sold in 2011	$108,000

Figure 7 shows related general ledger T-accounts for Cellular Products' manufacturing cost flow. Note how the cost of goods manufactured ($104,000) is the cost of all goods completed during the accounting period. These costs are all inventoriable costs. Goods completed during the period

are transferred to finished goods inventory. These costs become cost of goods sold in the accounting period when the goods are sold.

Also note that the direct materials, direct manufacturing labor, and manufacturing overhead costs of the units in work-in-process inventory ($7,000) and finished goods inventory ($18,000) as of December 31, 2011, will appear as an asset in the balance sheet. These costs will become expenses next year when these units are sold.

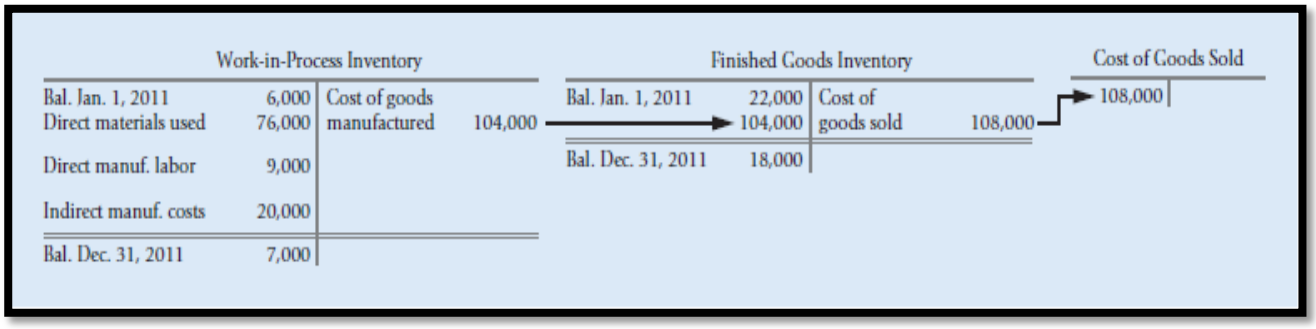


Figure 7 General Ledger T-Accounts for Cellular Products' Manufacturing Cost Flow (in thousands)

We are now in a position to prepare Cellular Products' income statement for 2011. The income statement of Cellular Products is shown on the right-hand side of figure5 and in figure 6. Revenues of Cellular Products are (in thousands) $210,000. Inventoriable costs expensed during 2011 equal cost of goods sold of $108,000.

$$\text{Gross margin} = \text{Revenues} - \text{Cost of goods sold} = \$210{,}000 - \$108{,}000 = \$102{,}000.$$

The $70,000 of operating costs comprising R&D, design, marketing, distribution, and customer-service costs are period costs of Cellular Products. These period costs include, for example, salaries of salespersons, depreciation on computers and other equipment used in marketing, and the cost of leasing warehouse space for distribution.

Operating income equals total revenues from operations minus cost of goods sold and operating (period) costs (excluding interest expense and income taxes) or equivalently, gross margin minus period costs. The operating income of Cellular Products is $32,000 (gross margin, $102,000 – period costs, $70,000). Those of you familiar with financial accounting will note that period costs are typically called selling, general, and administrative expenses in the income statement

Newcomers to cost accounting frequently assume that indirect costs such as rent, telephone, and depreciation are always costs of the period in which they are incurred and are not associated with inventories. When these costs are incurred in marketing or in corporate headquarters, they are period costs. However, when these costs are incurred in manufacturing, they are manufacturing overhead costs and are inventoriable.

1/11 Prime Costs and Conversion Costs

Two terms used to describe cost classifications in manufacturing costing systems are prime costs and conversion costs. Prime costs are all direct manufacturing costs. For Cellular Products,

$$\text{Prime costs} = \text{Direct material costs} + \text{Direct manufacturing labor costs} = \$76{,}000 + \$9{,}000 = \$85{,}000$$

As we have already discussed, the greater the proportion of prime costs in a company's cost structure, the more confident managers can be about the accuracy of the costs of products. As information-gathering technology improves, companies can add more and more direct-cost categories. For example, power costs might be metered in specific areas of a plant and identified as a direct cost of specific products.

Furthermore, if a production line were dedicated to the manufacture of a specific product, the depreciation on the production equipment would be a direct manufacturing cost and would be included in prime costs. Computer software companies often have a "purchased technology" direct manufacturing cost item. This item, which represents payments to suppliers who develop software algorithms for a product, is also included in prime costs. Conversion costs are all manufacturing costs other than direct material costs. Conversion costs represent all manufacturing costs incurred to convert direct materials into finished goods. For Cellular Products,

$$\text{Conversion costs} = \begin{matrix}\text{Direct manufacturing}\\ \text{labor costs}\end{matrix} + \begin{matrix}\text{Manufacturing}\\ \text{overhead costs}\end{matrix} = \$9{,}000 + \$20{,}000 = \$29{,}000$$

Note that direct manufacturing labor costs are a part of both prime costs and conversion costs.

Some manufacturing operations, such as computer-integrated manufacturing (CIM) plants, have very few workers. The workers' roles are to monitor the manufacturing process and to maintain the equipment that produces multiple products. Costing systems in CIM plants do not have a direct manufacturing labor cost category because direct manufacturing labor cost is relatively small and because it is difficult to trace this cost to products. In CIM plants, the only prime cost is direct material costs, and conversion costs consist only of manufacturing overhead costs.

1/12 Benefits of Defining Accounting Terms

Managers, accountants, suppliers, and others will avoid many problems if they thoroughly understand and agree on the classifications and meanings of the cost terms introduced in this chapter and later in this book.

Consider the classification of programming labor *payroll fringe costs* (for example, employer payments for employee benefits such as Social Security, life insurance, health insurance, and pensions). Consider, for example, a software programmer, who is paid a wage of $20 an hour with fringe benefits totaling, say, $5 per hour. Some companies classify the $20 as a direct programming labor cost of the product for which the software is being written and the $5 as overhead cost. Other companies classify the entire $25 as direct programming labor cost. The latter approach is preferable because the stated wage and the fringe benefit costs together are a fundamental part of acquiring direct software programming labor services.

Caution: In every situation, pinpoint clearly what direct labor includes and what direct labor excludes. Achieving clarity may prevent disputes regarding cost-reimbursement contracts, income tax payments, and labor union matters. Consider that some countries such as Costa Rica and Mauritius offer substantial income tax savings to foreign companies that generate employment within their borders. In some cases, to qualify for the tax benefits, the direct labor costs must at least equal a specified percentage of the total costs.

When direct labor costs are not precisely defined, disputes have arisen as to whether payroll fringe costs should be included as part of direct labor costs when calculating the direct labor percentage for qualifying for such tax benefits. Companies have sought to classify payroll fringe costs as part of direct labor costs to make direct labor costs a higher percentage of total costs. Tax authorities have argued that payroll fringe costs are part of

overhead. In addition to fringe benefits, other debated items are compensation for training time, idle time, vacations, sick leave, and overtime premium. To prevent disputes, contracts and laws should be as specific as possible regarding definitions and measurements.

1/13 Different Meanings of Product Costs

Many cost terms found in practice have ambiguous meanings. Consider the term *product cost*. A **product cost** is the sum of the costs assigned to a product for a specific purpose.

Different purposes can result in different measures of product cost, as the brackets on the value chain in figure 8 illustrate:

- **Pricing and product-mix decisions.** For the purposes of making decisions about pricing and which products provide the most profits, the manager is interested in the overall (total) profitability of different products and, consequently, assigns costs incurred in all business functions of the value chain to the different products.
- **Contracting with government agencies.** Government contracts often reimburse contractors on the basis of the "cost of a product" plus a prespecified margin of profit. Because of the cost-plus profit margin nature of the contract, government agencies provide detailed guidelines on the cost items they will allow and disallow when calculating the cost of a product.

  For example, some government agencies explicitly exclude marketing, distribution, and customer-service costs from the product costs that qualify for reimbursement, and they may only partially reimburse R&D costs. These agencies want to reimburse contractors for only those costs most closely related to delivering products under the contract. The second bracket in figure 8 shows how the product-

cost calculations for a specific contract may allow for all design and production costs but only part of R&D costs.

- **Preparing financial statements for external reporting under generally accepted accounting principles (GAAP).** Under GAAP, only manufacturing costs can be assigned to inventories in the financial statements. For purposes of calculating inventory costs, product costs include only inventoriable (manufacturing) costs.

As figure 8 illustrates, product-cost measures range from a narrow set of costs for financial statements−a set that includes only inventoriable costs−to a broader set of costs for reimbursement under a government contract to a still broader set of costs for pricing and product-mix decisions.

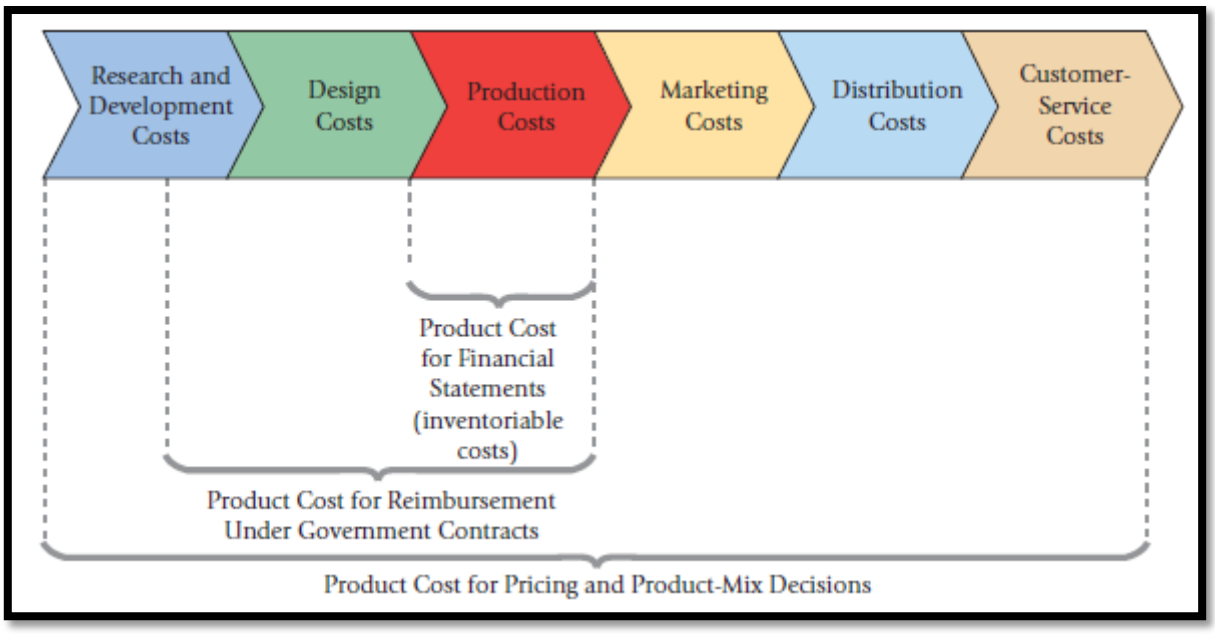


Figure 8: Different Product Costs for Different Purposes

This section focused on how different purposes result in the inclusion of different cost items of the value chain of business functions when product costs are calculated. The same caution about the need to be clear and precise about cost concepts and their measurement applies to each cost classification introduced in this chapter. Figure 12 summarizes the key cost classifications.

- **Using the five-step process described in Chapter 1, think about how these different classifications of costs are helpful to managers when making decisions and evaluating performance.**

1. *Identify the problem and uncertainties.* Consider a decision about how much to price a product. This decision often depends on how much it costs to make the product.
2. *Obtain information.* Managers identify direct and indirect costs of a product in each business function. Managers also gather other information about customers, competitors, and prices of substitute products.
3. *Make predictions about the future.* Managers estimate what it will cost to make the product in the future. This requires predictions about the quantity of product that managers expect to sell and an understanding of fixed and variable costs.
4. *Make decisions by choosing among alternatives.* Managers choose a price to charge based on a thorough understanding of costs and other information.
5. *Implement the decision, evaluate performance, and learn.* Managers control costs and learn by comparing actual total and unit costs against predicted amounts.

Questions & Exercises

Multiple Choices

1. Actual costs are:
   A) The costs incurred
   B) Budgeted costs
   C) Estimated costs
   D) Forecasted costs

2. In order to make decisions, managers need to know:
   A) Actual costs
   B) Budgeted costs
   C) Both costs
   D) Neither cost

3. The collection of accounting data in some organized way is:
   A) Cost accumulation
   B) Cost assignment
   C) Cost tracing
   D) Conversion costing

4. Cost assignment :
   A) Is always arbitrary
   B) Is includes tracing and allocating
   C) Is the same as cost accumulation
   D) Is finding the difference between budgeted and actual costs

5. Which of the following statements about the direct/indirect cost classification is NOT true?
   A) Indirect costs are always traced.
   B) Indirect costs are always allocated.
   C)The design of operations affects the direct/indirect classification.
   D) The direct/indirect classification depends on the choice of cost object.

6. Which one of the following items is a direct cost?
   A) Customer-service costs of a multiproduct firm; Product A is the cost object.
   B) Printing costs incurred for payroll check processing; payroll check processing is the cost object.
   C) The salary of a maintenance supervisor in a multiproduct manufacturing plant; Product B is the cost object.

D) Utility costs of the administrative offices; the accounting department is the cost object.

7. Indirect costs:
   A) Can be traced to the product that created the costs
   B) Can be easily identified with the cost object
   C) Generally include the cost of material and the cost of labor
   D) May include both variable and fixed costs

Exercises

1) Computing cost of goods purchased and cost of goods sold. The following data are for Marvin Department Store. The account balances (in thousands) are for 2011.

Marketing, distribution, and customer-service costs	$ 37,000
Merchandise inventory, January 1, 2011	27,000
Utilities	17,000
General and administrative costs	43,000
Merchandise inventory, December 31, 2011	34,000
Purchases	155,000
Miscellaneous costs	4,000
Transportation-in	7,000
Purchase returns and allowances	4,000
Purchase discounts	6,000
Revenues	280,000

Required:

A. Compute (1) the cost of goods purchased and (2) the cost of goods sold.
B. Prepare the income statement for 2011.

2) Cost of goods purchased, cost of goods sold, and income statement. The following data are for Montgomery Retail Outlet Stores. The account balances (in thousands) are for 2011.

Marketing and advertising costs	$ 24,000
Merchandise inventory, January 1, 2011	45,000
Shipping of merchandise to customers	2,000

Building depreciation	$ 4,200
Purchases	260,000
General and administrative costs	32,000
Merchandise inventory, December 31, 2011	52,000
Merchandise freight-in	10,000
Purchase returns and allowances	11,000
Purchase discounts	9,000
Revenues	320,000

Required:

Compute (1) the cost of goods purchased and (2) the cost of goods sold. Prepare the income statement for 2011.

3) Heaters selected data for October 2011 are presented here (in millions):

Direct materials inventory 10/1/2011	$ 105
Direct materials purchased	365
Direct materials used	385
Total manufacturing overhead costs	450
Variable manufacturing overhead costs	265
Total manufacturing costs incurred during October 2011	1,610
Work-in-process inventory 10/1/2011	230
Cost of goods manufactured	1,660
Finished goods inventory 10/1/2011	130
Cost of goods sold	1,770

Required: Calculate the following costs:

A. Direct materials inventory 10/31/2011
B. Fixed manufacturing overhead costs for October 2011
C. Direct manufacturing labor costs for October 2011
D. Work-in-process inventory 10/31/2011
E. Cost of finished goods available for sale in October 2011
F. Finished goods inventory 10/31/2011

4) Consider the following account balances (in thousands) for the Canseco Company:

Canseco Company	Beginning of 2011	End of 2011
Direct materials inventory	$22,000	$26,000
Work-in-process inventory	21,000	20,000
Finished goods inventory	18,000	23,000
Purchases of direct materials		75,000
Direct manufacturing labor		25,000
Indirect manufacturing labor		15,000
Plant insurance		9,000
Depreciation—plant, building, and equipment		11,000
Repairs and maintenance—plant		4,000
Marketing, distribution, and customer-service costs		93,000
General and administrative costs		29,000

Required:

1. Prepare a schedule for the cost of goods manufactured for 2011.

2. Revenues for 2011 were $300 million. Prepare the income statement for 2011

Chapter Two:

Product Cost Accumulation Systems and External Financial Statements

Chapter Two:

Product Cost Accumulation Systems and External Financial Statements

Learning Objectives:

- ✓ Upon completion of this chapter, you should be able to :
- ✓ Distinguish between a merchandising and a manufacturing entity.
- ✓ Distinguish between and understand two basic types of cost accumulation systems.
- ✓ Differentiate between a job cost accumulation system and a process cost accumulation system.
- ✓ Identify actual, normal, and standards costs.
- ✓ Discuss which type of cost accumulation system is most appropriate for a specific manufacturing process.
- ✓ Define direct costing and a absorption costing and discuss their use in financial statements.
- ✓ Briefly discuss the use of and preparation of internal and external financial statements.

2/1 Introduction:

The first part of this chapter is devoted primarily to a discussion of product costing, where appropriate, we shell discuss the implications of product costing to performance evaluation and managerial decision making.

Before the various cost accumulation systems used by manufacturers are considered, a distinction needs to be made between merchandising and manufacturing operations. A merchandiser buys completed goods for resale to customer at a sufficiently high selling price to more than cover the purchase cost plus operating expenses. In contrast, a manufacturer buys materials from various suppliers and converts them into finished goods through the use of direct labor and factory overhead costs. A manufacturer's income statement reflects the production of goods for resale.

And therefore, a manufacturing concerns raw materials, work in process, and finished goods inventories, which are defined as follows:

Raw materials inventory: refers to the cost of raw materials that have not yet been put into production and are still available for use at the end (or beginning) of a period.

Work-in-process inventory: represents the cost of incomplete goods still in production at the end (or beginning) of a period.

Finished goods inventory: contains the cost of completed goods on hand at the end (or beginning) of a period.

This chapter provides an overview of product cost accumulation systems and external financial statements.

2/2 Cost Accumulation: Periodic and Perpetual systems

Proper cost accumulation provides management with a basis for predicting the economic consequences of its decisions. Some of these decisions include the following:

1. Which products should we manufacture?
2. Should we expand or reduce a department?
3. What selling prices should we set?
4. Should we diversify our product lines?

Cost data are accumulated under either a periodic cost accumulation system or a perpetual cost accumulation system.

A periodic cost accumulation system provides only limited product cost information during a period and requires quarterly or year-end adjustments to arrive at the cost of goods manufactured. In most cases, the additional ledger accounts needed are simply added to a financial accounting system. (Periodic physical inventories are taken to adjust inventory accounts to arrive at the cost of manufactured goods.

A periodic cost accumulation system is not considered a complete cost accumulation system since the costs of raw materials, work - in - process, and finished goods can only be determined after physical inventories are taken. Because of this limitation, periodic cost accumulation systems generally used only by small manufacturing companies.

A perpetual cost accumulation system is a vehicle for accumulating product cost data, through the three inventory accounts that provide continuous information about raw materials, work-in- process, finished goods, cost of manufactured goods, and cost of goods sold. Such cost system is usually very extensive and are used by most medium and large manufacturing companies.

- ***Periodic cost accumulation system*.**

  The first step in comprehending a periodic cost accumulation system is to understand the flow of costs as goods pass through the various stages of production. The flow of costs in a manufacturing company, under a periodic cost accumulation system, is shown in figure 1.

The cost of goods put into production (direct materials + direct labor + factory overhead) plus the cost of work - in - process inventory at the beginning of the period equals the cost of goods in process during the period. In order to determine the cost of goods manufactured, the cost of ending work-in-process inventory is subtracted from the cost of goods in process during the period.

The cost of goods manufactured plus beginning finished goods inventory equals the cost of goods available for sale. When the ending finished goods inventory is deducted from this figure, the cost of goods sold results. The total operating costs can now be computed by adding selling, general, and administrative expenses to the cost of goods sold. For example, assume the following information for a period**.**

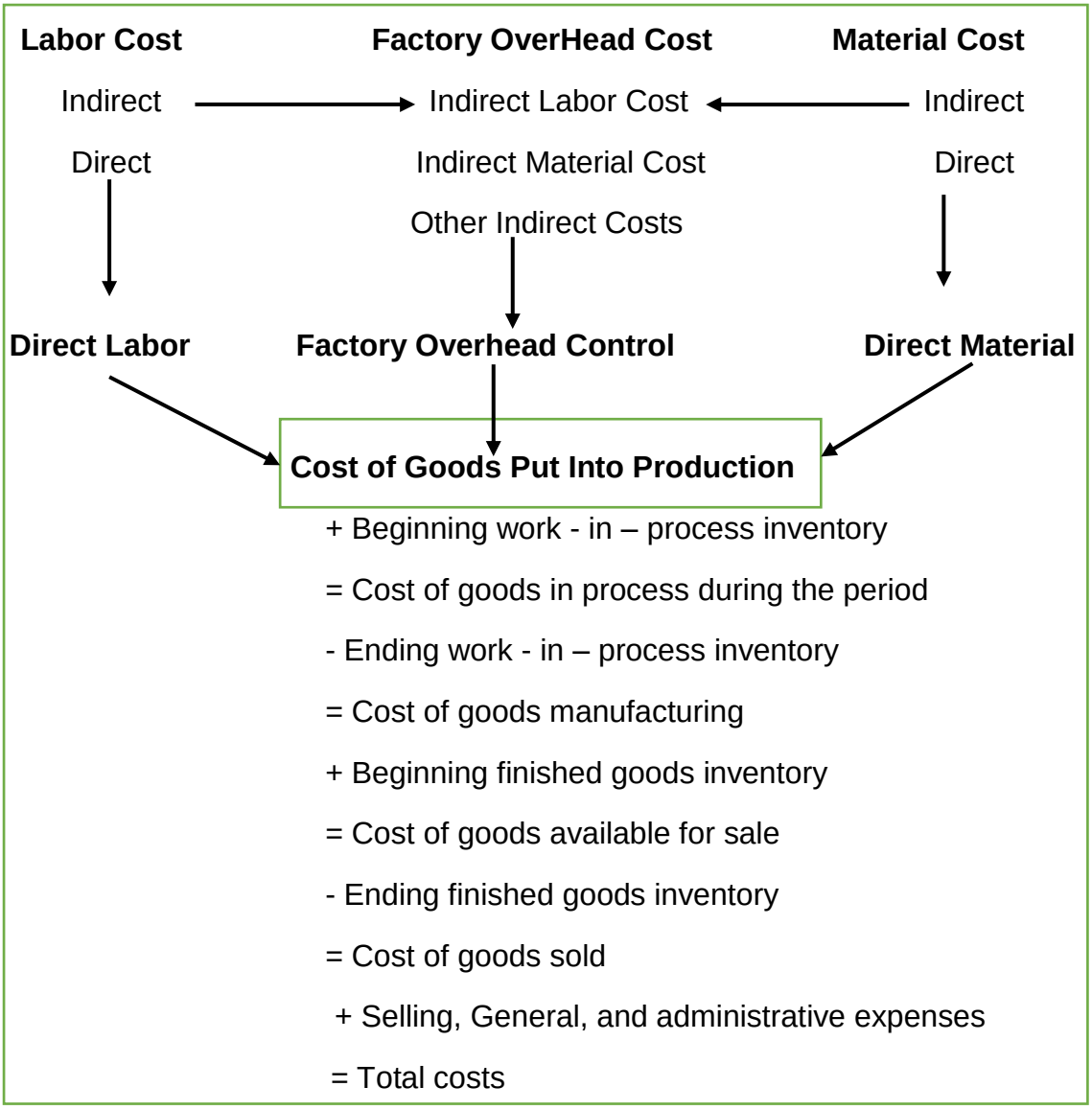


Figure 1: Flow of costs; Periodic cost system

Materials cost:

Direct ..... $ 60,000

Indirect 20,000

$ 80,000

Labor cost:

Direct $18,000

Indirect..... $17,000

$35,000

Other indirect manufacturing costs:

Power and heat…….....30,000

Selling, general, and administrative expenses…… 10,000

Inventories (in dollars):*

Beginning:

Work - in - process ……. 2,000

Finished goods ……15,000

Ending:

Work - in - process ……8,000

Finished goods…… 20,000

* Assume no beginning or ending raw materials inventory.

Figure 2 presents the computation of costs based on the preceding information.

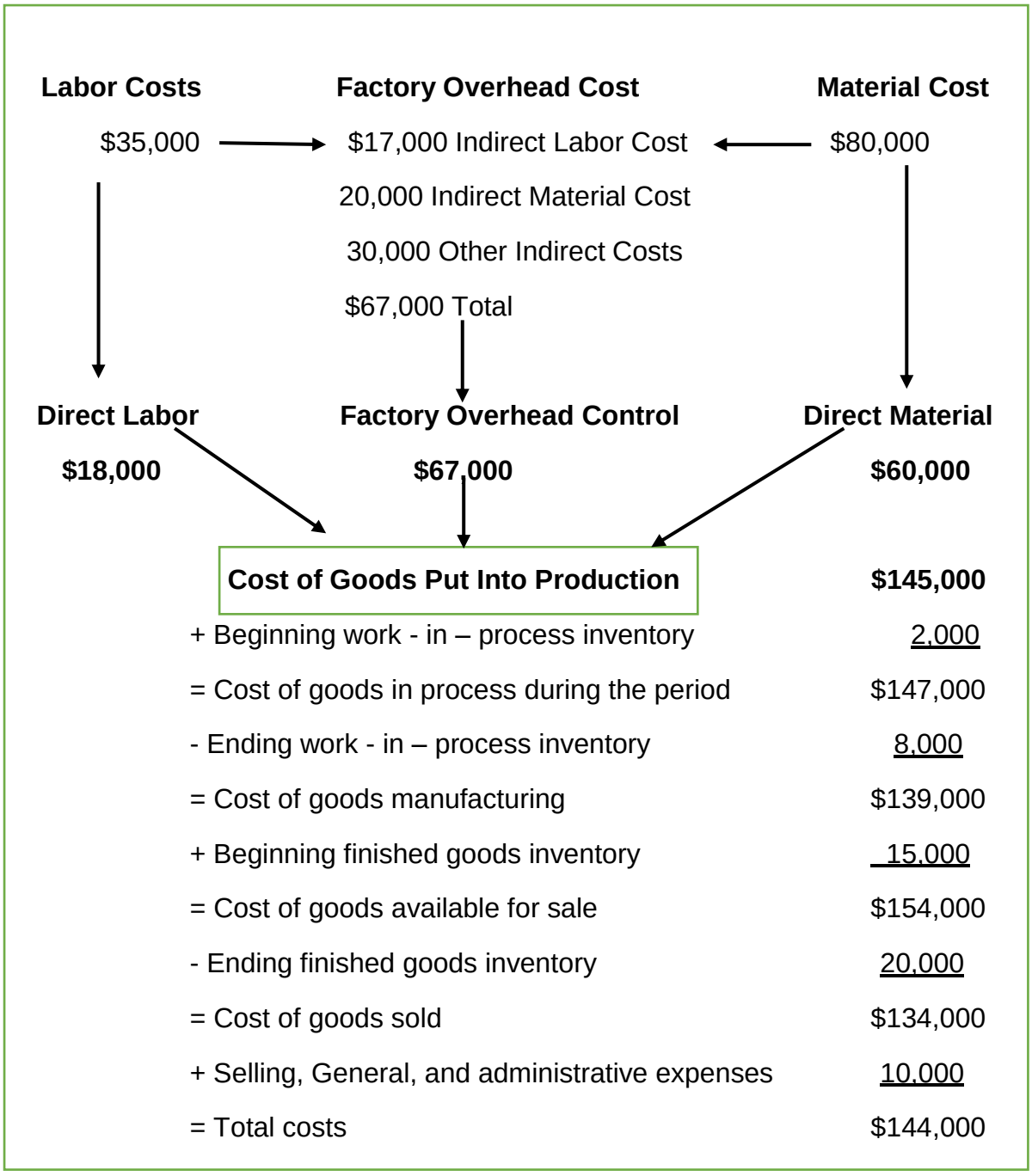


Figure 2: Computation of Costs in a periodic cost accumulation system

The perpetual cost accumulation systems provide much better control and more readily available information for managerial decision making than do periodic cost accumulation systems.

❖ ***Perpetual Cost Accumulation Systems.***

Perpetual cost accumulation systems are designed to provide relevant information to management on a timely basis to aid in planning and control decisions. The major objective in such systems, as was the case with periodic cost accumulation systems, is the accumulation of total costs and the computation of unit costs.

In a perpetual cost accumulation system, the cost of direct materials, direct labor, and factory overhead must first flow through work-in-process inventory in order to reach finished goods inventory.

The total costs transferred from work - in - process inventory to finished goods inventory during the period equal the cost of manufactured goods. The ending work - in – process inventory is the balance of unfinished production at the end of the period. As goods are sold, the cost of the goods sold is transferred from the asset account Finished Goods Inventory to the expense account Cost of Goods Sold. The ending finished goods inventory is the balance of unsold production at the end of the period. The total expenses equal the cost of goods sold plus selling, general, and administrative expenses.

Note that in a perpetual cost accumulation system, information is continuously available concerning raw materials inventory, work-in-process inventory, finished goods inventory, cost of goods manufactured. And cost of goods sold, instead of only at the end of the period as with a periodic cost accumulation system.

The flow of costs through a perpetual cost accumulation system is presented in Figure 3 (using the same cost information provided in Figure 2) . Two basic types of perpetual cost accumulation systems. Classified according to the type of manufacturing process, are job order and process costing.

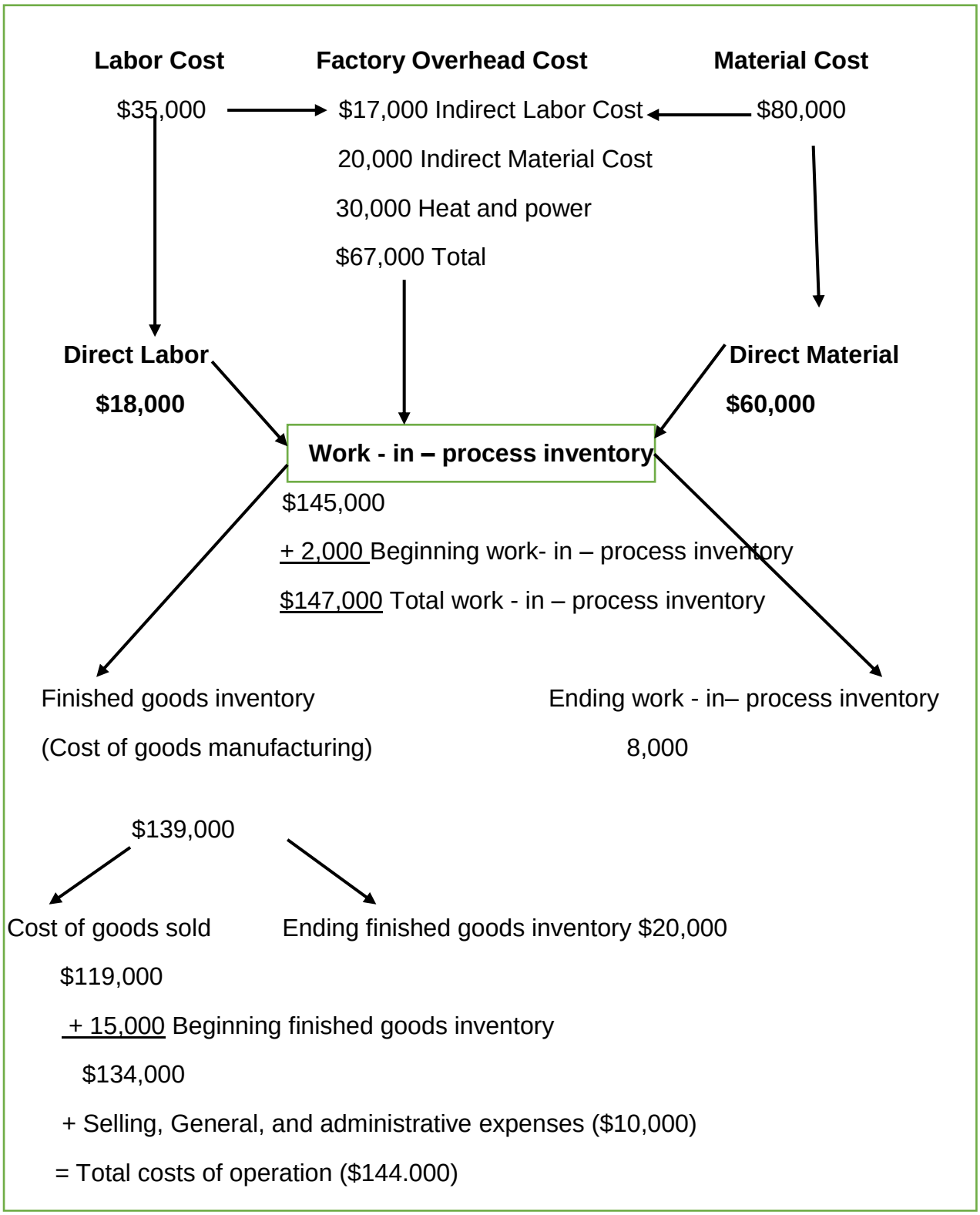


Figure 3 Flow of Costs; Perpetual cost system

2/3 Job Order Costing system:

Job costing is a costing system that accumulates costs and assigns them to specific jobs, customers, project, or contracts. A job order cost system is most suitable where the products manufactured different in materials and conversion requirements. Each product is made according to customer's specifications and the price quoted is closely tied to estimated cost. The cost incurred in manufacturing a particular job must therefore be matched to the goods produced.

Job order costing systems provide information important to managing profitability and setting prices for output. Custom manufactures typically price their goods using two methods. A cost- plus contract may be used, which allows producers to cover all direct costs and some indirect costs and to generate an acceptable profit margin.

In other cases, producers may use a competitive bidding technique. In such instances, the company must accurately estimate the costs of making the unique products associated with each contract; otherwise, the company can incur significant losses when actual costs exceed those that were estimated during the bidding process.

There are three basic elements of cost under a job order cost system; direct materials, direct labor, and factory overhead- are accumulated according to assigned job numbers. The unit cost for each job is obtained by dividing the total units for the job into the job's total cost.

☒ ***Steps in Job-Order Costing***

1. The first step in the process is the receipt of a sales order from a customer requesting a product or special group of products.
2. The sales order is approved, and a production order is issued.
3. Costs are recorded by classification, such as direct materials, direct labor, and factory overhead, on a job-cost sheet (may be manual or electronic) that is specifically prepared for each job.

☒ Job Order Costing Illustration

The following entries illustrate the flow of costs

1. Purchase of Materials

The journal entry to record the acquisition of inventory would be

Materials inventory	xxx	
Accounts payable		xxx

2. Issuance of Materials

In this step, a materials requisition form is prepared to determine the required materials from the materials storeroom. The materials requisition indicates the specific job charged with the materials used.

- ✓ All direct materials should be charged to work-in-process inventory, while all indirect materials should be charged to factory overhead control.
- ✓ The journal entry to record the requisition of direct and indirect materials would be

Work-in-process inventory – Job No	xxx	
Factory overhead control	xxx	
Materials Inventory		xxx

3. **Under job-order costing, there are two source documents for labor; a time card and a labor job ticket.**
   - ✓ Time (or clock) cards are inserted in a time clock by employees each day when they arrive, go to and return from lunch, take breaks, and leave work for the day. Labor job tickets are prepared daily by each employee indicating the job worked on, the number of hours worked, and the pay rate.
   - ✓ Time accumulated for employees working directly on production (direct labor) is charged to each job (work-in-process inventory).
   - ✓ Time accumulated for workers who cannot be identified directly with a particular job is indirect labor and is charged to factory overhead control.
   - ✓ The journal entry to record the labor cost would be

Work-in-process inventory – Job No	xxx	
Factory overhead control	xxx	
Payroll payable		xxx

4. The third component to be included in determining the total cost in a job order system is factory overhead, charged using an estimated rate.

1. The application of an estimated overhead rate is necessary under job-order costing because the outputs are customized and the processes vary from period to period.
2. As indirect costs are paid throughout the year, they are collected in the manufacturing overhead control account.
   - Note that work-in-process (indirect materials & indirect labor) are not affected when actual overhead costs are incurred.
   - The debits are made to factory overhead control account, not work-in-process.

Factory overhead control	xxx	
Accumulated depreciation – factory equipment		xxx
Prepaid insurance		xxx
Property taxes payable		xxx
Miscellaneous payables		xxx

3. Factory overhead costs are applied to each job based on a predetermined overhead application rate for the year (such as direct labor hours, direct labor dollars, direct materials dollars, machine hour, etc.,).
4. Overhead application is the process of allocating overhead costs to jobs. The predetermined overhead rate is calculated as follows:

$$\text{Application Rate} = \frac{\text{Estimated total factory overhead}}{\text{Estimated base}}$$

Work-in-process inventory – Job No	xxx	
Factory overhead applied		xxx

Note : Factory overheads costs may be recorded for the factory in total and then distributed to production departments and the jobs.

5. When a job is completed, all the costs are transferred to finished goods.

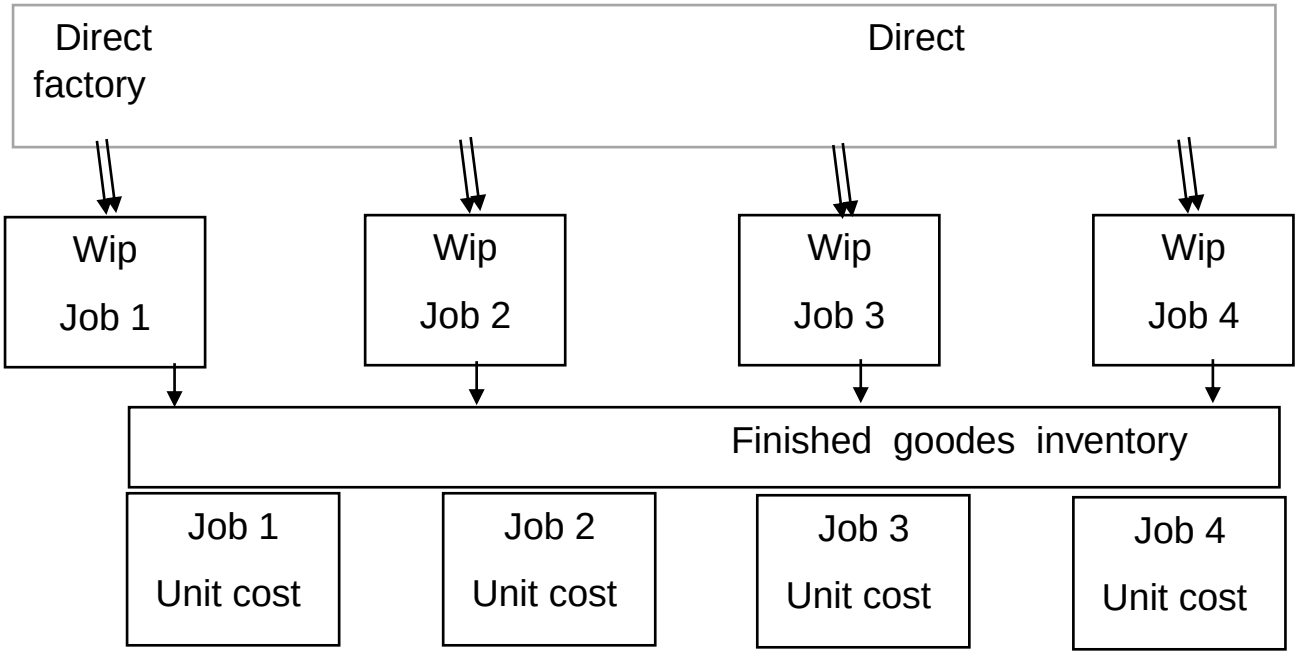
Finished goods inventory	xxx	
Work-in-process inventory – Job No		xxx

6. When the output is sold, the appropriate portion of the cost of goods sold.

Cost of goods sold	xxx		
	Finished goods	xxx	
Accounts Receivables	xxx		
	Sales		xxx

Figure 4 presents a diagram of a job order cost system.

Figure 4 : Job order cost accumulation system



WIP = work – in – process – inventory

2/4 Process Cost System .

Process costing uses an averaging technique to assign costs to units produced during the period. In both systems, unit costs are transferred between departments as goods flow from one department to the next so that a total production cost can be accumulated.

Under a process cost system, the three basic elements of a product's cost are accumulated according to department or cost center. Individual work-in-process inventory accounts are set up for each department and are charged with the costs incurred in the processing of the units that pass through them. Upon completion of the process, the cost of work-in-process inventory in the last department is transferred to finished goods inventory.

In a process- costing system, the unit cost of a product or service is obtained by assigning total costs to many identical or similar units of output. In other words, unit costs are calculated by dividing total costs incurred by the number of units of output from the production process***.***

Characteristics of a Process Cost System:

Process costing deals with allocating the costs incurred by department to the units that pass through the department. Unit costs for each department are based on the relationship between costs incurred over a period of time and units completed over the identical period.

A process cost system has the following characteristics:

1. Costs are accumulated by department or cost center.
2. Each department has its own general Work-in-Process Inventory account. This account is debited with the processing costs incurred by the department and credited with the costs of completed units transferred to another department or to finished goods.
3. Equivalent units are used to restate Work-in-Process Inventory in terms of completed units at the end of a period.
4. Unit costs are determined by department or cost center for each period.

5. Completed units and their corresponding costs are transferred to the next department or to finished goods inventory. By the time units leave the last processing department, total costs for the period have been accumulated and can be used to determine the unit cost of finished goods.
6. Total costs and unit costs for each department are periodically aggregated, analyzed, and calculated by use of departmental cost of production reports.

Figure 5 presents a diagram of a process cost system.

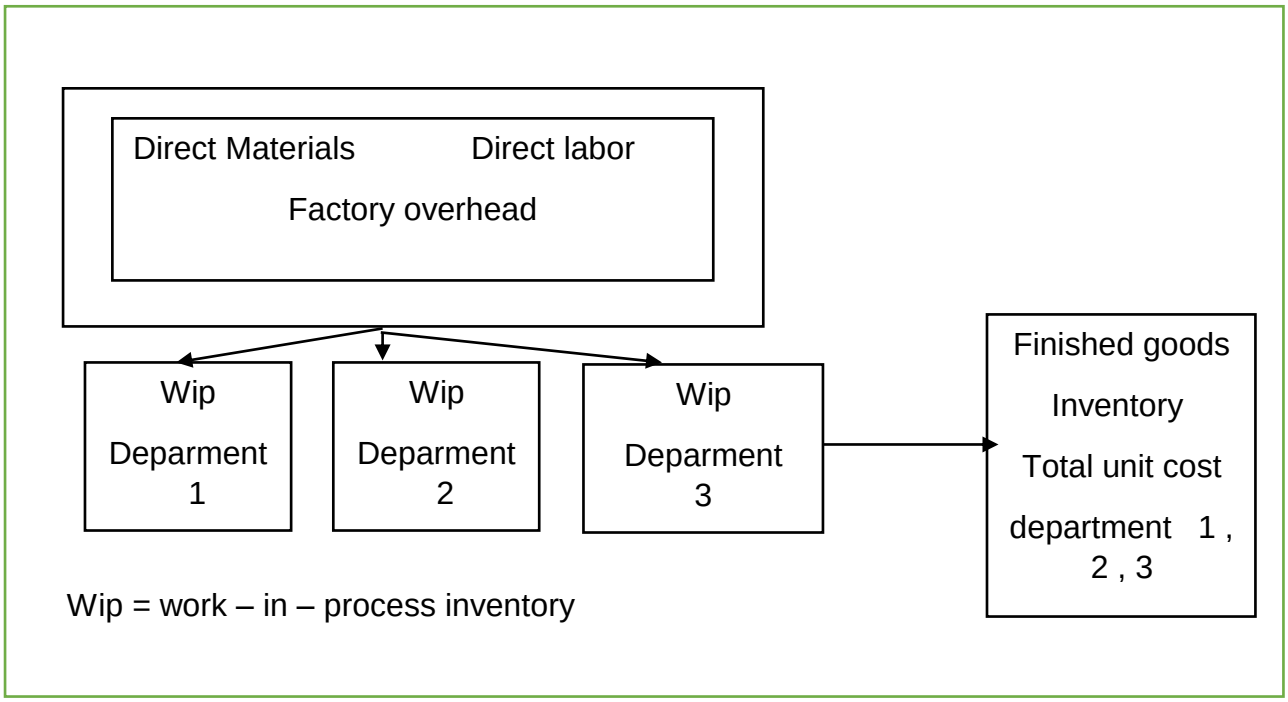


Figure **5 Process cost accumulation system**

2/5 Alternative product Costing Systems:

❖ Absorption Costing and Direct Costing

A. Absorption Costing

Figure 6 presents Cordell's income statement using the absorption approach (or absorption costing), the method used by companies for external financial reporting. Firms that take this approach consider all direct and indirect manufacturing costs (both variable and fixed) to be product (inventoriable) costs that become an expense in the form of manufacturing cost of goods sold only when the firm sells the related product.

Note that gross profit or gross margin is the difference between sales and the manufacturing cost of goods sold. Note too that the primary classifications of costs on the income statement are by three major management functions: manufacturing, selling, and administrative.

Sales……		$40,000
Less: Manufacturing cost of goods sold……		
Direct materials……..	$14,000	
Direct labor……	6,000	
Indirect manufacturing (Schedules 1 plus 2)*……..	10,000	30,000
Gross margin or gross profit……...		$ 10,000
Selling expenses (Schedule 3)…….	$ 6,000	
Administrative expenses (Schedule 4)…….	2,000	
Total selling and administrative expenses…….		$ 8,000
Operating income……...		$ 2,000
*Schedules 1 and 2 are in **Figure 2**. Schedules 3 and 4 are in **Figure 3**.		

Figure 6

Cordell Company Predicted Absorption Income

Statement for the Year Ended December 31, 20X1 (thousands of dollars)

B. Direct Costing

In contrast, Figure 7 presents Cordell's income statement using the contribution approach (also called variable costing or direct costing). For decision purposes, the major difference between the contribution approach and the absorption approach is that the former emphasizes the distinction between variable and fixed costs. Its primary cost classification is by variable- and fixed-cost behavior patterns, not by business functions. Note that it is difficult to classify a given cost as variable, fixed, or mixed (for example, repairs), so often approximations must suffice.

The contribution income statement provides a contribution margin—revenue less all variable costs, including variable selling and administrative costs. This approach makes it easier to understand the impact of changes in sales volume on operating income.

Another major benefit of the contribution approach is that it stresses the role of fixed costs in operating income. Before a company can earn income, its total contribution margin must exceed the fixed costs it has incurred for manufacturing and other value-chain functions. This highlighting of contribution margin and total fixed costs focuses management attention on cost behavior and control in making both short-run and long-run decisions. Remember that advocates of the contribution approach do not maintain that fixed costs are unimportant or irrelevant. They do stress, however, that the distinctions between behaviors of variable and fixed costs are crucial for certain decisions. Decisions usually affect fixed costs in a different way than they affect variable costs.

Sales…….		$40,000
Less: Variable expenses…….		
Direct materials……...	$14,000	
Direct labor…….	6,000	
Variable indirect manufacturing costs (Schedule 1)*…..	4,000	
Total variable manufacturing cost of goods sold……	$24,000	
Variable selling expenses (Schedule 3)……...	2,000	
Variable administrative expenses (Schedule 4)……...	200	
Total variable expenses……		$ 26,200
Contribution margin…….		**$ 13,800**
Less: Fixed expenses……		
Manufacturing (Schedule 2)……..	$ 6,000	
Selling (Schedule 3)……	4,000	
Administrative (Schedule 4)……	1,800	11,800
Operating income……..…….		$ 2,000
*Note: Schedules 1 and 2 are **Figure 2**. Schedules 3 and 4 are in **Figure 3**.		

Figure 7 Cordell Company Predicted Contribution Income

Statement for the Year Ended December 31, 20X1 (thousands of dollars)

The distinction between the gross margin (from the absorption approach) and the contribution margin (from the contribution approach) is important, especially for manufacturing companies. Consider the following computations of contribution margin (CM) and gross margin (GM):

CM/unit = Price - (Variable manufacturing cost/unit + Variable selling & admin. cost/unit)

GM/unit = Price - (Variable manufacturing cost/unit + Fixed manufacturing cost/unit)

The variable selling and administrative cost per unit affects the contribution margin but not the gross margin, while the fixed manufacturing cost affects the gross margin but not the contribution margin. Because fixed manufacturing costs do not change with small changes in volume of units, it can be misleading to express such costs on a per unit basis. Thus, it can be misleading to use gross margin to predict the effect of changes in volume.

C.Comparing Direct and Absorption costing

The direct (contribution) costing separates fixed costs from variable costs. It deducts variable costs from sales to compute a contribution margin and then deducts fixed costs to measure profit. In contrast, the absorption costing separates manufacturing costs from nonmanufacturing costs. It deducts manufacturing costs from sales to compute a gross margin and then deducts nonmanufacturing costs to measure profit.

Both formats can be relevant for decision making, depending on the type of decision being contemplated. In situations where decisions affect variable costs differently than they affect fixed costs, such as the short-run pricing decisions we will discuss in this chapter, the contribution costing will yield great value. In contrast, the absorption costing is well suited for long-run pricing decisions, where it is important that the prices over a product's life cover all manufacturing costs, including fixed costs.

Regulators do not allow the contribution costing for external financial reporting. However, many companies use the contribution costing for internal decision-making purposes and an absorption format for external purposes. Why? Because they expect the benefits of making better decisions using the contribution approach to exceed the extra costs of using two different reporting systems simultaneously.

2/6 External Financial Statements and Internal Reports

The principal contact that most people, other than accountants, have with accounting information is through published statements are generally the basis for investment decisions by stockholders, for lending decisions by banks and other financial institutions, and for credit decisions by vendors. For this reason, financial accounting is concerned with the proper recording summarizing, and presenting of assets. Liabilities, owners' equity, and profits or losses. Financial information prepared for external use is therefore closely regulated to protect the interests of external users.

All financial information published for external use must be presented in accordance with generally accepted accounting principles (GAAP). For example, property, plant, and equipment are recorded in historical dollars as required by GAAP. Thus a tract of land purchased for a plant site in 19X9 for $7,000 is corded at its purchase price. That amount is maintained on the books until the property is resold, despite any appreciation in real estate values.

For internal purposes, however, the current market value or replacement value may be more useful than the amount originally paid. For example, the current market value or replacement value of a machine may be more helpful than its original cost if management wishes to determine the current rate of productivity of the old machine versus the projected rate of productivity of a new machine. Management has great flexibility in using cost information for a wide variety of purposes in the planning and control of the company. Cost accounting information is far less restricted by outside influences than is financial accounting information and thus is more responsive to management needs.

Cost accounting is also more flexible with respect to the basis of measurement when used for internal operations. The basis of measurement for operations may be monetary (historical, present, or future dollars) or physical (labor hours, machine hours, or units produced), For example, management may wish to analyze the efficiency of workers in the factory, the cost data needed for this analysis may include the following:

1- A breakdown of hours worked by department, product, or process.
2- Hourly rates by worker classification.
3- Total labor hours and total labor dollars.
4- Labor hours of idle time.

The summarized cost information which will ultimately be used in external financial statements must adhere to generally accepted accounting principles.

Financial statements for external use generally must be prepared at least. Annually for stockholders, the Securities and Exchange Commission (SEC), the Internal Revenue Service (IRS), and to comply with other reporting requirements.

Some companies are required by the SEC to report financial information quarterly. Thus, information for external use is often reported at intervals established by outside agencies. In contrast, cost accounting reports are required at various intervals-weekly, biweekly, monthly-according to the needs of management. The nature of the reports and the content are determined by management. These periodic reports from the basis for annual reports. Furthermore, many non-routine studies and analyses are conducted for management on a one time basis.

Financial statements published for external use include statements of financial position (balance sheet), statement of income (income statement), statement of retained earnings, statement of cash flows, and statement of changes in stockholders' equity. While historical cost is the basis for the primary statements, certain large, publicly held enterprises voluntarily disclose supplementary information on a current cost basis (current purchased price of an asset owned). Segmented information (operations in different industries, countries, and major customer) may also be required for certain enterprises.

☒ External Financial Statements

The previously mentioned external financial statements provide vital information for external users such as creditors and investors. Another source of information for external users that must be prepared by manufacturing firms is the cost of goods manufactured statement.

In its basic from, a cost of goods manufactured statement may appear as in Table 1. The amount of cost of goods manufactured appearing at the bottom of the statement also appears on the income statement in the cost of goods sold section, as in Table 2. Note that the account called "Cost of Goods Manufactured" is treated on the income statement of a manufacturing company the same way that the Purchases account is treated on the income statement of a merchandising company.

The interrelationship of the cost of goods manufactured statement, the income statement, the statement of retained earnings, and the balance sheet is presented in Table 3. The statement of cash flows (not presented in Table 3) is based on the income statement and balance sheet and any relevant additional information.

Table 1 Production Company: Cost of Goods Manufactured Statement, for the Year Ended 31/12/XO

Costs put into production during the period:	
Direct materials	X
Direct labor	X
Factory overhead	X
Total costs put into production	X
Plus: Work-in-process inventory at the beginning of the period	X
Cost of goods in process during the period	X
Less: Work-in-process inventory at the end of the period	X
Cost of goods manufactured	X X

Table 2 Production Company: Income Statement for the Year Ended 12/31/XO

Sales		X
Cost of goods sold:		
Opening finished goods inventory	X	
Plus: Cost of goods manufactured	X	
Goods available for sale		X
Less: Closing finished goods inventory		X
Cost of goods sold		X
Gross profit		X
General, selling, and administrative expenses		X
Net income		X

Table 3 Interrelationship of Financial Statements

Trial Balance		
	Debit	**Credit**
Cash	$ 30000	
Receivables	4000	
Inventories-opening balance:		
Work-in-process	10000	
Finished goods	7000	
Other assets (noncurrent)	10000	
Total Liabilities (current)		$ 22000
Capital stock		4000
Additional paid-in capital		6000
Retained earnings-opining balance		20000
Added to work-in- process inventory during the period		
Direct materials	3000	
Direct labor	2000	
Factory overhead	4000	
Sales		50000
Marketing expenses	9000	
Administrative expenses	6000	
Other income		3000
Other expenses	5000	
Income taxes	9000	
Dividends	6000	
Total	$ 105.000	$ 105.000
Additional information:		
Closing inventories:		
Work-in-process	$ 7000	
Finished goods	6000	
Cost of Goods Manufactured Statement		
Costs put into production during the period		
Direct materials	$ 3000	
Direct labor	2000	
Factory overhead	4000	
Total costs put into production		$ 9000
Plus: Work-in- process inventory at the beginning of the period		10000
Costs of goods in process during the year		$ 19000
Less: work-in- process inventory at the end of the period		(7000)
Cost of goods manufactured		$ 12000
Income Statement		
Sales		$ 50000

Cost of goods sold:		
Opining finished goods sold inventory	$ 7000	
Plus: Cost of goods manufactured	12000	
Goods available for sale	$ 19000	
Less: closing finished goods sold inventory	(6000)	
Cost of goods sold		13000
Gross profit		$ 37000
Less: Marketing and Administrative expenses:		
Marketing expenses	$ 9000	
Administrative expenses	6000	(15000)
Income from operations		$ 22000
Non-operating income and expenses		
Other income	$ 3000	
Other expenses	(5000)	(2000)
Income before taxes		$ 20000
Income taxes		(9000)
Net income		11000
Statement of Retained Earnings		
Retained earnings-operating balance		$ 20000
Plus: Net income		11000
Subtotal		$ 31000
Less: Dividends		(6000)
Retained earnings-closing balance		$ 25000
Balance Sheet		
Assets		
Current:		
Cash	$ 30000	
Receivables	4000	
Work-in-process inventory	7000	
Finished goods inventory	6000	$ 47000
Noncurrent		
Other assets		10000
Total assets		$ 57000
Liabilities and stockholders' Equity		
Total current liability		$ 22000
Stockholders' equity		
Capital stock	$ 4000	
Additional paid-in capital	6000	
Retained earnings-closing balance	25000	35000
Total liabilities and stockholders' equity		$ 57000
For briefness, it is assumed there is no opening or closing materials inventory.		

A more detailed cost of goods manufactured statement, including materials inventory, for the XYZ. Manufacturing Company appears in Table 4.

Another common format of the cost of goods manufactured statement, whereby beginning work-in process inventory is added first at the top of the statement and ending work-in-process inventory is deducted as the last item at the bottom of the statement, is presented in Table 5 for the XYZ Manufacturing Company.

The format used in external financial statements will not be affected by the product costing technique selected. For example, the format of the cost of goods manufactured statement used by a custom maker (job order costing) will be the same as the one prepared by a mass producer (process costing).

Table 4 XYZ Manufacturing Company: Cost of Goods Manufactured Statement. For the Year Ended 12/31/19X2

Costs put into production during the period		
Direct materials:		
Materials inventory, January 1, 19X2.	$ 700000	
Purchases	42000	
Materials available for use	$ 742000	
Materials inventory, December 31, 19X2.	(34000)	
Materials used	$ 708000	
Less: Indirect materials	(34650)	
Direct materials used		$ 673350
Direct labor		676240
Factory overhead:		
Indirect materials	$ 34650	
Indirect labor	59217	
Heat	75000	
Light	47000	215867
Total costs put into production		$ 1565457
Plus: Work-in- process inventory at the beginning of the period		400000
Costs of goods in process during the period		$ 1965457
Less: work-in- process inventory at the end of the period		(200000)
Cost of goods manufactured		$ 1765457

Table 5 XYZ Manufacturing Company: Cost of Goods Manufactured Statement. For the Year **Ended 12/31/X2**

Work-in- process inventory at the beginning of the period		$ 400000
Costs put into production during the period		
Direct materials:		
Materials inventory, January 1, 19X2.	$ 700000	
Purchases	42000	
Materials available for use	$ 742000	
Materials inventory, December 31, 19X2.	(34000)	
Materials used	$ 708000	
Less: Indirect materials	(34650)	
Direct materials used		$ 673350
Direct labor		676240
Factory overhead:		
Indirect materials	$ 34650	
Indirect labor	59217	
Heat	75000	
Light	47000	215867
Total costs put into production		$ 1565457
Costs of goods in process during the period		$ 1965457
Less: work-in- process inventory at the end of the period		(200000)
Cost of goods manufactured		$ 1765457

Examples:

Examples (1)

King Manufacturing Corporation has the following information relating to the period just ended:

Beginning work-in- process inventory	$ 25000
Ending work-in- process inventory	10000
Direct materials cost	95000
Direct labor cost	110000
Factory overhead costs	70000
Beginning finished goods inventory	15000
Ending finished goods inventory	45000
Sales	300000
Selling and general expenses	75000

Required: From the preceding information, compute the following:

a- Cost of goods manufactured
b- Cost of goods sold
c- Net income or loss

Solution

(a) Cost of goods manufactured:

Costs put into production during the period:	
Direct materials cost	$ 95000
Direct labor cost	110000
Factory overhead costs	70000
Total costs of goods put into production	$ 275000
Plus: Beginning work-in-process inventory	25000
Cost of goods in process during the period	$ 300000
Less: Ending work-in-process inventory	10000
Cost of goods manufactured	$ 290000

(b) Cost of goods sold

Beginning finished goods inventory	$ 15000
Plus: Cost of goods manufactured	290000
Goods available for sale	$ 305000
Less: Ending finished goods inventory	45000
Cost of goods sold	$ 260000

(c) Net income or loss

Sales	$ 300000
Less: Cost of goods sold	260000
Gross profit	$ 40000
Less: Selling and general expenses	75000
Net loss	($ 35000)

Example (2) The following information is available for The Silverman Company on December 31, Year 3:

Raw materials		**Labor costs**	
Inventory, January 1	$9000	Direct	$19000
Inventory, December 31	12000	Indirect	$17000

Additional Information:

Heat and electricity for the factory	$ 25000
Materials purchased during the year	40000
Costs of goods in process during the year	103000
Work-in- process inventory, December 31	7000
Sales	125000
Finished goods inventory, January 1	25000
Costs of goods sold	105000
Selling, general and administrative expenses	11000

All materials are considered direct materials.

Required: Prepare a statement of cost of goods manufactured and an income statement.

Solution

Statement of Cost of Goods Manufactured, for the Year Ended December 31, Year 3

Direct materials:		
Inventory, January 1	$ 9000	
Purchase of direct materials	40000	
Total materials available	$ 49000	
Inventory, December 31	12000	
Direct materials used		$ 37000
Direct labor		19000
Factory overhead:		
Indirect labor	$ 17000	
Heat and electricity	25000	42000
Total manufacturing costs		$ 98000
Plus: Work-in-process inventory, January 1		5000
Cost of goods in process during the year		$ 103000
Less: Work-in-process inventory, December 31		7000
Cost of goods manufactured		$ 96000

The Silverman Company: Income Statement for the Year Ended December 31, Year 3

Sales,		$ 125000
Cost of goods sold:		
Finished goods inventory, January 1	$ 25000	
Plus: Cost of goods manufactured	96000	
Goods available for sale	$ 121000	
Less: Finished goods inventory, December 31 ($121000-105000)	16000	
Cost of goods sold		105000
Gross profit		$ 20000
Less: Selling, general, and administrative expenses		11000
Net income		$ 9000

Questions & Exercises

Multiple Choice

1-The cost of goods manufactured, under a periodic cost accumulation system, is equal to the:

a- Beginning finished goods inventory plus purchases.
b- Beginning work-in-process plus cost of goods in process during the year.
c- Cost of goods put into production plus beginning work-in-process less ending work-in-process.
d- Cost of goods sold less beginning work-in-process.

2-The cost of goods sold under a periodic cost accumulation system is equal to the:

a- Cost of goods available for sale less ending finished goods inventory.
b- Cost of goods available for sale plus beginning finished goods inventory.
c- Cost of goods manufactured plus beginning finished goods inventory.
d- Cost of goods manufactured less beginning finished goods inventory.

3-Under a perpetual cost accumulation system, the cost of direct materials. Direct labor, and factory overhead must first flow through the:

a- Finished goods account.
b- Work-in-process account.
c- Cost of goods sold account.
d- Cost of goods manufactured account.

4- A job order cost accumulation system is most suitable where:

a- Mass production techniques are used.
b- Homogeneous products are produced.
c- Continuous processing is performed.
d- Customized products are produced.

5- In a process cost system. The unit cost is computed for a:

a- Job.
b- Batch of goods.
c- Department.

d- Category of goods.

6- The process of charging factory overhead to work-in-process on the basis of a predetermined application rate multiplied by actual input is known as:

a- Normal costing.
b- Standard costing.
c- Actual costing.
d- Product costing.

7- Which of the following is a cost behavior-oriented approach to product costing?

a- Absorption costing.
b- Process costing.
c- Direct costing.
d- Job order costing.

8- Because the unit cost or a product cannot be determined until the end of the period, periodic cost accumulation system generally record only:

a- Standard costs.
b- Process costs.
c- Normal costs.
d- Actual costs.

9- Which of the following is not an example of a normally issued external financial statement?

a- Statement of financial position.
b- Statement of performance evaluation.
c- Statement of results of operations.
d- Statement of retained earnings.

10- The amount of cost of goods manufactured appearing on the bottom of the cost of goods manufactured statement also appears on the:

a- Statement of financial position.
b- Statement of performance evaluation.
c- Statement of results of operations.
d- Statement of retained earnings.

11- Sparkling Seltzer, Inc. bottled 200,000 gallons of seltzer water at a total cost of $56,000. Assuming that 75% of the bottled seltzer is sold, what is the unit cost of the seltzer and the total cost of the ending finished goods inventory, respectively?

a- $.07 per quart: $14,000
b- $.28 per gallon; $14,000
c- $.28 per gallon; $42,000
d- $.07 per quart; $42,000

12- Lehmann Manufacturing Corporation has the following information for the period just completed:

Direct materials……. ……..$65000

Direct labor…… ……..74000

Factory overhead... ……?

Beginning work-in-process inventory.....31000

Ending work-in-process inventory.....37680

Beginning finished goods inventory. ….46000

Ending finished goods inventory.....22000

Additional information: Last year total operating costs were $256,000. This year's total operating costs, of which 18% constitute selling, general, and administrative expenses, are $30,000 lower than last year's. What amount represents factory overhead?

a- 7 $29,000 b- $34,300

c- $47,000 d-$53,600

13- The accumulation of total costs and the computation of unit costs are the primary objective of:

a- A perpetual cost accumulation system.
b- A periodic cost accumulation system.
c- Both a periodic and a perpetual cost accumulation system.
d- A job order cost accumulation system.
e- Neither a periodic nor a perpetual cost accumulation system.

14- Hogan Manufacturing Company uses a process cost system. During the period $139,000 worth of produced goods were transferred to finished goods inventory.

Additional information:

Beginning finished goods inventory $14,000

Ending finished goods inventory 18,000

Total cost of operation 164,000

Selling general and administrative expenses 12,000

What is Hogan Manufacturing Company's cost of goods manufactured?

a- $157,000 b- $ 139,000

c- $ 138,000 d- $152,000

15- Balance Sneaker Company charges factory overhead to work-in-process inventory on the basis of predetermined factory overhead application rate. To do this, the predetermined factory overhead application rate is multiplied by the actual input of a given period. The management of Balance sneaker company charges factory overhead in this manner to avoid fluctuations in the unit cost of goods produced that would result if factory overhead was charged to work-in-process as it was incurred. Balance Sneaker Company uses:

a- Normal costing.
b- Standard costing.
c- Actual costing.
d- Absorption costing.

16- Which statement, if any, is incorrect?

a- Direct costing is a behavior-oriented approach because product costs are all variable by nature under direct costing and a direct relationship between cost and output can thus be maintained.

b- Both direct and absorption costing methods are suitable for use in a job order cost system or in a process cost system.

c- For purposes of external financial reporting, absorption costing must be used.

d- Ignore the question's wording. All statements are correct.

17- Lloyd Company has just contracted to sell 1,000 units of product X to Epson Company for a 12% profit over estimated cost. Lloyd company most likely uses a:

a- Job order cost system.

b- Direct cost system.

c- Process cost system.

d- System that cannot be determined from the information given.

18- Jerry's Pretzel Company uses a process cost system. The pretzel products are completed after they have been through each of Jerry's three manufacturing departments. This month's departmental unit cost information follows:

Unit Costs

Department 1 …..... $.14

Department 2 …..... $.39

Department 3…..... $.09

Production for the month was 10,000 packages of pretzels. During the month. Jerry's Pretzel Company incurred $500 of selling and administrative expenses.

What is the total unit cost of a pretzel package?

a- $0.21 b- $0.67

c- $0.62 d- $0.57

19- Internal reports:

a- May as a basis of valuation use any monetary or physical measurement basis.
b- Must adhere to generally accepted accounting principles.
c- Usually adopt a company-wide perspective.
d- Are directly regulated.

20- The following data relate to Lendl Manufacturing Company for the period:

Direct labor.....	$ 2,400
Factory overhead	1,700
Work-in-process inventory at end of period	5,000
Cost of goods manufactured	16,000
Sales	50,000
Opening finished goods inventory	9,000
Closing finished goods inventory	8,000
Total selling, general, and administrative costs	14,000

What is the cost of direct materials put into production during the period? By what amount will retained earnings increase (assuming no taxes or dividends)?

a- $ 6,700;	$14,000	c- $ 4,800	$ 25,000
b- $ 5,600;	$ 33,000	d- $ 5,900	$ 19,000

Exercice (1)

The Huffer Manufacturing Company manufacture rubber rafts. For the month of January, it incurred the following costs:

Materials …….. $ 10,000 (80% for direct materials)

Labor……..5,000 (70% for direct labor)

Factory overhead…….....5,000 (for heat, light, and power)

In addition to the costs of production, the company incurred selling expenses of $7,500 and general administrative expenses of $ 8,500

Required: company the cost of goods manufactured and the total costs.

Exercise (2)

The following information relates to the comfy water Bed Manufacturing Company: At the beginning of the period, there was $50,000 in work-in-process inventory. During the year Comfy incurred costs of $ 17,200 for direct materials, $15,700 for direct labor, and $32,100 for factory overhead (heat, light, and power).At the end of the period, there was work-in-process inventory of $ 40,000.

Required: compute the cost of goods manufactured for the comfy water Bed Manufacturing Company.

Exercise (3)

In September 2018, the BB Gun Company put into process $60,000 of raw materials (all direct materials). Department A used 15,000 direct labor hours at a total cost of $40,000, and Department B used 10,500 direct labor hours at a cost of $6 per hour. Factory overhead is applied in Department A and B at a rate of $ 3.75 and $4.50 per direct labor hour, respectively. Inventories on September1 were the following: materials, $20,000; work-in-process $28,200; finished goods, $15,100. On September 30, the inventories were: materials, $18,725; work-in-process, $24,500; finished goods, $16,500. The company produced 30,000 units during the month.

Required: Prepare, a combined statement of cost of goods manufactured and sold.

Exercise (4)

The Avocado Company had the following information available on May31, 2017: raw materials put into process (all direct materials), $47,000; direct labor paid at a rate of $4.35 an hour in Department S, $3.75 in department T, and $5.00 in Department P. Department S worked 9,725 hours, Department T worked 11,000 hours, and Department P worked 15,475 hours. Factory overhead was $60,000 for all three departments combined.

INVENTORIES

	MAY I	**MAY31**
Raw materials	$ 14,000	$12,750
Work-in-process	16,250	18,500
Finished goods	22,000	20,000

Required:

a. Prepare a statement of cost of goods manufactured.
b. What is the amount of the cost of goods sold?

Exercise (5)

The Star Company purchased materials for cash at a cost of $12,795. Direct materials of $9,250 and indirect materials of $3,545 were placed into the production of the company's most popular product, 78XT. The total payroll cost was $37,000, of which $25,000 was allocated to direct labor and $12,000 to indirect labor. The payroll was paid on March3.

The insurances and depreciation expenses for the manufacturing operations amounted to $16,000. Assume that the exact amount in the Factory Overhead account was applied to worked-in-process Inventory. The cost of the goods manufactory for the period was $64,000. Sales of 78XT amounted $65,000 in cash, and the cost of goods sold was $ 60,000.

Required: compute the amount by which ending work in-process inventory exceeded beginning work-in process inventory.

Exercise (6)

The Blimp Manufacturing Company produced 100,000 units during the year ended December31, 2018. It incurred the following costs for the year:

Materials..... $73,000 (10% is indirect materials)

Labor..... $ 97,000(7% is indirect labor)

Factory overhead...125% of direct labor cost

Work-in-process inventory, January 1, 2018....$35,250

Work-in-process inventory, December31, 2018…. $27,000

The factory overhead percentage includes indirect materials and indirect labor.

Required: Prepare a cost of goods manufactured statement for the period.

Exercise (7) The following data relate to the operations of Dexter Company for 2017:

	Work-in- process	Finished goods
Beginning inventories	$44,000	$30,000
Ending inventories	35,000	22,000

The cost of goods manufactured was $ 400,000 and the gross profit for the year was $ 60,000

Required: compute the sales for 2017.

Exercise (8) The Blum Company provides the following data for 2017:

	December 31	
	2016	2017
Inventory Balances		
Raw materials*	$12,000	13,500
Work-in-process	15,100	17,600
Finished goods	19,500	21,200

Operating Data

Cost of goods manufactured	$ 151,700
Direct labor cost	50,000
Factory overhead (utilities only)	62,500
Indirect materials cost	5,000

*consisting of both direct and indirect materials.

Required: compute the direct materials cost for 2017.

Exercise (9)

On December 31, year 1, the following information was available for the Tweedle Company: materials used during the year amounted to $94,000 of which $30,000 was for indirect materials labor cost for the company included to $22,000 for direct labor and $18,000 for indirect labor. The combined cost of heat and electricity was $34,000 selling, general and administrative expenses were $16,000 inventories were as follows: beginning work in-process, $9,500; ending work-in-process, $12,000; beginning finished goods, $18,000; ending finished goods, $22,000 there was no beginning or ending materials inventory.

Required: determine the total operating cost for the Tweedle Company, assuming that a periodic cost accumulation system is followed.

Exercise (10)

XYZ Corporation, which follows a periodic cost accumulation system, had the following information available for a period:

Inventories:

Beginning:	
Work-in-process	$5,000
Finished goods	18,000
Ending:	
Work-in-process	6,000
Finished goods	25,000
Material costs:	
Direct	75,000
Indirect	30,000
Labor costs:	
Direct	22.000
Indirect	20,000
Other factory overhead:	
Electricity	45,000
Selling, general, and administrative expenses	16,000

Required: Compute the total costs, assuming no beginning or ending materials inventory.

Exercise (11)

The Parrish Fertilizer Company produces various types of fertilizer. No beginning units in process or finished units were on hand on January 1, 2017; 30,000 finished units were on hand on December 31, 2017, and 95,000 units were sold during the year. There were no units in work-in-process inventory on December 31, 2017. The materials put into production cost $300,000; 75% were direct materials. There was no beginning or ending materials inventory.

Labor costs were $350,000; 40% was for indirect labor. Factory overhead costs, other than indirect materials and indirect labor, were the following:

Heat, light and power $115,000

Depreciation..... 78,000

Property taxes……..65,000

Repairs and maintenance.....42,000

Selling expenses were $80,000; general and administrative expenses were $50,000.

Required: Compute the following:

a. Cost of goods manufactured

b. Total cost

c. Unit cost

d. Prime costs

e. Conversion costs

f. Period costs

Exercise (12)

The Blackwell Clock Company manufacturing many types of clocks. They have just completed production for the current year. The sales for the year were $945.000 and inventories were as follows:

	Ending	Beginning
Raw materials inventory	-0-	-0-
Work-in-process inventory	$60000	$75000
Finished goods inventory	54000	35000

Direct materials for the period cost $176,000, direct cost $250,000, And factory overhead cost $237,500.

Selling expenses were $55,000 and general and administrative expenses were $117,000.

Required:

a- Prepare The Following Statements :
   1- Cost of goods Manufactured
   2- Cost of goods Sold

b- Compute the net income or loss.

Exercise (13)

The stiff shirt company has just completed its third year of operation. Sales for year were $1,300,000, and inventories were as follows:

	December 31	January 1
Raw materials inventory	-0-	-0-
Work-in-process inventory	$100,000	$95.000
Finished goods inventory	64.000	76.000

Costs For the period were as follows:

Direct materials $365,000

Direct labor.....405,000

Factory Overhead.....445,500

Selling expenses were $26,000. General administrative expenses were $82,000.

Required:

a- Prepare The Following Statements :
1- Cost of goods manufactured
2- Cost of goods sold
b- Compute the net income or loss. Less 30500

Chapter Three:

Costing of Materials

Chapter three:
Costing of Materials

Learning objectives:

Upon completion of this chapter, you should be able to:

- ✓ Distinguish between and account for direct and indirect materials as they are used in the production process.
- ✓ Differentiate among the forms used in the purchase and issuance of materials such as a purchase requisition, a purchase order, a receiving report, and a material requisition.
- ✓ Distinguish between the periodic and perpetual cost accumulation systems used to account for materials issued to production and for ending materials inventory.
- ✓ Distinguish among the five common control procedures used to assist management in keeping inventory costs to a minimum and plant production flowing.

3/1 Introduction:

Manufacturing is the process by which raw materials are converted into a finished product. Raw materials constitute an essential cost element of production. After raw materials are purchased and temporarily placed in a storeroom, a manufacturer proceeds to transform them into finished products via the incurrence of conversion costs (direct labor and factory overhead). If the manufacturing process is labor- intensive, labor costs will constitute a very significant element in the conversion process.

This chapter will explore the costing and controls of materials and labor.

3/2 Materials

Materials are the basic ingredients that are transformed into finished goods through the use of labor and factory overhead in the production process***. Materials costs*** can be either *direct materials* (are those that can be identified with the production of a finished product, that can be easily traced to the production, and that represent a major cost of a finished product), or *indirect materials (*comprise all other materials or supplies involved in the production of a product that are not classified as direct materials).

3/3 Accounting for Materials

Accounting for materials by a manufacturer usually involves two activities the purchase of materials and their issuance.

A. Purchase of Materials: Most manufacturers have a purchasing department whose function is to order raw materials and supplies needed for production. The manager of the purchasing department is responsible for assuring that the items ordered meet the quality standards set by the company, are acquired at the lowest price, and are delivered on a timely basis. Three from are commonly used in purchasing goods: a purchase requisition, a purchase order, and a receiving report.

B. **Purchase Requisition:** A purchase requisition is a written request, usually sent to inform the purchasing department of a need for a materials or supplies. Suppose that on April 1 a materials storeroom clerk wishes to place an order for 20 widgets, catalog number 92, at an estimated unit price of $1.00, needed by May 1. The clerk would fill out a purchase requisition form and sent it to the purchasing department so that they can order the widgets.

Although a purchase requisition is usually preprinted according to the specification of a particular company, most forms include the requisition (serially numbered), name of department or individual making the request, quantity of items requested, identifying catalog number, description of the item, unit price, total price, shipping, handling, insurance and related costs, total cost of entire requisition, order date, required delivery date, and authorized signature.

C. **Purchase Order** If the purchase requisition is properly completed, the purchasing department will issue a purchase order (in this case, for 20 widgets). *A purchase order* is a written request to a supplier for specified good at an agreed-upon price. The request also stipulates terms of delivery and terms of payment. The purchase order is the supplier's authorization to deliver goods and submit a bill. All items purchased by a company should be accompanied by purchase orders, which are serially numbered to provide control over their issuance.

   The following items are commonly included in a purchase order: preprinted name and address of company placing the order, purchase order number, name and address of supplier, order date delivery is requested, delivery and payment terms, quantity of items ordered, catalog number, description, unit and total price, shipping, handling, insurance and related costs, total cost of entire order, and authorized signature.

D. **Receiving Report** when the goods that were ordered are delivered, the receiving department will unpack and count them. (It is interesting to note that the quantity ordered is not shown on the copy of the purchase order sent to the receiving department. This deliberate omission ensures that the goods delivered are actually counted.) The goods are checked to be sure that they are not damaged and that they meet the specifications of the purchase order and the packing slip (a list,

prepared by the supplier that accompanies the order and details what is in the shipment).

Next, the receiving department issues a receiving report. This form includes the supplier's name, purchase order number, date delivery was received, quantity received, description of goods, differences from the purchase order (or mention of damaged goods) and authorized signature.

E. **Issuance of Materials:** The person in charge of the storeroom is responsible for the proper storage, protection, and issuance of all materials placed in his or her safekeeping. The issuance must be authorized by means of a materials requisition form prepared by the production manager or department supervisor. Each materials requisition form shows the job number or department requesting the goods, their quantity and description, and the unit cost and total cost of the goods issued.

The cost that is entered on the materials requisition form is the amount charged to production for materials consumed. Computing the total cost of materials issued seems relatively simple: The unit cost of an item is multiplied by the quantity purchased. The quantity is readily determined from the materials requisition form; however, determining the unit cost of materials issued is not that simple during periods of inflation (rising prices) or deflation (declining prices).

During a period of changing prices, what price should be used for materials placed into production during the period and what price should be used for the materials still on hand at the end of a period (ending materials inventory)? Should the cost of materials issued be multiplied by the beginning unit price of materials, the average unit price for the period, or the ending unit price?

3/4 Systems of Accounting for Materials Issued to Production and Ending Materials Inventory

Either the periodic inventory system or the perpetual inventory system may be used to account for materials issued to production and ending materials inventory.

A. Accounting by the Periodic Inventory System

Under a periodic inventory system, the purchase of materials is recorded in an account entitled "Purchases of Raw Materials." If a beginning materials inventory exists, it is recorded in a separate account entitled "Materials Inventory-Beginning." Purchases plus beginning inventory equal materials available for use during a period. To arrive at the ending materials inventory, a physical count must be made of the materials still on hand at the end of the period. The cost of materials for the period is determined by subtracting the ending materials inventory from the materials available for use during the period, as follows:

Materials inventory-beginning	X
+ Purchases	X
= Materials available for use	X
- Materials inventory-ending (based on a physical count)	X
= Cost of Materials issued	X

Note that under this method the cost of materials issued is not directly determined; it is indirectly computed as a residual. In other words, the cost of materials issued equals what is left over after the cost of the ending inventory is subtracted from the cost of the materials available for use.

B. Accounting by the perpetual Inventory System

Under the perpetual inventory system, the purchase of materials is recorded in an account labeled "Materials Inventory," rather than in a purchase account. If beginning materials inventory exists, it would also be recorded as a debit in the Materials Inventory account. When materials are issued, the Materials Inventory account is credited for the cost of materials issued with a corresponding debit to work-in-process inventory account.

The end result is that the cost of materials issued is charged to production at the time when the materials are issued, and the balance in the Materials Inventory account shows the cost of materials still available for use. Thus, under the perpetual inventory method, both the cost of materials issued and the ending materials inventory can be directly ascertained after each transaction.

Subsidiary ledger record cards must be maintained when a perpetual inventory system is used to account for materials inventory. The total of the materials subsidiary ledger record cards must equal the amount in the Materials Inventory Control account in the general ledger. The materials subsidiary ledger has a separate inventory record card for each type of item in inventory. The typical form of an inventory record card shows the date, quantity and dollar amount of materials received (debit) and issued (credit), and the resulting balance (debit).

The use of the perpetual inventory method also requires the taking of a physical count of materials on hand at least once a year in order to check for possible error or shrinkage due to theft or spoilage. If a physical count disagrees with the balances in the inventory record cards, the book figures are adjusted upward or downward to reflect the actual count.

C. Journalizing Materials Cost

The perpetual inventory system will be followed in this textbook since it is used by most medium and large size manufacturers; it provides better control and more information than a periodic inventory system. With the availability of inexpensive micro or mini computers even small-size manufacturers are now taking advantage of the benefits of maintaining a perpetual inventory system

Under a perpetual inventory system, when materials are purchased, a debit is made directly to the Materials Inventory account. When direct materials are put into production, a journal entry must be made to charge the cost or materials to work-in-process inventory. The cost of indirect materials, when put into production, is debited to factory overhead control.

For example, assume 100 units of direct materials and 20 units of indirect materials are purchased for $5 per unit and $1 per unit, respectively. The following entry is made to record the purchase of materials:

Materials inventory	520	
Cash (or accounts payable)		520

100 units × $5 per unit = $500

20 units × $1 per unit = 20

Total per unit = $520

A separate inventory account for direct materials and one for indirect materials may be maintained if desired by management.

Assume next that 30 units of direct materials and 10 units of indirect materials from the above purchase are placed into production. The following entry is made to record the issuance of materials from inventory:

Work in process inventory (30 units × $ 5)	150	
Factory overhead control (10 units × $ 1)	10	
Materials inventory		160

Direct materials are debited to work in-process inventory because they represent a major element of a product's cost and therefore require separate recognition in order to provide better control. **Indirect materials** usually represent insignificant amounts, and/or are not directly traceable to a product, and are therefore charge to factory overhead control. The factory overhead control account is used to accumulate the indirect costs of production such as indirect materials, indirect labor, factory depreciation, etc.

❖ ***Control Procedures***

It is most important that a company have a good system of materials inventory control. Achievement of good control keeps costs at a minimum level and plant production on a smooth, uninterrupted schedule. The following concepts should be employed in an inventory-control system:

1. Inventory is the result of purchasing raw materials and parts. It is also the result of applying labor and factory overhead to the raw materials to produce finished goods.
2. Reduction of inventory is the result of normal use and either finding alternative uses for or scrapping unneeded items.
3. Optimum inventory investment is based on quantitative techniques which are designed to minimize the cost of carrying inventory and the cost of ordering inventory.
4. Efficient purchasing, management, and investment in materials depend on an accurate forecast of sales and resulting production schedules.
5. Forecasts help determine when to order materials. Controlling inventory is accomplished through scheduling production.

6. Inventory control is more than maintaining inventory records. Control is exercised by people who are making personal judgments partially on the basis of their past experiences. Their decisions are made within a general framework of organizational objectives and policies to achieve them. Control is relative, not absolute.
7. Methods of inventory control will vary depending for the most part on the cost of the materials and their importance to the manufacturing process. Expensive materials, or those essential to production, will tend to have their program for control reviewed more frequently despite the cost and effort of doing so by experience personal.

3/5 Periodic and Perpetual Inventory Systems under Fluctuation

1. Periodic Inventory Systems

The methods commonly used to determine the value of ending inventory and cost of materials issued under the periodic inventory system are described below.

A. Specific Identification

Specific identification is the simplest but also the most time consuming method of determining cost of materials used and cost of the ending inventory.

This method entails keeping a record of the purchase price of each specific unit and the quantity of specific units used. Cost of materials used is computed by multiplying the quantity used by the specific price of each material. In many cases, when materials are purchased, a tag showing the purchase price is attached in order to identify the item.

The information in Tables 1 and 2 is the basis for the following discussion of methods of costing materials.

Tables (1) materials purchased and used

	Date	Units Purchased	Cost Per Unit	Units used	Beginning. of units available
Beginning inventory	1/1	20	$10	-	20
	5/1	50	11	-	70
	6/1	-	-	30	40
	9/1	40	12	-	80
	15/1	20	13	-	100
	20/1	-	-	60	40
	28/1	10	15	-	50
Total		140		90	

Table (2) Materials available for Use:

	Date	Units Purchased ×	Cost Per Unit	= Total
Beginning inventory	1/1	20	$10	$200
	5/1	50	11	550
	9/1	40	12	480
	15/1	20	13	260
	28/1	10	15	150
Cost of materials available for use				$1,640

For the specific identification method, assume that the 30 units issued on January 6 were taken from the purchased on January 5, and the 60 units issued on January 20 were taken from both the beginning inventory (20 units) and the lot purchased on January 9 (40 units). The computation of the ending materials inventory under the ***specific identification method*** would be as follows:

	Purchase Date	Units Purchased	Units Issued from Lot	AMT On Hand	× Unit Cost	= Ending Inventory
Beg. inventory	1/1	20	20	0	-	$ 0
	5/1	50	30	20	$11	200
	9/1	40	40	0	-	0
	15/1	20	0	20	13	260
	28/1	10	0	10	15	150
Total						**$ 630**

Therefore, the ending materials inventory is $630. The cost of materials issued is computed as follows.

Cost of materials available for use (Table 2)	$1,640
Less: Ending materials inventory	630
Cost of materials issued	$1,010

The specific identification method is used when dealing with expensive materials which are unique, such as diamonds; it would not be economically feasible to use this method to keep track of inexpensive materials. For example, a peanut processing company would not attach a price tag to each pound of peanuts purchased. Therefore, other methods must be employed when dealing with quantities of less expensive materials.

B. Average Cost

When an inventory contains many small, homogeneous materials (like peanuts), it is a fair assumption that the materials issued and on hand are likely to be a mixture of the materials available for use. Consider a product like gasoline. When new supplies are added to the pumps, the new liquid will mix together with the existing gasoline, leaving no clear distinction between the purchases. There are two methods of computing average cost:

i. Simple Average

Under this method, the various purchase prices are added together and their sum is divided by the total number of purchases (beginning inventory is treated as a purchase) to arrive at the average cost per unit. The simple average price for our example is computed as follows:

	Date	**Cost Per Unit**
Beginning inventory	1/1	$10
	5/1	11
	9/1	12
	15/1	13
	28/1	15
		$ 61
Simple average = $61÷5 = $12.20		

Therefore, the simple average is $12.20. Ending materials inventory is computed by multiplying the number of units on hand at the end of the period by the simple average:

Ending materials inventory = 50 × $12.20 = $610

However, if one were to compute the cost of materials issued in the same manner, the following error would result:

Cost of materials issued (90×$12.20)	$ 1,098
Plus the ending materials inventory	610
Cost of materials available for use	$1,708

The computed cost of materials available for use would be $68 greater than the actual cost of material available for use:

Actual cost of materials available for use (Table 2)	$1,640
Computed cost of materials available for use	1,708
Difference	$ 68

The difference arises because a different quantity was purchased at each price. For example, on January 5, 50 units were purchased at $11 per unit; and on January 15, 20 units were purchased at $13 per unit. Thus, the simple average method only works when the same number of units is purchased at each price. When materials are purchased in varying quantities, an alternative method of computing the average unit cost must be used.

ii. Weighted Average

A weighted average is obtained by first multiplying each purchase price by the quantity of units in each purchase. The sum of the results is then divided by the total number of units available for use.

The weighted average price for our example is computed as follows:

	Purchase Date	**Units Purchased**	**× Cost Per Unit**	**= Total**
Beg. inventory	1/1	20	$10	$200
	5/1	20	11	550
	9/1	40	12	480
	15/1	20	13	260
	28/1	10	15	150
Total		140		$1,640

Note that the total ($1,640) will always be the same figure as materials available for use.

Weighted average = $1,640 ÷ 140 = $11.71 (rounded off)

The ending materials inventory is computed by multiplying the number of units on hand at the end of the period by the weighted average cost per unit:

Ending materials inventory = 50 x $11,71 = $586 (rounded off)

The cost of materials issued may be computed in the same manner:

Cost of materials issued = 90 × $11,71 = $1.054 (rounded off)

Note that under the weighted average method, the ending inventory plus the cost of materials issued will equal the cost of materials available for use:

Ending inventory	$ 586
Cost of materials issued	1,054
Cost of materials available for use	$ 1,640

C. First-In, First-Out

In many situations, the materials that are received first are issued first. This especially true when perishable items are involved. For example, in a milk processing plant, the manager would want to sell the oldest milk first. The FIFO (initial letters of first-in, first out) method of inventory costing is based on the basis that first goods purchased are the first to be issued. Using theFIFO method, the ending inventory would consist of materials received last, and prices would therefore closely reflect current costs.

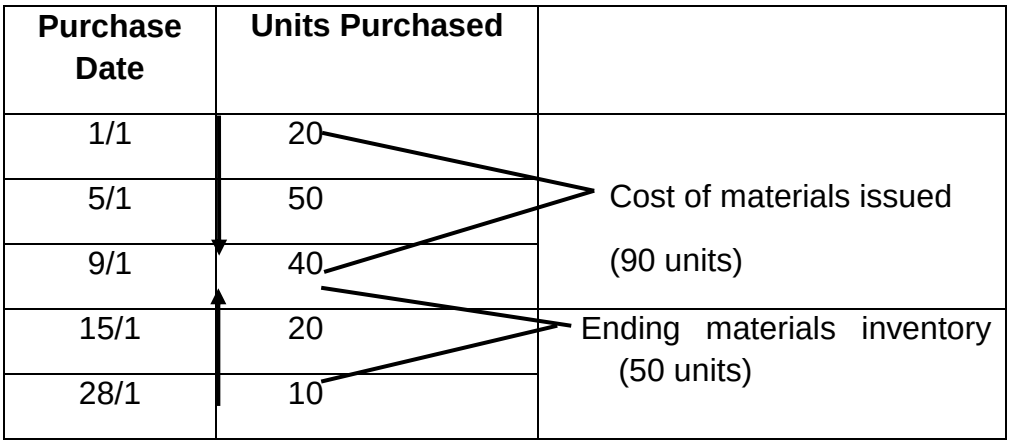
The FIFO method of inventory computation for our example is as follows: The 90 units issued are assumed to be from the following purchases:

	Purchase Date	**Units × Purchased**	**Cost Per Unit**	**= Total**
Beginning inventory	1/1	20	$10	$200
	5/1	50	11	550
	9/1	20	12	240
Cost of Materials Issued				$990

The 50 units in ending inventory are computed from the last purchase date back:

Purchase Date	Units Purchased	× Cost Per Unit	= Total
1/1	10	$15	$150
5/1	20	13	260
9/1	20	12	240
Ending inventory			$650

Note that both the cost of materials issued and the ending materials inventory will include part of the January 9 purchase of 40 units. Another way of looking at it is as follows:



To compute the cost of materials issued, work from the beginning materials inventory or earliest purchase and go forward in time. To compute the ending materials inventory, work from the most current purchase and go back in time.

D. Last-In, First-Out

The LIFO (first letters of last-in, first-out) method of inventory pricing assumes that the materials received last are the first to be issued. Therefore, the ending inventory reflects the process of the earliest materials received. Advocates of this method point out that it follows a flow of costs and provides a better matching of current costs with current revenue than does FIFO.

Under LIFO, the cost of materials issued closely reflects current costs (during inflation); thus, the income determination should be more accurate because current costs are matched with current revenue. In some cases, this method may also adhere to the flow of materials concept. For example, when coal is poured down a chute into a bin, the last coal in will be the first coal out. However, this is exception and not the rule.

The LIFO method of computing inventory cost is the opposite of computing costs under FIFO. The cost of materials issued is computed by taking the last purchase first and working backward. The ending materials inventory is computed by starting from the beginning materials inventory or earliest purchase and working forward.

The LIFO method of inventory computation for our example is as follows: The 90 units issued are assumed to be from the following purchases.

Purchase Date	Units Purchased	× Cost Per Unit	= Total
28/1	10	$15	$150
15/1	20	13	260
9/1	40	12	480
5/1	20	11	220
Cost of materials issued			$1,110

The 50 units in the ending inventory are computed from the earliest purchase price going forward:

Purchase Date	Units Purchased	× Cost Per Unit	= Total
1/1	20	$10	$200
5/1	30	11	330
Ending materials inventory			$530

Note this time that both the cost of material issued and the ending materials inventory include part of the purchase on January 5 of 50 units. Another way of looking at it is as follows:

Purchase Date	Units Purchased	
1/1	20	Ending materials inventory (50 units)
5/1	50	
9/1	40	
15/1	20	Cost of materials issued (90 units)
28/1	10	

The major shortcoming of the periodic inventory method is that the cost of materials issued cannot be determined without a physical count of the ending materials inventory, which can be very expensive and time-consuming. The periodic inventory techniques discussed would also be inadequate if information were continuously needed about the cost of materials issued and on hand. Because most sizable manufacturing companies need cost information continuously, they are likely to use a perpetual inventory system.

2. Perpetual Inventory System

The use of the perpetual inventory system under fluctuating prices will now be illustrated.

A. Specific Identification:

The cost of materials issued and the ending materials inventory are computed by multiplying the units issued or on hand by the specific cost of each unit issued or still on hand; therefore, the choice of either the perpetual or periodic inventory system will not affect the method of measurement.

B. Average Cost:

i. Simple Average:

Under the periodic inventory method, all the different purchase costs are added together at the end of each of period. This sum is divided by the total number of purchases (beginning inventory is treated like a purchase) to arrive at the simple average cost per unit. When the perpetual inventory system is used, this computation must be performed after each purchase; this technique is usually referred to as the "simple moving average." Hence, many averages may be used in one period.

The same example used to illustrate the periodic inventory system will demonstrate the perpetual inventory system. The simple moving average cost for the cost of materials issued and the ending materials inventory is computed as in Table 3.

Note: As recognized under the periodic inventory system, the actual cost of materials available for use ($1,640) will differ from the computed amount under the perpetual inventory system (the exception being when an equal number of units are purchased at each price). In all other instances, this problem is overcome by employing the weighted average cost method.

Table 3 Simple Moving Average: Perpetual Inventory System:

DATE Beginning Inventory	Purchased		Cost of materials available for use	Issued		Cost of materials issued	Balance		Total cost
	Units	Unit cost		Units	Unit cost		Units	Unit cost	
									$200.00
1/1			$200				20	$10,00	
5/1	50	$11	550				70	10,50 (1)	735.00
6/1				30	$10.50	$315,00	40	10,50	420.00
9/1	40	12	480				80	11,00 (2)	880.00
15/1	20	13	260				100	11,50 (3)	1,1150.00
20/1				60	11.50	690,00	40	11,50	460.00
28/1	10	15	150				50	12,20 (4)	610.00
Total			$1,640	Total		$1,005.00	ending balance		$610.00

Cost of materials issued..... $1,005.00

Ending inventory.....…..... 610,00

Computed cost of materials available for use…… $1,615,00

COMPUTATIONS

(1)	1/1	$10,00		(2)	9/1	$21.00	
	5/1	11.00				12.00	
		$21.00	÷ 2= $10.20			$33.00	÷3 = $11.00
(3)	15/1	$33.00		(4)	28/1	$46.0	
		13.00				15.00	
		$46.00	÷4=$11.50			$61.00	÷5 = $12.20

ii. **Weighted Average**:

When the perpetual inventory system is used, the weighted average must be recomputed after each purchase instead of at the end of the period as in the periodic inventory system. The weighted average cost is computed after each purchase by dividing the total cost of materials on hand by the total number of units on hand. Under the perpetual inventory system, this technique is usually referred to as the "weighted moving average cost". The weighted moving average cost for the cost of materials issued and the ending materials inventory is computed as in Table 4.

Table (4) Weighted Moving Average: Perpetual Inventory System

Date Beginning Inventory	Purchased		Cost of materials available for use	Issued		Cost of materials issued	Balance		Total cost
	Units	Unit cost		Units	Unit cost		Units	Unit cost	
1/1			$200				20	$10,00	$200.00
5/1	50	$11	550				70	10,714(1)	750.00
6/1				30	$10.714	$321.42	40	10,714	428.00
9/1	40	12	480				80	11,357(2)	908.65
15/1	20	13	260				100	11,686(3)	1,168.60
20/1				60	11.686	701.16	40	11,686	467.44
28/1	10	15	150				50	12,349(4)	617.45
Total			**$1,640**	**Total**		**$1,022.58**	**Ending balance**		**$617.45**

Cost of materials issued	$1,023
Ending materials inventory	617
Computed cost of materials available for use	$1,640

COMPUTATIONS

(1)	20	at	$10,00	=$200.00	(2)	40	at	$21.00	$428.56
	50	at	11.00	=$550.00		40	at	12.00	$480.00
	70			$750.00		80		$33.00	$908.56
	Average		$10.714	$908.56		**Average**		$11.357	
(3)	80	at	$11.357	$260.00	(4)	40	at	$11.686	=$467.44
	20	at	13.00	=260.00		10	at	15.00	= 150.00
	100			$1,168.56		50			$617.44
	Average		$11.686			**Average**		$12.349	

C. **FIFO**. Since the cost of materials issued is computed from the earliest materials purchased, and the ending materials inventory consists of the most recent purchases, these two amounts will be identical under both the periodic and the perpetual inventory systems.

D. **LIFO.** Here, the cost materials issued and the ending materials inventory may differ under the periodic and perpetual inventory systems. The difference results from the cost to be assigned at the date that materials are issued. Under the perpetual inventory system, a cost must be assigned to each unit issued on the date of issue, whereas under the periodic inventory system, the cost is assigned at the end of the period.

Under the LIFO perpetual cost inventory system, the cost of materials issued and the ending materials inventory are computed as in Table 5.

Table (5) LIFO: Perpetual Inventory System

DATE Beginning Inventory	**Purchased**		**Cost of materials available for use**	**Issued**		**Cost of materials issued**	**Balance**		**Total cost**
	Units	Unit cost		Units	Unit cost		Units	Unit cost	
1/1			$200				20	$10,00	$200.00
5/1	50	$11	550				20	10,00	750.00
							50	11,00	
6/1				30	11.00	$330.00	20	10,00	
							20	11,00	420.00
9/1	40	12	480				20	10,00	
							20	11,00	900.00
							40	12,00	
15/1	20	13	260				20	10,00	
							20	11,00	1,640.00
							40	12,00	
							20	13,00	
20/1				20	13.00		20	10,00	
				40	12.00		20	11,00	420
28/1	10	15	150				20	10,00	
							20	11,00	570.00
							10	15.00	
Total			**$1,640**	**Total**		**$1,070.00**	**Ending balance**		**570.00**

Cost of materials issued..... $1,070

Ending inventory.....….....….. 570

Cost of materials available for use……. $1,640

3. ***Comparison of Inventory Methods***:

The method selected for valuing the ending materials inventory directly affects the allocation of the materials available for use between the cost of materials issued and the ending materials inventory. Table 6 is a summary of the results of using the different methods and inventory systems in our example.

The largest gross profit results from computing inventory under the FIFO method, while the lowest gross profit results when the LIFO method is used. The FIFO method results in the highest ending materials inventory (assuming inflation); the LIFO method results in the lowest ending materials inventory. The difference between the gross profit obtained under FIFO versus LIFO would be exactly equal to the difference between the two ending materials inventories and cost of materials issued.

In periods of rising prices, if a firm wishes to show a lower gross profit and therefore lower net income, it would use the LIFO method. Imagine the amount of manipulation and confusion that would result if a firm were free to choose a different method inventory valuation each period. To prevent this occurrence, generally accepted accounting principles state that once a method of valuing inventory has been selected, the same method must be used every year.

This conforms to a fundamental accounting concept: consistency.

Table 6 Summary and Comparison of Inventory methods:

	Specific Identification	**Weighted Average**	**FIFO**	**LIFO**
Cost of materials issued:				
Periodic inventory system	$1,010	$1,054	$990	$1,110
Perpetual inventory system	1,010	1,023	990	1,070
Ending inventory:				
Periodic inventory system	630	586	650	530
Perpetual inventory system	630	617	650	570

After an acceptable has been chosen, it must be used consistently, unless it is evident that changing to another method will improve the company's financial reporting. The initial selection of a method should be based on which one results in the best approximation of periodic net income for a company. Since no two companies are identical, a firm's particular situation must be analyzed before the most appropriate valuation method can be selected.

4. Lower of Cost or Market (LCM)

Once an inventory method has been selected and used the next step to consider is whether the "lower-of-cost-or-market" rule applies .This rule states that ending materials inventory must be assigned either the historical cost (cost that the company paid and originally recorded on the books) or the current market value, whichever is lower.

Current market value is defined as the replacement cost of an item, or how much it would cost the firm today to buy an item of inventory. If replacement cost is higher than historical cost, no adjustment is necessary. However, if replacement cost is lower than historical cost, the ending materials inventory must be reduced and the cost of goods manufactured increased. Logically it follows that if raw materials in inventory decreases in value, the selling price of the finished goods should also decrease; thus, an eventual loss of wealth will occur.

The loss in wealth should be charged to the period in which the loss occurred. The LCM rule is supported by the principle of conservatism, which states that all potential losses should be accounted for in the period in which they occur.

❖ ***Computation of LCM***

The LCM rule may be applied to the total materials inventory figure or individually to various units of inventory. The method selected must be consistently applied.

The previous examples of inventory valuation assumed (for the sake of simplicity) that we had only one type of materials inventory. In a situation where only one type of inventory exists and where the replacement cost is lower than the actual unit cost, the replacement cost must be used instead of the actual cost.

For example, refer back to our computation of materials inventory under LIFO using the periodic system. The following dollar amount of ending materials inventory resulted for the 50 units:

Purchase Date	Units Purchased	× Cost Per Unit	= Total
1/1	20	$10	$200
5/1	30	11	330
Ending materials inventory			**$530**

No adjustment would necessary if the replacement cost were greater than or equal to $11 per unit. However, assume that the replacement cost dropped to $8 per unit. Now the ending materials inventory would be computed as follows: 50 units x $8= $400

Materials inventory before LCM adjustment……$530
Materials inventory after LCM adjustment…….. 400
Difference (to cost of goods manufactured)……... $130

The resulting decrease of $130 in ending materials inventory would be added to the cost of goods manufactured because it represents a loss in inventory value.

❖ ***Criticism of the LCM rule:***

The LCM rule was introduced in a period when was considered to be extremely important. The LCM rule violates consistency, because in one period the ending materials inventory may be valued at cost, but in another period it is based on market value. It is also inconsistent to recognize a loss in inventory value before it is actually realized, although increases in replacement cost are recognized only when the finished inventory is sold.

❖ ***Defense of the LCM rule:***

The AICPA has established limits on the market value used to compare with cost.

1- That market value may not exceed the net realizable value (defined as selling price less any cost to complete and sell). This upper limit precludes deferring losses into future periods by overvaluing ending inventories.

2- That market value may not be less than net realizable value minus a normal profit margin. This lower limit precludes the deferral of profits into future periods by undervaluing ending inventories.

Examples

Example (1): The president of Margo's Supply Company has following data concerning the company's wood pulp inventory for the month of January. The company measures its ending inventory under FiFO method.

1/1	Opening inventory : 1000Ib of wood pulp costing $ 0.50
10/1	Purchased: 300 Ib at $ 0.55/Ib
16/1	Issued: 300 Ib
26/1	Issued: 750 Ib
28/1	Purchased: 400 Ib at $ 0.60/Ib
31/1	Issued: 350 Ib

All purchases are made by paying cash

Required:

a- Journalize the above transactions under a perpetual inventory system

b- Compute the cost of materials issued and the ending materials inventory.

(A)

January10	Materials inventory (300 × $0.55)	165.00	
	Cash		165.00
	To record purchase of goods on 1/10		
January16	Work-in-process inventory	150.00	
	Materials inventory (300 × $.50)		150.00
	To record cost of materials issued.		
January26	Work-in-process inventory	377.50	
	Materials inventory		377.50
	[(700 × $.50) + (50 × $.55)		
	To record cost of materials issued.		
January28	Materials inventory (400 x $.60)	240.00	
	Cash		240.00
	To record cost of materials issued.		
January31	Work-in-process inventory	197.50	
	Materials inventory		197.50
	{ (250 x $.55) ÷ (100 x $.60)}		

To record cost of materials issued.

b

Materials inventory				Work-in-process inventory	
1/1	500.00	16/1	150.00	16/1	150.00
10/1	165.00	26/1	277.50	26/1	377.50
28/1	240.00	31/1	197.50	31/1	197.50
	905.00		725.00		725.00
	180.00				

Cost of materials issued ……. $275
Ending materials inventory…….. 180
Cost of materials available for use ……. $905

Questions & Exercises

Questions:

☒ Multiple choices:

1) A written order sent to inform the purchasing department of a need for materials is called a:
   a) purchase order
   b) purchase requisition
   c) receiving report
   d) materials requisition form

2) A written request to a supplier for specified goods at an agreed-upon price is called a:
   a) purchase order
   b) purchase requisition
   c) materials requisition form
   d) receiving report

3) Which of the following forms must be filled out when inventory is to be removed from the materials inventory to be placed into production?
   a) purchase order
   b) purchase requisition
   c) receiving report
   d) materials requisition form

4) Under a periodic inventory system, the purchase of materials is recorded in an account entitled:
   a) cost of goods sold
   b) purchase of raw materials
   c) work in process inventory
   d) materials inventory

5) Under a perpetual inventory system, the purchase of materials is recorded in an account entitled :
   a) cost of good sold
   b) purchase of raw materials
   c) work in process inventory
   d) materials inventory

6) The total of materials subsidiary ledger inventory cards must equal to the amounts in the following accounts:

a) cost of goods sold
b) purchase of raw materials
c) work in process inventory
d) materials inventory

7) The cost of idle time incurred by employees that is considered normal for the production should be charged to:

a) work in process inventory
b) direct labor
c) administrative expense
d) factory overhead

8) Jason company accounts for materials issued to production through a periodic inventory system. If Jason company had materials available for use of $3000, purchases of $16000, and an ending materials inventory (based on a physical count) of $9000, what is the cost of materials issued?

a) $37000
b) $s23000
c) $5000
d) $21000

☒ Exercises:

1. The Douglas corporation uses a periodic inventory system and provided the following data:

Cost of materials used	$15000
Purchase of materials	$15000
Materials available for use	$19000

Required: compute by how much the ending materials inventory the beginning materials inventory.

2. Elko Party Hat Manufacturing Corporation was formed on September 29.2018. the president of the company provided the following data concerning the materials inventory for the month of February :

February 2 purchased for cash.1000 units of direct materials costing $20 per unit and 30 units of indirect materials costing $5 per unit.
5 placed into production: 400 units of direct materials.
20 placed into production: 10 units of indirect materials

Required: write journal entries for the above transactions.

3. The following information relating to materials inventory account was provided by Sheila Corporation. Which uses a perpetual inventory system: if you know the following

Beginning balance $100000
Additional debits added the account during the period $300000.
The ending balance exceeded the beginning balance by $2000.

Required: compute the cost of materials used .

4. the beginning materials inventory and the purchases of penny company for the year are as follow:

	Units	*Total cost*
January 1	65	$650
February 1	70	840
March 25	85	1360
August 19	90	1620
October 6	105	2100
December 17	145	2900
	560	$9470

During the year 500 units were issued. The FIFO method of inventory valuation is used under periodic inventory system.

Required: determine the cost of materials issued and the cost of ending materials inventory.

5. Based on the information given above. Determine the cost of materials issued and the cost of ending materials inventory. Assuming that the LIFO method of inventory valuation is used under periodic inventory system.

6. The Regal Corporation manufactures and distributes various types of giftware. A schedule of opening raw materials inventory, purchase, and issuance for the current year is as follow:

	Date	Units purchased	Cost per unit	Unit issued
Opening Inventory	1/1	2500	$53.00	---
	2/3	3275	54.50	
	9/5	---	---	2950
	11/7	2320	57.00	
	1/9	---	---	1525
	6/10	1905	56.00	
	17/12	---	---	1150

Additional information: the Regal Corporation uses aperiodic inventory system, replacement cost of each unit on December 31 is $56

Required:

A- compute the ending materials inventory and the cost of materials issued, using the following methods:

1- Specific identification (assume that issues on May 9 came from the purchase of March : issues on September 1 came from the purchase of July 11: and issues on December 17 came from the purchase of October)
2- Simple average cost
3- Weighted average cost
4- FiFO
5- LiFO

B- Apply the LCM rule on an individual basis.

7. The chilly air conditioner company sells one type of commercial air-conditioning unit. Each finished unit costs the company $130: the selling price per unit is $250, completely installed. The company had an opening inventory on January 1 of 130,000 units of material x. the total cost of the beginning materials inventory was $169000. During the current year, the Chilly Company made three purchases. A schedule of raw materials inventory purchase, and issuance for the current is as follow:

Date	Units purchased	cost per unit	unit issued
5/2	----	----	14000
3/3	17000	14.25	----
23/5	13000	15.25	----
3/6	----	----	12000
19/8	----	----	15000
2/11	12000	16	----

The chilly air conditioner company uses a perpetual inventory system, and the replacement cost for each unit of material x is $16 as of December 31.

Required: compute the ending materials inventory and the cost of materials issued, using the following methods:

a- Specific identification, given that the materials issued on February 5 came from the beginning materials inventory: June 3, from purchases of May 23: and august 19, came from the purchase of March 3.
b- weighted average cost
c- FiFO
d- LIFO

Chapter four:

Costing of labor

Chapter Four

Costing of labor

Learning objectives:

Upon completion of this chapter, you should be able to:

- ✓ Distinguish between and account for direct and indirect labor as they are used in the production process.
- ✓ Explain the labor concepts used in product and service costing
- ✓ Identify the activities involved in accounting for labor.
- ✓ Discuss the design and establishing of an effective system of controlling time and wages
- ✓ Discuss further problems relating to the calculation of wages.
- ✓ Discuss the accounting treatment of certain problems relating to wages.
- ✓ Discussion of the accounting system for calculating the total wages

4/1 Introduction:

Labor costs represent a significant part in the total production's costs. The term "labor costs" is excessive to include wages paid to employees working directly in production and these wages represent direct costs. The other part is the salaries and wages paid to supervisors, managerial representatives and the like, and represent indirect costs.

In revising the workers earnings (wages), we will find that there are enormous number of types can be included within these earnings, such as cash wages, allowances, employer's contribution to provident fund, production bonus, profit bonus, pension, and holiday and vacation pay.

As a final point, wages would be paid either according to hours or sometimes according to the amount of production.

4/2 Labor

Labor is the physical or mental effort expended in manufacturing a product. Labor cost is the price paid for using human resources The compensation paid to employees who engage in production–related activities represents factory labor cost. Direct labors related are those who work on a product directly, either manually or by using machines.

Direct labor was defined as all labor that is directly involved in the production of finished product, that can be easily traced to the product, and that represents a major labor cost of producing that product. **Examples** are assembly line workers in an automobile factory or knitting machine operators in a sweater factory. Direct labor is considered both a prime cost and a conversion cost.

> *"Direct labor cost includes the labor used to manufacture the product or to provide the service plus some portion of non-value-added time that is normal and unavoidable, such as coffee breaks and personal time. Other types of nonproductive labor that are discretionary and planned, such as downtime, payroll taxes, fringe benefits (vacation, etc.), and training usually are included not as direct labor but as indirect labor"*

Indirect labor is factory labor that is not directly traceable to a product; also, it is not considered worthwhile to relate the cost of the indirect labor to production. Laborers whose services are indirectly related to production include product designers, job supervisors, and product inspectors. Indirect labor is considered part of factory overhead cost.

> *"Indirect labor costs include supervision, quality control, inspection, purchasing and receiving, materials handling, janitorial labor, downtime, training, and cleanup. Note that an element of labor can sometimes be both direct and indirect, depending on the cost object; for example, labor for the maintenance and repair of equipment might be direct to the manufacturing department where the equipment is located but indirect to the products manufactured in that department"*

4/3 Costs Included in Labor

The principal labor cost is wages paid to production workers wages are payments made on an hourly, daily, or piecework basis. Salaries are fixed payments made regularly for managerial or clerical services However, in practice, the terms "wages" and "salaries" are often incorrectly used interchangeably.

Total labor costs have been increasing rapidly in recent years, particularly in areas such as vacation and holiday pay, pensions, hospitalization, life insurance, and other fringe benefit costs. In some cases these supplementary costs represent nearly 30% of regular earnings.

4/4 Accounting for Labor

To retain information on different categories, indirect labor costs are commonly divided into many sub classifications, for example, office staff and idle time costs. Note that managers' salaries usually are not classified as indirect labor costs. Instead, the compensation of supervisors, department heads, and all others who are regarded as management is placed in a separate classification of labor-related overhead.

Accounting for labor by a manufacturer usually involves three activities: timekeeping, computation of total payroll, and allocation of payroll costs these activities must be performed before the payroll is recorded in the accounting records.

A. **Timekeeping** Most large-scale manufacturers have a separate timekeeping section within a personnel department whose function is to collect the house worked by employees. Two source documents commonly used in timekeeping are the time card and the labor job ticket.

i. **A time card (clock card)** is inserted in a time clock by the employee several times each day upon arrival, going to lunch, taking a break, and when leaving for day. By mechanically keeping a record of total hours worked each day by employees, this procedure provides a reliable source for computing and recorded total payroll costs.

ii. **Labor job tickets** are prepared daily by employees for each job worked on. Labor job tickets indicate the number of hours worked, a description of work performed, and the employee's wage rate (inserted by the payroll department).

B. **Computation of Total Payroll:**

The payroll department's primary function is to compute the total payroll, including gross amount earned and the net amount payable to employees after deductions (for federal and state withholding taxes, social security taxes, and so on). The payroll department distributes the payroll and maintains records of employees' earning, wage rate, and job classification.

C. Allocation of Payroll Costs

Using time cards and labor job tickets as a guide, the cost accounting department must allocate the total payroll costs (including the employer's portion of taxes and fringe costs) to individual job, departments, or products. Some companies have the payroll department prepare the allocation and send it to the cost department where the appropriate journal entries are prepared. The total payroll cost for any one period must equal the sum of labor costs allocated to individual jobs, departments, or products.

4/5 Journalizing Labor Costs

Payrolls are generally prepared weekly, semimonthly, or monthly. Gross wages for an individual are determined by multiplying the hours shown on time cards by the rate per hour, plus any bonus or overtime .Journal entries to record the payroll and related liabilities for amounts withheld are made each payroll period. Employer payroll expenses and payroll cost distributions are usually journalized at the end of the month.

The basic journal entries to record factory labor costs are follows:

1- To record the payroll:

Work-in process inventory (direct labor)..... x

Factory overhead control (indirect labor)..... x

Payroll payable……..... x

2- To record employee withholding and pay the payroll:

Payroll payable……..... x

Employee withholding payable……..... x

Cash (to employees) ……..... x

*These withholdings include FICA, state and federal taxes, union dues, insurance, savings, etc.

3- To record employer taxes and fringe benefit costs (pension, insurance, etc.):

Factory overhead control……..... x

Employer taxes and benefit payable…….....x

4/6 Special Problems Relating To The Accounting For Labor

The accounting for labor involves special problems that are not encountered in the accounting for materials. The following problem areas will be discussed: Fringe benefit costs, shift premiums, overtime, idle time, and minimum guaranteed wage and incentive plans.

i. **Vacation pay** should not be charged to work-in-process when an employee is on vacation. An employee is contributing to production only while on the job. Therefore, only payroll costs for the weeks actually worked should be included in work-in-process inventory, and vacation pay should be accrued over the same period of productive labor and charged to factory overhead control.

Factory employees are generally entitled to paid vacations after an initial period of employment. The amount of vacation time is usually based on length of employment. An employee who has worked between 1 and 5 years may get vacation, while an employee who has worked more than 5 years may be entitled to 3 weeks.

For example: an employee earning $150 per week is entitled to a 2 week paid vacation, or $300. In order to record the weekly labor cost to production, the entry should show the following:

Work-in-process inventory……..150
Factory overhead control-Vacation pay ($300/50)……...6
Payroll payable……150
Vacation pay payable……6

This entry may be made for the 50 weeks that the employee is working. When it comes time, for vacation, $300 will have accumulated in the Vacation Pay Payable account, some companies, having hundreds or even thousands of employees, may prefer to record the vacation, pay via a separate monthly repetitive entry, based on one-twelfth of the annual estimated vacation cost.

For holiday pay, the amount of the accrual will depend on provisions of the labor contract or on company personnel policies. With the number of paid holidays usually ranging from 8 to 11 during a year. Accounting for holiday pay is handled much the same as vacation pay. In fact, many companies combine the two costs into one account, Vacation and Holiday pay, making one entry instead of two.

In an actual business these accruals arc generally based estimated annual totals. Thus, the estimated total vacation pay could be based on last year's amount adjusted for any expected changes. Since most vacations are taken during July and August, any corrections in the accrual could be spread out over the last 5 or 6 months of the year so that no costs would be unduly distorted. This same accrual procedure can be used for other paid absences, such as jury duty or sick leave.

For a salaried employee, the vacation pay, holiday pay, or other paid leave will be charged to the period in which the absence occurs. It is assumed that the work will be done by another person during the absence or that the absent employee will take care of it upon returning. If a temporary worker is hired to handle the duties, the additional labor cost is charged to factory overhead control (to avoid double counting). Payroll fringe benefit costs have increased appreciably. A growing-number of companies have chosen to treat fringe benefit costs as direct labor costs. However, most companies still include the cost of fringe benefits in factory overhead accounts.

i. Shift Premiums

It is an accepted practice to pay shift premiums, or higher hourly rates, for the less desirable evening shift (3 P.M. to 11 P .M) or night is shift (I l PM. to 7 A.M.) This shift premium, or shift differential, should be changed **factory overhead control rather than work-in-process**, and spread over all units produced for example, assume-a company's day shift rate is $6.50 per hour, and the night shift rate for the same job is $7.00, or $0.50 more per hour. The following entry would be made for a production employee working 40-hour week on the night shift.

Work-in-process Inventory(40 hours xS6.50 per hour) …….260
Factory overhead control-shift premium(40hoursxS0.50 per hour)…… 20
Payroll payable(40 hours x $7.00 per hour)…….. 280

Note that charging factory overhead control for shift premiums (instead of work-in-process) is especially important when a job order cost system is used because the unit cost of individual jobs produced when shift premiums are paid will not be distorted Shift premiums are not caused by specific jobs and therefore should be spread over all the jobs produced during the period.

ii. Overtime Premium

Regular earnings represent the total hour worked, including overtime hours, multiplied by the regular Pay rate. Overtime premium represents the overtime hours multiplied by the premium rate. The premium rate for overtime is usually some fraction of the regular rate. Over time is commonly referred to as time - and- a half because most overtime hours worked are paid the regular rate plus a premium of one - half the regular rate. Three accounting treatments that are commonly used are based on the underlying cause of over time

TREATMENT 1 most overtime results from the random scheduling should be treated like a shift premium and changed to factory overhead control. For example, assume that an assembler, Harry Smith, worked a total of 45 hours in a single week on job 345.

Smith's weekly rate of pay is $6 per hour for any hours. Worked up to 36 hours as per his union contract, and $9 Per hour for any hours worked in excess of 36 hours per week. Smith's total wages for the week are computed as follows:

Regular pay (45hours x$6 per hour)	$270
Overtime premium (9 hours x $3 per-hour)	27
Gross pay	$297

The journal' entry to record Smith' s total wages for the week, assuming that the overtime premium was due to random scheduling, is as follows:

Work-in-process inventory — job345	270	
Factory overhead control- overtime premium	27	
Payroll payable		297

TREATMENT2 When overtime results from the requirements of a specific job and not from random scheduling, the overtime premium should be charged to the specific job that caused the overtime. For example, if the overtime worked by Harry smith was caused by a rush order and the customer has agreed to pay for special service, then the following entry should be made:

Work- in — process inventory —job 345	297	
Payroll payable		297

TREATMENT 3 if overtime resulted from negligence or poor workmanship on the part of Harry Smith, then the overtime premium should be charged as a loss and the following entry should be made:

Work- in process inventory — job 345	270	
Loss from overtime premium	27	
Payroll payable		297

The type of accounting treatment accorded overtime is important in that it determines what actions, if any, should be taken by management in the planning and control of labor costs. For example, the recording of a loss might call for closer supervision or better on-the job training.

iii. Idle Time

Idle time results when employees have no work to perform but are still paid for their time. For example, when a new job is being "set up" for production, some workers may temporarily have nothing to do. If their idleness is normal for the production process and cannot be avoided, the cost of idle time should be charged to factory overhead control Let us assume that Karla King spent 36 hours on job 97 and was idle for 4 hours during the week. King's rate of pay is $8 per hour for a 40-hour week, as per union contract. The following entry should be made to record King's total wages:

Work- in —process inventory' —job 97(36 hours x $8/hour)….. …	288	
Factory overhead control idle time (3 hours x S8hour)…….. ...	32	
Payroll Payable……		320

If the cost of idle time was due to negligence or inefficiency, it should be charged to a loss account. For example, if King was idle for 4 hours because the work station preceding hers on the assembly line was inefficient and not able to produce the quantity of units that should have been produced and transferred to king, then the following entry should be made:

Work-in-process inventory- job 97……. 288
Loss from idle time…….32
Payroll Payable…….. 320

iv. Minimum Guaranteed Wage and Incentive Plans

When payments to an employee are based solely on the number of units produced, the employee is said to be paid at a "piecework" rate. Many employers will pay employees a minimum wage but they can earn more if they produce more. This labor payment system benefits new employees because it guarantees them a minimum salary while they are learning their new job (during which time they usually do not produce enough units to trigger the piecework rate).

Experienced employees also benefit from this system because they are provided an opportunity to earn more money as they become more efficient. If the output multiplied by the piece rate results in an amount less than the guaranteed wage, the difference is charged to factory overhead control. If the output multiplied by the piece rate results in an amount greater than the guaranteed wage, it should theoretically be charged to work-in-process inventory. Under this type of compensation system, an average employee working on a job is expected to earn not only the minimum wage but a bonus as well. Had another type of compensation system been used, the employer would probably have paid workers an amount equivalent to the minimum wage plus the average bonus.

An example of the minimum rate/piecework rate compensation system is shown in table (1). Any employee who produced more than 75 units received bonus. Factory overhead is charged $9($6+$3) because two employees did not produce enough units to exceed the minimum guaranteed wage.

Work-in-process inventory…….174
Factory overhead control- minimum guaranteed wage……..9
Payroll payable ……..183

Table (1) Combined Minimum rate & Piecework Rate, Daily summary

Employee Names	Units Produced	Price Rate	Piecework Earnings	Difference*	Total Earnings
Zaccaro	65	$0.60	$ 39	$ 6	$ 45
Frankel	75	0.60	45	…	45
Lyle	80	0.60	48	…	48
K.Mooney	70	0.60	42	3	45
Totals	**290**		**$174**	$9	**$183**

*Minimum Guaranteed Daily Wage= $ 45.00

v. **Incentive plans** vary in format and application. Two commonly used plans are the Gnatt Task and Bonus Plan and the Taylor Differential Piece-Rate System. Under the Gnatt Plan, a bonus rate is applied only to the total number of pieces produced above the standard number of units. Under the Taylor System, a bonus rate is applied to the total number of pieces produced as long as the standard is achieved.

Before adopting an incentive plan, management must examine the possible negative effects. Incentive plans require additional record-keeping, resulting in increased clerical costs. In addition, quantity may become the worker's main consideration, with the single-minded objective of extra units superseding upper-level management's objective of maximum quality. For incentive plans to be considered

successful, increases in total payroll. costs must be offset by in-creases in Production and sales as well as reductions in labor cost per unit and/or labor-related overhead costs per unit.

Examples

Example (1)

The A. B. Cody Company recently adopted as incentive plan. Factory workers are paid $.75 per unite with a guaranteed minimum wage of $200 per week Following is a report on employees' productivity for the week ending May 19,2020. All employees had worked the full 40-hour week.

Weekly Summary	
Name	**Units Produce**
M. Akoto	240
J. Halstead	275
H. Glassman	250
A. lanello	285
Rivera	225
Victor	265
Total	**1,540**

Solution:

Name	Units produced	Price rate	Piecework earnings	Below minimum	Total earnings
M.Akoto	240	$ 0.75	$ 180	$ 20.00	$ 200
J.Halstead	275	0.75	206.25	-	206.25
H.Glassman	250	0.75	187.50	12.50	200
A.Lanello	285	0.75	213.75	-	213.75
K.Rivera	225	0.75	168.75	31.25	200
V.Victor	265	0.75	198.75	1.25	200
Total	**1,540**		**$ 1,155**	**$ 65**	**$ 1,220**

Example (2)

Herman Highgear Manufacturing Corporation pays its employees weekly. Below is the payroll summary prepared by the payroll department for the week ended January 13, 19XX.

Payroll Summary			
Name	**Hours**	**Rate**	**Total Gross Pay**
J.Opoltetto	40	$ 6.50	$ 260
T.Malmgren	35	5.75	201.25
K.Keller	40	6.00	240
A.McGahan	40	6.50	260
F.Polli	36	6.25	225
J.Montalban	40	6.00	240
B.Valli	40	6.50	260
Total			**$ 1,686.28**

Additional information:

Total federal income tax withheld = $ 120

Total FICA tax withheld = $ 75

From the time cards, the following information was obtained:

Name	Total Hours	Direct hours	Indirect hours
J.Opoltetto	40	35	5
T.Malmgren	35	34	1
K.Keller	40	35	5
A.McGahan	40	30	10
F.Polli	36	30	6
J.Montalban	40	40	…
B.Valli	40	38	2
Total	271	242	29

Solution:

(a)

Work-in-process inventory ……..1,502.50
Factory overhead control……..183.75
Payroll payable …….1,686.25

COMPUTATIONS

	Direct Labor		Indirect Labor	
J.Opoletto	35 × $6.50=	$227.50	5× $6.50 =	$32.50
T.Malmgren	34 × 5.75 =	195.50	1× 5.75 =	5.75
K.Keller	35 × 6.00 =	210.00	5× 6.00 =	30.00
A.Mcgahan	30 × 6.50 =	195.00	10× 6.50 =	65.00
F.poli	30 × 6.25 =	187.50	6× 6.25 =	37.50
J.Montalban	40 × 6.00 =	240.00	--- ---	
B.Valli	38 × 6.50 =	247.00	2×6.50 =	13.00
Totals		**$1.502.50**		**$96.75**

(b)

payroll payable	1,686.25	
Employee income taxes payable		120.00
Employee FICA taxes payable		75.00
Cash		1,491.25

Example(4)

The H. B. Hayes Corporation's vacation policy is as follows:

I to 2 years of service: I week paid vacation.

3 to 10 years of service: 2 weeks paid vacation.

Over 10 years: 3 weeks paid vacation.

The payroll records show the following:

NAME	YEARS OF EMPLOYMENT	SALARY (WEEKLY)
K. Abby	32	$200
B. Caron	1.5	153
S. O"Laughlin	7	300
L. Locklin	5	275
M. Macnamara	12	392
F. Stack	4	200
V. Tige	0.5	150
W. Brandy	1	153
K. Torres	5	275
T. zello	15	441
Total		**$2.539**

Required:

a-Determine the amount that should be recorded each week for each employee.

b- Assuming no employee is on vacation, give the journal entry to distribute the weekly payroll.

Solution

	VACATION				
Name	**WEEKS**	**SALARY**	**VACATION PAY ÷ WEEKS ON JOB***	**=**	**ACCRUAL**
K. Abby	2	$200	$400 ÷ 50	=	$8
B. Caron	1	153	153 ÷ 51	=	3
S.O'laughlin	2	300	600 ÷ 50	=	12
L Locklin	2	275	550 ÷ 50	=	11
M.MAcnamara	3	392	1,176 ÷ 49	=	24
F. Stack	2	200	400 ÷ 50	=	8
V. Tige	-	150			
W. Brandy	1	153	153 ÷ 51	=	3
K. Torres	2	275	550 ÷ 50	=	11
T. Zello	3	441	1,323 ÷ 49	=	27
Total					**$107**

- **52** Weeks Less Number of Vacation Weeks

(b)

Work-in-process inventory	2,539	
Factory overhead control—vacation pay	107	
Payroll payable		2,539
Vacation pay payable		107

Example (5)

The Soapy Manufacturing Company awards a year-end bonus equal to 2 weeks' salary to all employees who have been employed for at least I Year. Following are the payroll records:

NAME	YEARS EMPLOYMENT	OF WEEKLY SALARY
J. J. Kosinsky	3	$ 208
F. B. Frome	10	286
H. H. Healy	1/2	198
K. L. Kim	4	182
A. C. Dorfman	4	234
C.I. Chu	5	260
Total		$ 1.368

Required:

a- Compute each employee's bonus.

b- Give the journal entry to distribute the weekly payroll, including the bonus accrual.

(Assume the bonus is charged to factory Overhead control.)

NAME	Weekly Salary × 2	Bonus
J. J. Kosinsky	$ 208 × 2	$416
F. B. Frome	286 × 2	572
H. H. Healy	--- × 2	---
K. L. Kim	182 × 2	364
A. C. Dorfman	234 × 2	468
C.I. Chu	260 × 2	520
Total annual bonus payment		**$ 2,340**

(b)

Bonus accrual:		
NAME	BOUNS	AMOUNT
J. J. Kosinsky	$416	$8
F. B. Frome	572	11
H. H. Healy	….	---
K. L. Kim	364	7
A. C. Dorfman	468	9
C. 1. Chu	520	10
	$ 2,340	$45

Work-in-process inventory	1,368	
Factory overhead control—Bonus pay	45	
Payroll payable		1,368
Bonus payable		45

Questions & Exercise

Questions:

- **Multiple choice**

1) Factory worker fringe benefit costs are usually charged to:
   a) work in process inventory
   b) direct labor
   c) administrative expense
   d) factory overhead
2) Vacation pay for factory workers should be charged to:
   a) work in process inventory
   b) direct labor
   c) administrative expense
   d) factory overhead
3) The cost of idle time incurred by employees that is considered normal for the production should be charged to:
   a) work in process inventory
   b) direct labor
   c) administrative expense
   d) factory overhead
4) Which statement is correct?
   a) Vacation pay should be charged to work in process when an employee is on vacation.
   b) Accounting for holiday pay is handled in much the same way as vacation pay.
   c) For a salaried employee, vacation pay, holiday pay, and overtime pay should be accrued over periods of productive labor and charged to factory overhead control.
   d) Because of appreciable increases in payroll fringe benefit costs, many companies have changed their treatment of these costs and now charge them to factory overhead control.

5) The lemon Car Company operates two shifts. The company's day shifts pay rate is $5 per hour and the night shift pay rats $5.5 for the same work ($0.5 more per hour). Which entry is appropriate for a night shift worker who puts in 35 hours?

a) work in process inventory 175
Work in process inventory –shift premium 17.5
Payroll payable 192.5

b) work in process inventory 192.5
Payroll payable 192.5

c) work in process inventory 175
Loss from shift premium 17.5
Payroll payable 192.5

d) work in process inventory 175
Factory overhead control –shift premium 17.5
Payroll payable 192.5

6) Idle time that results from negligence or inefficiency should:

a) Be accounted for in a manner similar to overtime premium that resulted from poor workmanship.

b) Be accounted for in the same a manner as idle that is normal (cannot be avoided).

c) be charged to administrative expense

d) Be accounted for in a manner similar to overtime premium that resulted from the requirements of a specific job.

7) Mitmakers Co. pays their employee on a combined minimum rate and piecework rate plan. The minimum guaranteed daily wage is $55. Any employee who produces more than 20 baseball mitts receives a bonus. Assume that yesterday, Mr. Fabor produced 23mitts. What amount should be charged to factory overhead control?

a) 0
b) $8.25
c) $55
d) $63.25

8) Based on the previous information .assume that Mr. Jackson produced 7 mitts. What amount should be

a) 0
b) $19.25
c) $55
d) $35.75

❖ Exercises:

1. The Tom Thumb Corporation follows this vacation policy for workers:

   1 to 3 year of service: 1 week paid vacation

   4 to 12 year of service: 3 week paid vacation

   Over 12 years of service: 4 week paid vacation

The payroll records show the following the information pertaining to the next year (all employees work directly on the product).

Name	Years of employment	Salary (weekly)
I. Gelati	5	$350
B. O'Hara	2	175
R. Reilly	6	370
F. Maestro	15	425
R. Auerbach	8	400
K. Sposare	5/12	125
T. Fyumo	3	390

Required:

a- Determine the amount that should be accrued each week for each employee.
b- Show next years journal entry needed to distribute the weekly payroll, the tom thumb corporation uses the perpetual cost accumulation system. To prepare the entry assume that no employees be on vacation.

2. The spring company has had an incentive plan for the past several years. The factory workers are paid $2.25 per unit with a minimum guaranteed wage of $175 per week. The report on employees productivity for the week ending September 21, 2018 follows. All employees worked the 40 - hour week.

Weekly summary	
Employees name	units produced
F. Chimienti	72
M. Donohue	80
G. Duchene	78
N. Grimsly	82
R. Strauss	68
S. Beeber	73
Total	453

Required:

a- Compute each employee's gross wages.

b- What amount should be charged to work in process?

c- What amount should be charged factory overhead?

3. Snoopy's Manufacturers, Ltd., awards a bonus at the end of the year equal to 3 weeks' salary to all employees who have been employed or more than one year. The payroll records shows the following information pertaining to next year:

Name	Years of employment	Weekly summary
B. Alexander	5	$225
M. Diskint	7	239
C. Ravel	2	150
P. Mahoney	3	200
S. Rapt	15	425
J. Terzella	10	375
N. Van Zandt	11/12	125
Total		$ 1739

Required:

a- Compute each employee's bonus and the total annual bonus payment.

b- Show the next years entry to be made each week to record the payroll. Including the bonus accrual. (Assume that the next years bonus cost will be the same as this years).

4. The midget manufacturing company pays its employees weekly. Following is the factory payroll summary prepared by the payroll department for the week ending July 15, 2018.

Payroll summary			
Name	**Direct labor hours**	**Indirect labor hours**	**Rate**
W. Bianco	39	1	$6.5
S. Cone	33	2	7.25
F. Giant	42	--	5.75
P. Malone	40	5	6
L. Palmeri	30	8	6.8
J. Teicher	36	3	7.1

Additional information:

FICA taxes - employee	$95
FICA taxes - employee	95
Federal & state income taxes withheld	156.06
Federal unemployment taxes	10.92
State unemployment taxes	42.13

Required: prepare the journal entries

a- To record the employ taxes and pay the payroll
b- To record the employers payroll taxes payable

5. Charger manufacturing company pays its employees weekly. The payroll summary prepared by the payroll department for the week ending September 24, 2018 ,follows:

Payroll summary				
Name	**Direct labor hours**	**Indirect labor hours**	**Rate**	**Total gross pay**
A	30	2	$5.25	$183.75
B	38	4	5.10	214.2
F	40	---	4.75	190
P	28	10	5.10	193
L	37	3	4.5	180
J	39	2	5	205
TOTAL				**$1166.75**

Additional information:

Total federal & state income taxes withheld	$116.68
Total FICA withheld	70.55

Required:

a- Prepare the journal entry to record the payroll.
b- Prepare the journal entry to record employee taxes and payroll.

6. Chaykin Corporation accumulated the following payroll data for the week ending April 10:

Employee	Hours worked	Base rate per hour
A	35	$5
I	50	6
B	35	7
X	48	8
M	51	6

Additional information:

a- The union contract requires that employees receive time and a half for any hour worked above 35 per week.
b- Mr. A worked the 1 A.M. to 9 A.M shift and will receive an additional $2 per hour above his $5 base rate. He worked the entire week on job1.
c- Mr. is overtime resulted from resulted from random scheduling of too many jobs. MR. I worked 25 hours on job2 and 25 hours on job 3.
d- Mr. B worked 30 hours on job 4. The rest of the time he was idle because his supervision forgot to order the necessary raw materials to complete the job.
e- Mr. X worked the entire week on job 5. Which was a rush order, the customer paid for special service.
f- Mr. M had to work overtime because he had to correct his own poor workmanship on job 6.

Required: prepare the journal entry to record payroll.

Chapter Five

Costing of Factory overhead

Chapter Five

Costing of Factory overhead

Learning Objectives:

Upon completion of this chapter, you should be able to:

- ✓ Apply the concept of factory overhead as an accumulation of all indirect manufacturing costs.
- ✓ Compute a factory overhead application rate using the appropriate denominator activity.
- ✓ Explain the four estimated levels of production and discuss their importance in calculating an appropriate factory overhead application rate.
- ✓ Applied the concepts of applied factory overhead, actual factory overhead, and under-and overapplied factory overhead and illustrate how these accounts are utilized in the journalization of factory overhead.

5/1 Introduction:

In chapter three & four we discussed two of the three elements of product cost: materials and labor. In this chapter, we discuss the costing of fifth element, factory overhead.

Factory overhead costs are those elements, which cannot be related to a specific product or department, but still essential elements for the benefits or the whole production or mostly represent a common elements for the existence of the manufacturing company.

Accordingly, factory overhead cost appeared to be difficult to allocate between production and this leads to suggest a clustering technique, accompanied with a search behind each element to count its effect.

Factory overhead refers to the cost pool used to accumulate all indirect manufacturing costs (excluding selling, general, and administrative expenses because they are nonmanufacturing costs).

Example of factory overhead include the following:

- Indirect labor and indirect materials
- Heat, light, and power for the factory
- Rent on factory building
- Depreciation on factory building and factory equipment
- Motive power
- Maintenance of factory building and factory equipment
- property taxes on factory building
- supervisors' salaries

☒ ***Factory overhead costs*** are divided into three categories on the basis of their behavior in relation to production. The categories are (1) variable costs, (2) fixed costs, and (3) mixed costs.

1. **Variable factory overhead costs.** Total variable factory overhead costs vary in direct proportion to the level production, within the relevant range, which was previously defined as that interval of activity within which total fixed costs and per unit variable costs remain constant: that is, the greater the number of units produced , the higher the total variable factory overhead cost. However, variable factory overhead cost per unit remains constant as production either increases or decreases. Examples of variable factory overhead costs are indirect materials and indirect labor.
2. **Fixed factory overhead costs.** Total fixed factory overhead costs remain constant within the relevant range regardless of the varying levels of production within that range. Examples of fixed factory overhead costs are property taxes, depreciation, and rent on the factory building.

3. **Mixed factory overhead costs.** Mixed factory overhead costs are neither wholly fixed nor wholly variable in nature but have characteristics of both. Mixed factory overhead costs must ultimately be separated into their fixed and variable components for purposes of planning and control. Examples of mixed factory overhead costs are factory truck rentals and factory telephone services (semi variable factory overhead costs) and factory supervisors and factory inspector salaries (step factory overhead costs).

5/2 Actual Versus Normal Costing of Factory Overhead:

- ***In an actual cost system***, product costs are only recorded when they are incurred. This technique is usually acceptable for the recording of direct materials and direct labor because they can be easily traced to specific jobs (job order costing) or department (process costing). Factory overhead, because it is an indirect element of product cost, usually cannot be easily or conveniently traced to a specific job or department. As a consequence, a modification of an actual cost system, called normal costing, is commonly used.
- ***Under normal costing***, costs are accumulated as they are incurred, with one exception: factory overhead is applied to production on the basis of actual inputs (hour, units) multiplied by a predetermined factory overhead application rate. This procedure is necessary because factory overhead costs are not incurred evenly throughout a period; Therefore, estimates must be made and a rate developed to apply factory overhead costs to jobs or departments as units are produced. The classification of factory overhead costs as variable, fixed, or mixed becomes important when the predetermined factory overhead application rate is computed.

❖ Two key factors determine the factory overhead application rate for a period: (1) estimated of production (denominator) and (2) estimated factory overhead costs (number).

1. Estimated level of production:

In computing the factory overhead application rate for a period, the estimated level of production (the denominator of the predetermined rate) for the next period is an important consideration because total factory overhead is a combination of variable, fixed, and mixed costs. (Remember that fixed and mixed costs per unit are both affected by the volume of production, while variable cost per unit remains constant).

The estimated level of production cannot, in the short run, exceed the firm's productive capacity. The productive capacity of a firm is dependent upon many factors: physical size and condition of the factory building and the factory equipment, availability of resources such as a trained labor force and various raw materials, etc.

Under ideal situations, management usually sets the productive capacity on the basis of projected demand for the products design, production specification, and desired annual production capacity and are instructed to design productive facilities. However, one of the biggest problems is that projected demand for the product, in many cases, is unknown or fluctuates annually. Should management plan for a small productive capacity and then expand as the products demand increases? This would seem the safe way except that it is usually more economical to build the optimum productive capacity at the outset than to make costly modifications.

Management could start out with a large plant and hope to grow into it this is also uneconomical because the extra cost of the unused or idle productive capacity be absorbed by the units produced, which will result in an undesirable increase in unit cost. Many innovative approaches using sophisticated techniques have been developed to aid management in making decisions related to optimum plant capacity. For our purposes, we will assume that the productive facilities are already in place.

The next problem is to estimate the number of units that will be produced, during the next period, within the constraints of the existing productive facility. Should the estimate be based on the plant facilities maximum output under ideal conditions or should the figure allow for practical considerations, such as possible machinery breakdowns and labor absenteeism? What about marking considerations?

Should estimates of production be tied into sales projections for the next period, or possibly the next few years? In reality, all the preceding factors and a significant number of other must be considered when projections are made.

- ✓ ***The following productive capacity levels may be used to project the level of production for the next period.***

Capacity is the ability to act in a certain way to achieve the main objective of a firm. The way of acting can be measured and expressed in terms of output units or service units.

A. **Theoretical or ideal productive capacity.** The maximum output that a department of factory is capable of producing, with no provision for either a lack of sales orders or interruptions in production (due to work stoppages, machines downtime for repairs and maintenance, set-up time, or ideal productive capacity. At this capacity level, the plant is assumed to function 24 hours a day, 7

days a week and 52 weeks a year without any interruptions in order to yield the highest physical output possible (i.e, 1005 of plant capacity).

B. **Practical or realistic productive capacity.** The maximum production attainable, with a provision for anticipated and unavoidable interruptions in production but with no provision for a lack of sales orders, is called practical or realistic productive capacity. Practical capacity is the maximum capacity expected when the plant operates at a planned level of efficiency.

C. **Normal or long – run productive capacity.** The productive capacity based on practical productive capacity, tempered by the long-range productive customer demand for the product, is called normal or long-run productive capacity. Normal capacity is equal to or less than practical productive capacity. The long-range (usually 5 years) estimate of customer demand for the product is, in essence, a weighted average that smooths out seasonal, cyclical, and other variations in customer demand.

D. Expected or short–run productive capacity. Capacity based on estimated production for the next period is called expected or short–run productive capacity. In any one period, expected productive capacity can be more than, equal to, or less than normal productive capacity. In the long-run total expected productive capacity should equal total normal productive capacity.

☒ Comparison of productive capacity:

The first productive capacity level, theoretical and practical, only take into consideration the physical capacity of a department or factory. Thus, if a company could sell everything it produced, these capacity levels could be used to compute the factory overhead application rate. However, this is rarely they except to sell.

Therefore, sales projections are a vital factor in the planning process and must be considered when estimating production levels. For most companies, either normal productive capacity or excepted productive capacity is used to compute factory overhead costs because these two bases explicitly include projected customer demand in their estimates.

Expected productive capacity should be used in theory only when normal productive activity is difficult to determine.

For example, assume that a company has a normal productive capacity of 200,000 units. Expected productive capacity for the current year is 160,000 units. Management expects production of 205,000 units in the following year. Fixed factory overhead costs are $180,000: variable factory overhead costs are $1.15 per unit. The factory overhead application rate computed for normal productive capacity and expected productive capacity are shown in table 1.

Different factory overhead application rates result because the fixed factory overhead cost is spread over a greater number of units under normal productive capacity. The fixed factory overhead application rate is $0.90 per unit ($ 180,000÷200,000 units) under normal productive capacity, but it is $1.125 per unit ($180,000÷160,000) under expected productive capacity.

Table 1 factory overhead application rates

	Expected productive capacity	**Normal productive capacity**
Fixed factory overhead costs	$180,000	$180,000
Variables factory overhead costs:		
160,000 units × $1.15/unit	184,000	---------
200,000 units × $1.15/unit	----------	230,000
Total factory overhead costs	$364,000	$410,000
Divided by estimated units of production	160,000	200,000
Factory overhead application rate	$2.275*	$2.05**
* $1.15 variables + $1.125 fixed ** $1.15 variables + $0.90 fixed		

Normal productive capacity is used by firms that believe a products cost should be based on an average cost which takes into consideration production-related interruption and recurring fluctuations in customer demand.

Using expect production as the basis for applying factory overhead should provide the closest approximation (out of the four possible productive capacity levels) of unit product cost for the next period. The major drawback in using expected productive capacity is that varying unit costs will result across different time periods if output varies appreciably.

2. Estimate Factory Overhead Costs:

Once the estimated level of production has been determined, a company must develop some means of arriving at a satisfactory estimate of factory overhead costs - the numerator of the predetermined rate.

A budget of estimate factory overhead costs for the next period is usually prepared. Each item must be classified as either fixed estimate factory overhead or variable factory overhead. (Mixed costs have to be divided into their fixed and variable components). Total fixed costs do not change as

production levels change within the relevant range: therefore, the level of production is not a factor in determining total fixed costs.

Total variable costs, on the other hand, vary in direct proportion to changes in the level of production: therefore, the level of production is a factor in determining total variable portion of factory overhead costs.

For example, assume the following information for 2018 for the stone corporation, which manufactures one product, in one department, and uses a process cost system to accumulate costs:

Normal capacity, in unit	250,000
Normal capacity, in direct labor hours (2 direct Labor hours per unit)	500,000

Relevant range of production:

In units	100,000 - 400,000
In direct labor hours	200,000 - 800,000

Factory overhead costs:

Variable factory overhead:

Indirect materials, average per unit	$0.50
Indirect labor costs, average per hour	$5.00
Indirect labor hours (3% of 500,000 direct labor hours)	15,000
Fuel to run factory equipment, average per machine hour	$30,00
Equipment hours required (3% of 500,000 direct labor hours)	15,000

Fixed factory overhead:

Factory rent	$300,000
Depreciation of factory equipment	$50,000

A budget of the estimated factory overhead costs for the next period, 2018, is shown in table 2. This is called a static budget because it represents only one level of production (i.e., 250,000 units).

Table 2 Stone Corporation: static factory overhead budget for 2018

Estimated units of production at normal capacity	250,000
Estimated direct labor hours at normal capacity (2direct labor hours per unit)	500,000
Variable factory overhead costs:	
Indirect materials ($0,50\unit × 250,000 unit)	$125,000
Indirect labor ($5.00\hour × 15,000 indirect labor hours)	75,000
Fuel for equipment ($30.00\machine hour × 15,000 machine hours)	450,000
Total variable factory overhead costs	$650,000
Fixed factory overhead costs:	
Factory rent	$300,000
Depreciation of factory equipment	50,000
Total fixed factory costs	$350,000
Total factory overhead costs	$1,000,000

5/3 Determination of factory overhead application rates:

Once the level of production and factory overhead costs for the next period have been estimated, the predetermined factory overhead application rate for the next period can be computed.

Determining the factory overhead cost rates: this means the determination of the cost of producing a unit of production/service in a production center. This requires a foundation and a basis of determination.

Factory overhead application rates are generally in terms of dollars per unit of estimated activity of some base (called denominator activity). There are no definitive rules for determining which base to uses as the denominator activity. However, there must be a direct relationship between the base and factory overhead costs.

Also, the method used to determine the factory overhead application rate should be the simplest and least costly to compute and apply. Once total factory overhead costs have been estimated and the base chosen, the normal capacity activity level must be estimated in order to compute the factory overhead application rate.

The formula for computing the factory overhead application rate, which is the same regardless of the base chosen, is as follow:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated base at denominator activity}} = \text{Factory overhead application rate per unit, hour. Dollar, * etc.}$$

* For bases expressed in dollars, the rate is expressed as a percentage by the rate by 100.

These bases are commonly used to compute the factory overhead application rate:

(1) Units of production

(2) Direct materials cost

(3) Direct labor cost

(4) Direct labor hours, and

(5) Machine hours.

1. Units of production:

This method is very simple, since data on the units produced are readily available for applying factory overhead. The formula is as follows:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated units of production}} = \text{Factory overhead application rate per unit of production}$$

The data for following illustration are based on the Stone Corporation's static factory overhead budget at the normal productive capacity level (table 2). The estimated factory overhead costs for the period are $1,000,000 and normal productive capacity is 250,000 units. The factory overhead application rate using the units of production method would be computed as follows:

$$\frac{\$1{,}000{,}000}{250{,}000 \text{ units}} = \$4.00 \text{ per unit of production}$$

This method applies factory overhead equally to each unit produced and is appropriate when a company or department manufactures only one product.

2. Direct materials cost:

This method is suitable when can be determined that a direct relationship exists between factory overhead costs and direct materials cost. When direct materials are a very large part of total cost, it may be inferred that the factory overhead costs are directly related to direct materials. The formula is as follows:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated direct materials cost}} \times 100 = \text{percentage of direct materials cost}$$

For example, Stone Corporation's estimated factory overhead costs for the period is $1,000,000; assume that the estimated direct materials cost is $500,000. Using direct materials cost as the base, the factory overhead application rate is computed as follows:

$$\frac{\$1,000,000}{\$500,000} \times 100 = 200\% \text{ of direct materials cost}$$

One problem in using direct materials cost as a base where more than one product is manufactured is that different products require varying quantities and types of direct materials with different acquisition costs. Therefore, different factory overhead application rates should be determined for each product. As can be seen, we are beginning to move away from one of our objectives - simplicity - with the use of multiple rates. This should indicate to management that perhaps another base would be more appropriate.

3. **Direct labor cost:**

This is most widely used because direct labor costs are generally closely related to factory overhead cost, and payroll data are readily available. It therefore meets our objectives of having a direct relationship to factory overhead cost, being simple to compute and apply, and requiring little, if any, additional cost to compute. Thus this method is appropriate when a direct relationship exists between direct labor cost and factory overhead. (There are, however, situations where there is little relationship between direct labor costs and factory overhead and this method would not be appropriate.

For example, factory overhead costs may be composed largely of depreciation and equipment-related costs). The formula is as follows:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated direct labor cost}} \times 100 = \text{percentage of direct labor cost}$$

If estimated factory overhead costs are $1,000,000 and estimated direct labor costs are $2,000,000 (500,000 direct labor hours at an assumed $4 per direct labor hour), the Stone Corporations factory overhead application rate would be compute as follows:

$$\frac{\$1,000,000}{\$2,000,000} \times 100 = 50\% \text{ of direct labor cost}$$

If there is a direct relationship between factory overhead cost and direct labor cost, but wage rates vary greatly within departments, the following base may be more preferable.

4. Direct labor hours:

This method is appropriate when there is a direct relationship between factory overhead costs and direct labor hours, and when there is a significant disparity in hourly wage rates. Timekeeping records must be accumulated to provide the data necessary for applying this rate. The formula is as follows:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated direct labor hours}} = \text{factory overhead application rate per direct labor hour}$$

Assume that the Stone corporation's estimated factory overhead for the period is $1,000,000 and estimated direct labor hours are 500,000 (250,000 units at 2 direct labor hours per unit). The factory overhead application rate, based on direct labor hours, would be computed as follows:

$$\frac{\$1,000,000}{\$5,000,000 \text{ direct}} = \$2.00 \text{ per direct labor hour}$$

This method, like the direct cost method, would be inappropriate if factory overhead costs were composed of costs unrelated to labor activity.

5. Machine hours:

This method uses the time required for machines to perform similar operations as a base in computing the factory overhead application rate. This method is appropriate when a direct relationship exists between factory overhead costs and machine hours.

This generally occurs in companies or departments that are largely automated so that the majority of factory overhead costs consist of depreciation on factory equipment and other equipment- related costs. The formula is as follows:

$$\frac{\text{Estimated factory overhead costs}}{\text{Estimated machine hours}} = \text{factory overhead application rate per machine hour}$$

Assume that the stone corporations estimated factory overhead costs for the period are $1,000,000 and estimated machine hours are 15,000, as per table 2. The factory overhead application rate would be computed as follows:

$$\frac{\$1,000,000}{15,000 \text{ machine hours}} = \$66.7 \text{ per machine hour}$$

The disadvantage of this method is the additional cost and time involved in summarizing total machine hours per unit. Since every company is different, the decision regarding which base is appropriate for a particular manufacturing operation must be made by management after careful analysis.

5/4 Applied factory overhead cost:

After the factory overhead application rate has been determined, it is used to apply (or match) estimated factory overhead costs to production. The estimated factory overhead costs are applied to production on an on-going basis as goods are manufactured, according to the base used (i.e. as a percentage of direct materials costs or direct labor cost or on the basis of direct labor hours, machine hours, or units produced).

For example, assume that the factory overhead application rate was determined to be $2 per direct labor hours, using direct labor hours as a base, and that 100,000 actual direct labor hours were worked. The $200,000 (100,000 × $2) of estimated factory overhead would have been applied to production during the period in relation to the direct labor hours which actually worked.

5/5 Actual factory overhead costs:

Actual Factory Overhead Costs are usually incurred daily and recorded periodically in the general and subsidiary ledgers. Subsidiary ledgers permit a greater degree of control over factory overhead costs as related accounts can be grouped together and the various expenses incurred by different departments can be described in detail.

Factory overhead encompasses may different items and involves a variety of accounts. For this reason, some companies develop a chart of account that indicates the account to which specific factory overhead costs are to be charged.

4/6 Accounting for actual factory overhead costs:

Factory overhead charges are gathered from many sources, such as the following:

1- Invoice. Bills received from suppliers or service organizations
2- Vouchers. Paid bills
3- Accruals. Adjustment for items like accrued utilities payable
4- Year-end adjusting entries. Adjustments for items like depreciation and amortization expense

Manufacturing companies commonly use a departmental factory overhead cost sheet for the analysis of factory overhead costs. Each department maintains a departmental factory overhead cost sheet which is subsidiary ledger of factory overhead control account. These sheets are detailed records of the amount of total factory overhead actually incurred for each department. Reconciliation of the control and subsidiary ledgers should be performed at regular intervals.

Table (3) is a department factory overhead coast sheet for processing department, using the following facts for the month of April:

Date	Item	Amount
3\4	Indirect materials requisitions	$800
3\4 - 20\4	Job tickets –indirect labor	1,200
10/4	Miscellaneous invoices	7,000
30/4	Utilities	1,500
30/4	Adjusting entries-depreciation/machinery	2,000
Total		$12,500

Table (3) department factory overhead cost sheet: processing department

		Indirect labor			Other				
Date	Source	Indirect material	Regular	Over-time	Depre.: machinery	Depre.: factory	Utilities	Misc.	Total overhead
3\4	Materials requisitions	$800							$800
3\4 – 20/4	Job tickets		$1,200						1,200
10/4	Miscellaneous invoices							$7,000	7,000
30/4	Utilities						$1,500		1,500
30/4	Adjusting entries				$2,000				2,000
Total		$800	$1,200		$2,000		$1,500	$7,000	$12,500

5/6 Journalizing factory overhead:

The journal entries to record factory overhead costs under either a job cost order cost system or process system are basically the same. The major difference is that under a job order cost system applied factory overhead is accumulated by job whereas under a process cost system applied factory overhead is accumulated by departments.

Both actual and applied factory overhead costs must be recorded. Actual factory overhead costs are charged (debited) to a factory overhead control account when the costs are incurred. Factory overhead costs are applied as production occurs by charging work in process inventory. A predetermined factory overhead application rate is used to apply factory overhead costs to the work in process inventory account.

The credit in this entry is to factory overhead applied account. The purpose of using two separate factory overhead accounts is that the debit balance in factory overhead control account represents the total actual factory overhead incurred while the credit balance in the factory overhead applied account represents total factory overhead applied. This information would be lost if only one account were used to record both actual and applied factory overhead.

At the end of the period, the total credits balance in the factory overhead applied account is closed against the total debit balance in factory overhead control. Any different between the balance in these two accounts is recorded as under applied (debit balance) or over applied credit balance (credit balance) factory overhead. Continuing our example of Stone Corporation, the actual information for the Stone Corporation for 2018 is presented in the table 4.

The following summary journal entries for the stone corporation for the year ended 2018 relate to factory overhead:

Table (4) Stone Corporation: actual cost and production data for 2018

Actual units produced (100% complete)	200,000
Actual direct labor hour	400,000
No beginning or ending work –in-process exists.	
Actual factory overhead costs:	
Variable factory overhead costs:	
Indirect material	$100,000
Indirect labor	60,000
Fuel for equipment	360.000
Total variable factory overhead costs	$520,000
Fixed factory overhead costs:	
Factory rent	$300,000
Depreciation of factory equipment	50,000
Total fixed factory overhead costs	$350,000
Total factory overhead costs	$870,000

1. To apply factory overhead to production assuming direct labor hours are used as the base:		
Work in process inventory	800,000	
Factory overhead applied ($2.00 per labor hour x 400,000 actual direct labor hours)		800,000
2. To record actual factory overhead:		
Factory overhead control	870,000	
Various credits		870,000
Note: various credits include materials inventory, payroll payables, cash, accumulated depreciation of factory equipment, etc.		

3. To close factory overhead applied and factory overhead control:		
Factory overhead applied	800,000	
Underapplied factory overhead	70,000	
Factory overhead control		870,000

5/7 Analysis of Underapplied or Overapplied factory overhead

The difference between applied factory overhead and actual factory overhead should be analyzed to determine the cause (s). The difference or variance can usually be isolated into the following categories:

1- **Price variance.** Results when a company spends more or less on factory overhead than anticipated. For example, an unexpected increase in the price of indirect materials would increase total variable factory overhead costs: an unexpected increase in the price of factory insurance would increase total fixed factory overhead costs.

2- **Efficiency variance.** Results when workers are more or less efficient than planned. That is, workers may take longer time than expected to generate production. Consequently , equipment, for example , used to produce the units must be run longer than it should be run, which will increase total factory overhead costs because more fuel and other equipment-related costs will be unnecessarily incurred.

3- **Production volume variance.** Results when the activity level used to calculate the predetermined factory overhead application rate is different from the actual production level achieved. A production volume variance is a fixed factory overhead phenomenon that results from having to apply fixed factory overhead to production as if it were a variable cost in order to determine a product's cost. For example, when the actual production is less than denominator activity, fixed factory overhead will be underapplied.

5/8 Accounting For the Difference between Applied and Actual Factory Overhead

The amount of factory overhead applied during a period will seldom equal the actual factory overhead incurred because the predetermined factory overhead application rate is based on both an estimated numerator (factory overhead costs) and an estimated denominator (productive capacity).

Insignificant differences are usually treated as a period cost by adjusting cost of goods sold. Significant differences should be prorated to work in process inventory, finished goods inventory, and cost of goods sold, in proportion to the unadjusted factory overhead balance in each account.

The objective is to allocate the under or over applied factory overhead to those accounts that were distorted by using what unintentionally proved to be the incorrect application rate and thereby to adjust their ending balances to approximate what they would have been if the correct application rate had been used. When a job order cost system is used to accumulate costs, the factory overhead applied to individual jobs must also be adjusted under a process cost system, the factory overhead assigned to each department must be adjusted.

Continuing the example of the stone corporation, assume the following additional information:

Units sold	180,000
Units in finished goods inventory	20,000
Units in work-in-process inventory	0
Total units produced	200,000

Unadjusted factory overhead costs in:

	Dollars	Percentage of total
Cost of goods sold (180,000 units sold x $2.00/ direct labor hour x 2 direct labor hours/unit)	$720.000	90%*
Finished goods inventory (20,000 units $2,00/ direct labor hour x 2 direct labor hours/unit)	80,000	10%**
Total	$800.000	100%

*$720.000 ÷ $800,000 = 90%

**$80,000 ÷ $800.000 = 10%

The following entry would be made to prorate the $70,000 of underapplied factory overhead for the Stone ration:

Cost of goods sold (90% x $70,000)	63000	
Finished goods inventory (10 % x $70,000)	7000	
Underapplied factory overhead		70000

5/9 Allocation of Budgeted Service Department Costs to Producing Departments:

Cost allocation involves the assignment of direct and indirect manufacturing costs to various categories. A cost may be reallocated serveral times within a production cycle.

When a company manufactures more than one product it is important that factory overhead costs be allocated to departments or cost centers in order to match factory overhead costs to specific jobs or departments. Therefore, when multiple products are produced a single factorywide factory overhead application rate is not appropriate for allocating factory overhead costs.

Before a department or cost center factory overhead application rate can be computed, the total budgeted service department costs must first be allocated to producing departments. A service department is a department which provides benefits to producing departments and/or service departments. A producing department (also called a line department) is a department in which material conversion or production takes place. Examples of service departments are the maintenance department, which is responsible for the upkeep of the machinery, building, and grounds; and the utility department, which is responsible for providing electricity of heating and lighting the factory.

Since producing departments are directly benefited by service departments, the total budgeted costs of operating the service departments must be allocated to the producing departments. (Allocated total budgeted service department costs are just as much indirect manufacturing costs as are the indirect materials and indirect labor of producing departments). Once the total budgeted service department costs have been allocated to producing departments, the factory overhead application rate for each producing department can be computed.

Budgets for service and producing departments should be prepared before the allocation process is begun. Total budgeted service department costs that can be traced to a specific producing department should be allocated directly to that department. For example, if the repairs and maintenance department plans to purchase fan belts that fit only the equipment used in the assembly department then the budgeted cost of the fan belts expected to be replaced during the next period should be charged directly to the assembly department.

Total budgeted services department costs that cannot be identified with a specific department must be separated into variable and fixed cost components and both groups must be independently allocated to producing departments. The allocation of the variable and fixed service department total budgeted costs that cannot be directly traced to a specific department is made by using a basis that has some relationship (correlation) between services rendered and costs incurred. For example, the square footage of the producing departments may be used as a basis to allocate janitorial department costs if it is found that the physical size of a department is a good indicator of how long it takes the janitors to clean the area. However, square footage may be inappropriate if, for example, the cutting department is half the size of the assembly department but takes twice as long as clean because it produces more waste than the assembly department.

Once a basis for allocation has been determined, a method of allocation must be selected. The following methods are commonly used to allocate service department total budgeted costs to producing departments: (1) direct method, and (2) step method

1. **Direct Method:**

The direct method is the one most commonly used for allocating total budgeted service department costs because of mathematical simplicity and ease of application. Under this method, service department total budgeted costs are allocated directly to the producing departments, ignoring any services rendered by services department to each other. (For example, the building and grounds maintenance department may service the personnel department, and the personnel department may provide services to the building and grounds maintenance department). The direct method is appropriate for allocating service department total budgeted costs when no reciprocal services exist.

For example, the Crane Manufacturing Company has two service departments and two producing departments. The total budgeted cost for the period of each department is shown in Table 6 Assume that the total budgeted cost of the building and grounds maintenance department is allocated to the machinery and assembly departments, on the basis of the estimated number of squire feet: the total budgeted cost of the general factory administration department is allocated using estimated total labor hours. The factory overhead application rates for the producing departments are based on estimated direct labor hours.

Table 6 Crane manufacturing Company: total budgeted overhead cost

Service departments (total estimated costs):			
Department X-Building and Grounds Maintenance			$ 10,000
Department Y-General Factory Administration			7,500
Producing Departments (Estimated Factory Overhead Costs):			
Department A-Machinery			36,500
Department B-Assembly			44,600
Department	Estimate direct labor hours	Estimated square feet	Estimated total labor hours
X-Building and Grounds Maintenance	……	700	1,000
Y-General Factory Administration	…..	500	700
A-Machinery	1,800	1,000	2,800
B-Assembly	950	3,000	1,200
Total	**2,750**	**5,200**	**5,700**

To simplify the illustration, variable costs and fixed costs will be allocated together. The allocation of total budgeted service department costs to producing departments under the direct method is computed in table 7.

Table 7 Allocation of Costs: Direct Method

		Service departments		**Producing departments**	
		Dep.X	**Dep.Y**	**Dep.A**	**Dep.B**
Total budgeted costs allocated to producing departments A and B		$ 10,000 (10,000)	$ 7,500 (7,500)	$ 36,500 2,500 (1) 5,250(3)	$ 44,600 7,500(2) 2,250 (4)
Balance after allocation		$ 0	$ 0	$ 44,250	$ 54,350
Factory overhead application rates (per direct labor hour)				$ 24.58 (5)	$ 57.21(6)
Computations					
Allocations of department X, Building and Grounds Maintenance					
Total budgeted costs ÷ square feet of Dep.A and B= $10,000÷ 4,000 = $2.5 per square foot					
			Square Feet	×	Rate per square foot
1) To Dep A-Machinery		$ 2,500	1,000	×	$ 2.50
2) To Dep B-Assembly		7,500	3,000	×	2.50
Total		$ 10,000			
Allocations of department Y, General Factory Administration					
			Total labor hours	×	Rate per Total labor hours
3) To Dep A-Machinery		$ 5,250	(2,800	×	$ 1.875)
4) To Dep B-Assembly		2,250	(1,200	×	1.875)
Total		$ 7,500			
Factory overhead application rate (on the basis of direct labor hours) for producing departments:					
			Total cost after allocation	÷	Direct labor hours
For Dep A-Machinery		$24.58/direct labor hour	($44,250	÷	1,800)
For Dep B-Assembly		$57.21/direct labor hour	($54,350	÷	950)

2. Step Method

The step method is more accurate than the direct method when a service department services another service department because it takes into consideration the services provided by one service department to another service department the allocation of budgeted service department costs is performed by a series of steps as follows:

A. The budgeted costs of the service department that provides services to the greatest number of other service departments are usually allocated first.

B. The budgeted costs of the service department that provides services to the next greatest number of service departments are then allocated. Any budgeted costs added to this department from step A are included. Note that under this method, once a service department's budgeted costs have been allocated to other departments, no additional budgeted costs can be allocated back to it. That is, the department whose budgeted costs were allocated in step A will not receive any cost allocation from the second department.

C. This sequence is continued, step by step, until all the budgeted service department costs have been allocated to producing departments.

For example, assume that the total budgeted costs of the Building and Grounds Maintenance department are allocated first, followed by the allocation of the total budgeted costs of the General Factory Administration department. For the Crane Manufacturing Company, the allocation of total budgeted service department costs to producing departments under step method is shown in table 8.

Note that the difference between the direct method and the step method is the allocation of the total budgeted costs of one service department (department X) to the other service department (department Y), which is made only under the step method.

Table (8): Allocation of Costs: Direct Method

		Service departments		Producing departments	
		Dep.X	**Dep.Y**	**Dep.A**	**Dep.B**
Total budgeted costs allocated to service departments Y and Producing departments A and B		$ 10,000 (10,000)	$ 7,500 1,111 (1)	$ 36,500 2,222 (2)	$ 44,600 6,667(3)
Subtotal			$ 8,611	$ 38,722	$ 51,267
Allocated to Producing departments A and B			(8,611)	6,028 (4)	2,583 (5)
Factory overhead application rates (per direct labor hour)		$ 0	$ 0	$ 24.86(6)	$ 56.68(7)
Computations					
Allocations of department X, Building and Grounds Maintenance					
Total budgeted costs ÷ square feet of Dep.Y, A, and B= $10,000 ÷ 4,500 square feet = $2.2222 per square foot					
			Square Feet	**×**	**Rate per square foot**
1) To Dep Y, General Factory Administration		$ 1,111	(500	×	$ 2,2222)
2) To Dep A-Machinery		2,222	(1,000	×	$ 2.2222)
3) To Dep B-Assembly		6,667	(3,000	×	2.2222)
Total		$ 10,000			
Allocations of department Y, General Factory Administration					
Total budgeted costs ÷ Total labor hours of Departments A and B= $ 8,611 ÷ 4,000 total labor hours = $ 2.1527 per total labor hours					
			Total labor hours	**×**	**Rate per Total labor hours**
4) To Dep A-Machinery		$ 6,028	(2,800	×	$ 2.1527)
5) To Dep B-Assembly		2,583	(1,200	×	2.1527)
Total		$ 8,611			
Factory overhead application rate (on the basis of direct labor hours) for producing departments:					
			Total cost after allocation	**÷**	**Direct labor hours**
For Dep A-Machinery		$24.86/direct labor hour	($44,750	÷	1,800)
For Dep B-Assembly		$56.68/direct labor hour	($53,850	÷	950)

5/10 Allocation of actual Service Department Costs to Producing Departments

We have just illustrated the use of the two alternative cost methods: direct and step. The selected method was used to allocate budgeted service department costs to producing departments at the beginning of the period as a necessary prerequisite to the determination of the producing department's predetermined factory overhead application rates. Service departments benefit producing departments in that their costs are properly accounted for as factory overhead costs of producing departments and thus they can be attached to products via the predetermined factory overhead application rates.

During the accounting period, actual factory overhead costs are debited to a Factory Overhead Control and a parallel treatment is accorded actual service department costs, which are debited to service department Cost Control Account. Given the existence of service departments, we cannot directly proceed to a comparison of the Factory Overhead Applied Account and the Factory Overhead Control Account for the purpose of determining under or over applied factory overhead because the Factory Overhead Control account's debit balance at the end of the period consists only of the actual producing department Factory Overhead costs.

Clearly, Factory Overhead Applied and Factory Overhead Control Accounts, as they exist at present, cannot be meaningfully compared until the Factory Overhead Control Account is adjusted at the end of the period to include the actual service department costs.

Therefore, it is necessary to allocate actual service department costs to producing departments at the end of the period. Once this allocation is made using the direct step method, a journal entry follows to transfer the actual costs out of the service department Cost Control Accounts and into the Factory Overhead Control Accounts. After this journal entry and corresponding posting to appropriate general ledger accounts, Factory Overhead Applied and Factory Overhead Control can be compared, under or over applied factory overhead computed and the applicable end of period journal entry made.

At the end of period allocation of actual service department costs to producing departments will be illustrated using the Crane Manufacturing Company. Recall that the company has two service departments and two producing department. The total actual overhead cost for the period for each department is shown in table 10.

Table (10) Crane Manufacturing Company: Total Actual Costs

Service departments			
Department X		$ 11,000	
Department Y		7,900	
Producing departments			
Department A		38,400	
Department B		43,700	
Additional Information			
Department	**Actual Direct Labor Hours**	**Actual Square Feet**	**Actual Total Labor Hours**
X - Building and Grounds Maintenance	…	650	1,400
Y- General Factory Administration	…	550	900
A - Machinery	1,700	1,300	3,000
B - Assembly	1,000	2,600	1,500
Total	$2,700	5,100	6,800
Factory overhead control Department A $38,400	Factory overhead applied Department A $41,786 ($24.58/DLH×1,700 actual DLH)		
Factory overhead control Department B $43,700	Factory overhead applied Department B $57,210($57.21/DLH×1,000 actual DLH)		
Department X cost control $ 11,000	Department Y cost control $ 7,900		

It should be noted that Factory Overhead Applied accounts have end of period balances based on actual direct labor hours (table 10) times the predetermined factory overhead application rates (table 7, direct method) of $ 24.58 and $ 57.21 per direct labor hour for Machinery and Assembly departments, respectively.

The actual cost of department X is allocated to A and B departments, on the basis of the actual number of square feet, and the actual cost of department Y is allocated, using actual total labor hours.

The allocation of actual services department costs to producing departments under the direct method is computing in table (11).

Table (11) Allocation of Costs : Direct Method

		Service departments		**Producing departments**	
		Dep.X	**Dep.Y**	**Dep.A**	**Dep.B**
Total actual costs allocated to producing departments A and B		$ 11,000 (11,000)	$ 7,900 (7,900)	$ 38,400 3,667 (1) 5,267(3)	$ 43,700 7,333(2) 2,633 (4)
Balance after allocation		**$ 0**	**$ 0**	**$ 47,334**	**$ 53,666**
Computations					
Allocations of department X, Building and Grounds Maintenance					
Total costs ÷ square feet of Dep.A and B = $11,000÷ 3,900 = $2.82 per square foot					
			Square Feet	×	Rate per square foot
1) To Dep A-Machinery		$ 3,667	(1,300	×	$ 2.82)
2) To Dep B-Assembly		7,333	(2600	×	$ 2.82)
Total		$ 11,000			
Allocations of department Y, General Factory Administration					
Total costs ÷ Total labor hours of Departments A and B= $ 7,900 ÷ 4,500 labor hours = $ 1.75555 per total labor hours					
			Total labor hours	×	Rate per Total labor hours
3) To Dep A-Machinery		$ 5,267	(3,000	×	$ 1.75555)
4) To Dep B-Assembly		2,633	(1,500	×	1.75555)
Total		$ 7,900			

After total actual service department costs are allocated to producing departments as shown in table 11, the following entries are made:

Factory overhead control- Machinery (A) Building and Grounds Maintenance (X) Cost Control	3,667	3,667
Factory overhead control- Assembly (B) Building and Grounds Maintenance (X) Cost Control	7,333	7,333
Factory overhead control- Machinery (A) General Factory Administration (Y) Cost Control	5,267	5,267
Factory overhead control- Assembly (B) General Factory Administration (Y) Cost Control	2,633	2,633

As a result of the journal entries above, the two service department cost control accounts are closed and their balances transferred as per table 11 to the two producing department factory overhead control accounts. The next step in the computation of under or over applied factory overhead as follows:

	Machinery	Assembly
End-of-period balance in factory overhead control after allocation (table 11)	$ 47,334	$ 53,666
End-of-period balance in factory overhead applied (table 10)	41,786	57,210
Underapplied factory overhead	$ 5,548	
Overapplied factory overhead		$ 3,544

The final step is record the $ 5,548 of underapplied factory overhead and the $ 3,544 of overapplied factory as follows:

Factory overhead control- Machinery	41,786	
Underapplied factory overhead – Machinery	5,548	
Factory overhead control- Machinery		47,334
Factory overhead applied - Assembly	57,210	
Overapplied factory overhead- Assembly		3,544
Factory overhead control- Assembly		53,666

Example:

The Capricorn corporation has the following information related to applied and actual factory overhead :-

Factory overhead control	$ 30500
Applied factory overhead	$ 39700

Actual factory overhead costs are in the following accounts:

Cost of goods sold	32000
Ending work-in-process inventory	3500
Ending finished goods inventory	4200

Required :

a. Allocate the under or over applied factory overhead to those accounts distorted by using what turned out to be an incorrect factory overhead application rate .
b. Prepare the end-of period entries.

Solution :-

a-The over applied balance is allocated as follows:-

Balance before allocation :

Cost of goods sold	$32000
Ending work-in-process inventory	$3500
Ending finished goods inventory	$ 4200
	$ 39700

To cost of goods sold :

$$\frac{32000}{39700} \times 9200 = \$\ 7416$$

To ending work-in-process inventory:

$$\frac{3500}{39700} \times \$\ 9200 = 811$$

To ending finished goods inventory:

$$\frac{4200}{39700} \times \$\ 9200 = 973$$

Total allocated = 7416 + 811 + 973 = $ 9200

b- The end of period entries:

Factory overhead applied	39700	
Overapplied factory overhead		9200
Factory overhead control		30500

Overapplied factory overhead	9200	
Cost of goods sold		7416
Work-in-process inventory		811
Finished goods inventory		973

Questions & Exercises

Multiple Choices:

1-Deprecation based on the number of units produced would be classified as what type of cost?

A-out-of-pocket C-variable

B-marginal D-fixed

2-the variable factory overhead application rate under the normal , practical , and expected activity levels would be the same :

A-Except for normal volume C-Excepted for expected activity

B-Except for practical volume D-for all the activity levels

3-Cost company that the differences in product cost , resulting from the application predetermined overhead rates rather than actual overhead rates, were immaterial though actual production was substantially less than planned production . the most it explanation is that :

A-overhead was composed chiefly of variable costs

B-several products were produced simultaneously

C-fixed factory overhead was a significant cost

D-costs of overhead items were substantially higher than anticipated

4-If a predetermined overhead rate is not employed and the volume of production is increased over the level planned , the cost per unit would be expected to :

A-Decrease for fixed costs and remain unchanged for variable costs

B-Remain unchanged for fixed costs and increase for variable costs

C-Decrease for fixed costs and increase for variable costs

D-increase for fixed costs and increase for variable costs

5- The Carlo company budgeted overhead at $ 255000for the period for department A . on the basis of a budgeted volume of 100000 direct labor hours. At the end of the period, the factory overhead control account for department A had a balance of $ 270000; actual direct labor hours were 105000. What was the over – or under applied overhead for the period?

A-$2250 over applied

B-$2250 under applied

C-$15000over applied

D-15000under applied

6-factory overhead application rate best reflect anticipated fluctuation in sales over several years when the rates are computed using figures based on:

A-Maximum capacity

B-Normal capacity

C-practical capacity

D-Expected capacity

7-Preferable, under applied factory overhead resulting from significant unanticipated price increases should be written off by ?

A-Decreasing cost of goods sold

B-Increasing cost of goods sold

C-Decreasing cost of goods sold, work-in-process inventory, and finished goods inventory

D-Increasing cost of goods sold, work-in-process inventory, and finished goods inventory

8-In order to identify costs that related to a specific product, an allocation base should be chosen that:

A-Does not have a cause and effect relationship

B-Has a cause and effect relationship

C-considers variable costs but not fixed cost

D-considers direct materials and direct labor but not factory overhead

9-The only method of allocation service department costs to producing department that considers reciprocal services is called the:

A-Direct method

B-Step method

C-Out-of-step method

D-Algebraic method

10-In the determination of factory overhead application rate, in numerator of the formula is the:

A-Actual factory overhead for the next period

B-Estimated factory overhead for the next period

C-Actual labor hours for the next period

D-Estimated labor hours for the next period

11-Which productive capacity level does not consider product demand, but the same time accounts for anticipated and unavailable interruption in production?

A-short-run productive capacity

B-Normal productive capacity

C-Theoretical productive capacity

D-Realistic productive capacity

12- Expected productive capacity for the current year is 175000 units. Management expected production of 208000 units of the following year. Fixed factory overhead costs are $180000. If the factory overhead application rate, under expected productivity capacity, is $2.08, what is the variable factory overhead cost per unit?

A-$ 1.03 C-$ 1.17

B-$ 1.05 D-$ 1.21

13- J & j company budget total variable overhead costs at $ 180000 for the current period. In addition, they budgeted costs for factory rent at $215000 costs for depreciation on office equipment at $ 12000, costs for office rent at $ 92000 and costs for depreciation of factory equipment at $ 38000. All these costs were based upon estimated machine hours of 80000. At the end of the period , the factory overhead control account had balance of $ 387,690 . Actual machine hours were 74000, what was the over or under applied factory overhead for the period?

A-$ 12650 over applied C-$ 108,850 over applied

B-$ 12650 under applied D-$ 108,850 under applied

14-When the planned activity level used to calculate the predetermined factory overhead application rate differs from the actual level achieved for the period , the result is a :

A-Denomination variance

B-Effective variance

C-Controllable variance

D-Under application of fixed factory overhead

Exercises:

1. Donahue and Daughters, Inc., produced 225,000 bottles of perfume during the year. The production costs for bottles of perfume were the following:

Direct materials	$ 940,000
Direct labor	550,500
Indirect materials	348,750
Factory rent	40,000
Depreciation	33,750
Indirect labor	213,750
Factory supervisions	60,000

Each worker can produce 2500 bottles. Each supervisor can handle up to 30 workers: the supervisors are paid equal salaries. Depreciation is determined using the units of production method.

Required: determine the total factory overhead for Donahue and Daughters, Inc., if the company had produced 375000 bottles during the year.

2. The Coastin on AIR Co, estimated its levels of production as follows:

Maximum Capacity	650,750 units
Long-run Capacity	450,500 units
Short- run Capacity	370,000 units

Because of anticipated and unavoidable interruptions in production, theoretical capacity would be reduced by 85,000 units. Total fixed expenses were expected to be $ 260,000. Variable expenses were expected to be $0.85 per unit.

Required:

A. Determine the estimated factory overhead costs, using each of the following volume production:
   i. Ideal Capacity
   ii. Realistic Capacity

iii. Normal Capacity
iv. Expected Capacity

B. What would the factory overhead application rates be using units of production as the base for each of the four levels of productive capacity?

3. The Sullivan Manufacturing Company makes hammers that it sells to hardware stores in Karen Country, North Carolina. For year 5, the factory overhead expenses were expected to be:

Fixed	$ 100,000
Variable	125,750
Semivariable	17,000

For year 5, the company expected production to be 175,500 hammers: machine hours, 180,000: and direct labor hours 36,400. The estimated direct materials cost was predicted to be $ 265,000, and the estimated direct labor cost $ 172,460.

The actual data for January were as follows:

12,000 hammers

25,000 machine hours

5,000 direct labor hours

$ 44,020 direct materials cost

$ 18,000 direct labor cost

Required: Compute the application rates used to apply factory overhead, and determine the applied overhead during January for each of the following bases:

a- Units of production
b- Direct materials cost
c- Direct labor hours
d- Direct labor cost
e- Machine hours

4. Assume the following information for M.L.&O. corporation, year 2:

Estimated factory overhead:	
Fixed	$ 76,000
Variable	$ 6 per unit
Expected capacity	30,000 unit
Estimated direct labor hours	25,000
Estimated machine hours	20,000

The following data were supplied for the month of March, year 2:

Actual direct labor hours	2400
Actual machine hours	2200
Actual overhead	$ 25,000

M.L.& O. uses short-run capacity to estimate its factory overhead. The company uses Applied factory overhead account and over or underapplied factory overhead account. At the end of the month, the over or underapplied factory overhead account is closed to the cost of goods sold account.

Required: using the data given, prepare two sets of journal entries one using direct labor hours and the other using machine hours to apply the factory overhead to units produced. Do the following:

a. Record the applied factory overhead.
b. Record the actual factory overhead.
c. Close the applied factory overhead and factory overhead control accounts.
d. Close the over or underapplied factory account.

5. Factory overhead

	Department 1	**Department 2**	**Department 3**
Actual direct labor hours	420	550	375
Factory overhead rate per direct labor hours	$ 3.95	$ 2.10	$ 4.00
Actual factory overhead costs			
Rent on factory	$400	$ 250	$ 360
Factory supplies	233	141	220
Indirect labor	407	324	175
Fuel, factory	385	400	620

Small tools	120	80	75
Applied factory overhead in the following accounts:			
Cost of goods sold	850	705	1,000
Ending work-in-process inventory	509	250	300
Ending finished goods inventory	300	200	200

Required: using the data given, prepare journal entries for the following:

a. Record the applied factory overhead.
b. Record the actual factory overhead.
c. Close the applied factory overhead to the control account.
d. Allocate the over or underapplied factory overhead among ending work-in-process inventory, ending finished goods inventory, and cost of goods sold.

6. The Snowman Ice Company has two service departments and two production departments:

Service departments' total costs:	
Department 1, Repair	$ 14,000
Department 2, Cafeteria	11,000
Producing departments' factory overhead costs:	
Department 10, Machinery	52500
Department 11, Assembly	48000

Department	Square Feet	Estimated total Labor Hours
1, Repair	1500	3500
2, Cafeteria	1800	1200
10, Machinery	2000	2300
11, Assembly	3000	1700
Total	8300	8700

The costs of the Repair department are allocated on the basis of Square Feet. The costs of the Cafeteria department are allocated on estimated total labor hours. The producing departments use estimated direct labor hour: 1500 in department 10 and 1250 in department 11.

Required: Allocate the total costs of the service departments to the producing departments by using the following methods:

1. Direct method
2. Step method

Compute the factory overhead application rates for the two producing departments in all two solutions

7. The Ippolito Company prepared the following list in order to determine the factory overhead in each department for the year 2018:

	Factory Overhead Cost	
	Production Department	
	H	G
Rent	$ 25,000	$ 77,000
Repairs	10,000	12,050
Fuel	35,000	42,000
Indirect labor	15,750	17,000
Indirect materials	6100	5,650
Heat and light	20250	15,120
Depreciation	9400	7,130
Miscellaneous	6000	5,050
Total	$ 127500	$ 181,000

	Total Cost		
	Service Department		
	U	V	W
Rent	$ 1,500	$ 1,450	$ 700
Repairs	2,300	3,000	750
Fuel	950	700	600
Indirect labor	14,500	10,000	9,750
Indirect materials	12,700	9,450	6,000
Heat and light	900	600	750
Depreciation	300	150	175
Miscellaneous	70	60	50
Total	**$ 33,220**	**$ 25,410**	**$ 18,775**

Additional data needed for allocation of factory overhead:

- Department U services G, V, and W in the ratio of 2:1:1, respectively

- Department V services Departments H, G, and U in the ratio of 4:3:2:1, respectively
- Department W services H and G in the ratio of 3:1, respectively

Required: Assume Department U is allocated first, V is second, and W is last.

a- Allocate the total costs of the service departments to the producing departments by using the following methods:
   1. Direct method
   2. Step method

b- Determine the factory overhead application rates for the producing departments using the following bases: Department H, 100,000 direct hours: and Department G, 195,000 direct labor hours.

Chapter Six:

Marketing Costs

Chapter Six:

Marketing Costs

Learning objectives:

Upon completion of this chapter, you should be able to:

- ✓ Define marketing cost and discuss how they are developed.
- ✓ Expand on the marketing cost system.
- ✓ Analyzing the marketing costs
- ✓ Discuss the steps of applying the cost centers approach upon marketing costs apportionment:

7/1 Introduction:

The main objective of any company whether manufacturing or trading is to sell its products Therefore, the focus of analysis during this chapter is upon the selling and distribution costs (or it was known, the marketing costs). Accordingly, the marketing costs will represents all elements of costs result from roving products from the ownership of the company to the ownership of the consumer or customers. These costs are ranged between 20 to 30 per cent of sales in most products and some estimates have shown in certain cases that they ranged between 50 to 60 per cent (see, i.e. Trill et al 1965). Furthermore, the analyses, planning and controlling of these costs are very difficult. We can summarize the reasons of these difficulties a follows:

i. These costs are mostly happening outside the company.
ii. Most of these costs are created for raising the consumer's satisfaction which is difficult to be appraised.
iii. Analysis of marketing costs are cumbersome than manufacturing to the volume of sales, the direct association with goods sold, to types or further according to types of customers (wholesalers, retailers or the public), to the channels of distribution or to the type of sales.
iv. Most of marketing costs are indirect costs.

v. Marketing strategies and further, activities are not repetitive, but depend upon the nature of the market in each transaction.

According to above, the area of marketing costs provides vast scope for their analysis, and enables for the application of accurate methods of guidance and control.

7/2 Analyzing the marketing costs:

The necessity of valid and reliable analysis of marketing costs is due to the following reasons :

a) To determine the cost of selling each product.
b) To help in setting the proper price.
c) To aid in driving polices regarding the optimum size of sales and types of product to be encouraged.
d) To help in cost controlling and profit planning.
e) To help in planning a stable marketing policy both in the short and long run.

Accordingly, and due to the nature of market, one should expect that the scope of analysis here will be more difficult than that established earlier, with regard to the manufacturing costs. In addition to direct/ indirect analysis or cost volume behavior analysis, there is another analysis according to sources of profitability, which may simply divided to types of sales, and to geographical channels of distribution.

Therefore, we will limit our text during this chapter to only analysis according to types of sales and channels of distribution. However, the problem which still exists, that most of marketing costs are indirect, and to A ermine the share of each unit's cost, an approach for apportionment of these costs between the competing products applied and this will be solved within the application of cost centers approach. In this case, one before dividing the

could be amp any to a manageable cost centers, should be wise to realize whether the company is a manufacturing trading or is only a adding company.

In the case of a manufacturing/ trading company, there will be o production jobs working simultaneously. The first will include the manufacturing production, while the second will include the selling production. The method of applying the cost enters approach in this case will be difficult to be undertaken and handled for the level of this text, therefore, we decided to exclude and to focus only upon the case of the trading companies.

7/3 Steps of applying the cost centers approach upon marketing costs apportionment:

According to this, the main divisions of the Marketing costs Analysis Sheet will include these broad centers:

1- **Production centers** this will represent the selling centers and will be coded No. 5 (according to the Egyptian uniform Accounting system). Under this heading code, it will include a number of major types or kinds of sales or territories.

2- **Technical service centers** y this will represent the centers, like, electricity, maintenance and the like, which offer a substantial aid to the company. This will be coded No. 6 according to the National system of Egypt. These centers are not necessary to be found in every company, and the existence depends only upon the main policy of the company.

3- **Marketing services centers:** which are essential to be found for the achievement of the main company's marketing policies and services, such as; publicity and advertisement about the whole products, stores, transport and packing and dispatch. All these services and their related costs are not only specific for a special type of sales or territory, but for

all types. Therefore, these costs are indirect and should be apportioned in such a way between types of sales or territories.

After arriving at the previous divisions, the cost centers Approach can be applied in the following steps:

i. Analyzing the whole company's costs to two broad divisions:

(1) With regard to the production centers (no.5) this could be divided according to territories, to sub-centers, if selling is through various geographical areas (this will be considered and treated firstly), or it may be divided to sub-centers according to types of sales, if selling is directly happened by the main board office and this will be treated separately).

(2) Analyzing the whole company's costs to two broad classes as:

a- **Special costs** which are relating directly to a specific type of sales or territory. Examples of these types are as follows:

- Advertisement for certain type of product or to certain territory, which should be allocated directly this type or territory.

- Local transport certain between customers.

- Often marketing expenses paid for a specific type of sales.

All above items should be allocated directly to the responsible sales type or territory and be recorded in their divisions in center no. 5.

b- **Common marketing costs** for the achievement of the general marketing policy of the company. These costs cannot easily be related to a specific type of sales; therefore, they should be apportioned between the competing sales or territories. Examples of these costs are as follows:-

- Salesmen salaries.
- Advertisement.

- Packing and dispatch.
- Transport.
- Other marketing expenses.

All these items should represent and occupy a specific sub-centers in the marketing service center (no.7), and further be apportioned between the competing sales or territories as we will see later.

ii. Apportionment centers No. 7 to centers No.5, and here we should distinguish between two states:-

Firstly:- Marketing policy depends upon territories and geographical branches in selling products:-

Here, every territory will engage a specific sub-center in the production centers No.5, while centers No.7 will represent the central marketing services by the company. To determine the marketing costs per unit sold, we have to go through these steps

1) Apportionment of centers No.7 (general marketing services) to centers No. 5 (territories), according to a method of allocation and a basis of apportionment. With regard to the method of allocation which will be adopted during this chapter, we will follow the individual allocation method. This method was adopted here only for simplicity; however, other methods discussed in chapter (5) are possibly to be used also.

With regard to basis of apportionment of marketing services to territories, we suggest the following bases, as appear in table 1.

Table (1) **Bases of Apportionment**

Items	Basis of Apportionment
Salesmen Salaries	According to value of sales sent to each territory
Stores	Size of units sent to each territory or number of units sold in each territory
Transport	Weight of units sent to each territory, number of units sent multiplied by distance from the central office to each territory
Packing and dispatch	Size of units sent to each territory or number of units sold in each territory
Other marketing expenses	Value of sales in each territory
advertisements	Value of sales in each territory

2) After finishing the above step, we will find ourselves determined the total marketing costs in each territory. The marketing costs analysis sheet prepared for calculating the total costs of every territory should be prepared in the central accounting office of the company. Therefore, we should prepare another analysis sheet in each territory, to be prepared in the local accounting office of each region, to determine the marketing cost per unit sold, and this will be discussed in the following paragraphs.

3) In preparing the local marketing analysis sheet, we should follow these steps:

a- Production centers No. 5, should be reserved and divided to sub-centers, according to types of sales. Marketing services centers should be reserved for the share of the territory in the central marketing services, and be divided to sub-centers according to types of services received.

b- Total territory marketing costs, determined in sheet no. 1, should be divided to a special costs for a special type of sales, which should be allocated directly to this type of sales and recorded in the sub-center of this type. The second division of the total costs is the

share of the territory in the central marketing costs, and this should be allocated to the specific sub-centers in center No. 7.

c- Apportionment of the marketing cost centers to the sales types centers (no.5) by following the individual allocation method and by using these bases (see table 2)

d-The summation of each type of sales' cost center will give the total cost of marketing this type of sales.

e- To calculate the marketing costs recovery rates, the best recommended basis of absorption is the number of units sold.

f- An exceptional case from above process, when only one type of sales be sold in every territory, then no need to make two marketing sheets and only the first sheet will be enough. This is because, from the first sheet, which gives the total marketing cost in every territory, this total will represent in the same time, the total marketing costs for the type sold. Therefore, we can calculate the recovery rate depending upon this first sheet only.

Table (2) **Bases of Apportionment**

Items	**Basis of Apportionment**
Salesmen Salaries	Value of sales per type
Stores	Size of sales per type
Transport	Number of units sold multiplied by distance to customers per type sold.
Packing and dispatch	Size, per type of units sold
Other marketing expenses	Value of sales in each territory
advertisements	value of sales per type

Example: A leading trading company selling two types of products A and B through two territories L and M and the following are data extracted from the books of the board office and of the territories.

Item	Total	L	M
Distance (Km^2)	170	20	150
Number of units sent to territory from type (A)	5000	2000	3000
Number of units sent to territory from type (B)	7000	4000	3000
Number of units returned to the main office from type (A)	5000	-	5000
Advertising Expenses	6000	500	1000
Stores	1000	-	-
Transport	300	-	-
Packing & dispatch	1500	-	-
Sales Commission	500	300	200

Further information:

1) Size in feats for types A and B is 5 and 2 respectively.
2) Price in pounds for types A and B is 2 and 3 respectively.
3) Detailed data from the territories books appears in table (3) as follows.

Table (3)

Items	Territory L		Territory M	
	A	B	A	B
Units sold	2000	4000	2500	3000
Local advertising expenses	200	300	600	400
Sales commission	-	300	200	-
Price	2	3	2	3

Required:

1- Prepare the central marketing costs analysis sheet.
2- Prepare the local marketing analysis sheet for L and M territories.
3- Determine the marketing cost per units sold in each region and for types A and B.

SOULUTION

Marketing costs analysis sheet

Items	total	territories		marketing		services		Basis of apportionment
		L	M	Adv	St	Tran	Pack	
Advertising	500	500	1000	4500				
Stores	1000				1000			
Transport	3500					3500		
Packing and dispatch	1500						1500	
Sales Commission	500	300	200					
Total	12500	800	1200	4500	1000	3500	1500	
Apportionment of services centers:								
Advertising	2400	2100						Sales value of units sent
Stores	517	183						Size of units sent
Transport	2074	1426						Number of units sent multiplied by distance
Packing and dispatch	717	783						Size of units sent
Total	6208	5992						

(1) Apportionment of various service centers to territories has depended upon units sent rather than units sold.

(2) General advertising by the central office was apportioned between territories L and M according to a ratio of 16000 15000 i.e., the value of units sent to both L and M territories from both A and B types).

(3) General stores costs in the central office was apportioned between territories L and M according to a ratio of 22000: 24000 (i.e., the size of units sent to both L and M territories from both A and B types).

(4) General transport cost by the central office was apportioned between territories L and M according to a ratio of 120000: 90000 (i.e. the number of units sent to both L and M territories from both A and B types, multiplied be distance from the central office to both L and M territories).

Territory L

Items	total	territories		marketing		services		Basis of apportionment
		L	M	Adv	St	Tran	Pack	
Sales Commission	300	-	300					
Advertising	2900	200	300	2400				
Stores	517				517			
Transport	2074					2074		
Packing and dispatch	717						717	
Total	6509	200	600	2400	517	2074	717	
Apportionment of services centers:								
Advertising		600	1800					Sales value of units sent
Stores		235	282					Size of units sold
Transport		691	1383					Number of units sold multiplied by distance
Packing and dispatch		326	391					Size of units sold
Total	5608	2052	4456					
Divided by the number of units sold	2000	1.11						
Marketing recovery rates	1.03	1.11						

Territory M

Items	total	Territories		Marketing		services		Basis of apportionment
		L	M	Adv	St	Tran	Pack	
Sales Commission	200	200						
Advertising	3100	600	400	2100				
Stores	483				483			
Transport	1426					1426		
Packing and dispatch	783						783	
Total	5992	800	400	2100	483	1426	783	
Apportionment of services centers:								
Advertising		750	1350					Value of Sales
Stores		281	202					Size of units sent
Transport		648	778					Number of units sold multiplied by distance
Packing and dispatch		455	328					Size of units sold
Total		2943	3058					
Divided by the number of units sold		÷ 2500	÷ 3000					
Marketing recovery rates		1.17	1.02					

Secondly: Marketing policy depends upon direct selling centrally by the board office.

This case appears clearly in cases of no branches following the control office. This accounting system for marketing costs in this case takes the following steps:

1) Dividing the production centers (no.5) to subcenters according to type of sales, while marketing services centers remain as they appear in the above method, when selling achieved through territories.
2) Allocating the specific costs to the responsible centers.
3) Apportionment of service centers costs to the production centers according to an acceptable bases (these basis are identical to those discussed in table 2.

4) The total marketing costs of each type of sales to be divided by the number of units sold as a final step to arrive at the marketing recovery rate of each type of sales.

Example: A leading trading company working in two products A and M. Sales is directly through the main office and these are data relating to the marketing activities.

Items	A	B
Units sold	8000	10,000
Size in feats	2	3
Sales Commission	500	700
Price in EL	12	9
Cost of production per unit in EL	6	4
Gifts to customers in units	-	4500

Additional information

The general marketing costs were amount to:

EL 2000 advertising

EL 1000 Packing and Dispatch

EL 800 Storing

EL 300 Others

Required:

1. Prepare the marketing costs analysis sheet
2. Determine the cost of marketing per unit of each type of sales
3. Calculate the gross profit of each type of sales

Territory L

Items	total	Territories		Marketing		services		Basis of apportionment
		L	M	Adv	St	Tran	Pack	
Sales Commission	1200	500	700					
Gifts to customers	4500		4500					
Advertising	2000			2000				
Packing and dispatch	1000				1000			
Storing	8000					800		
others	300						300	
Total								
Apportionment of services centers:								
Advertising		1032	968					Value of Sales
Packing and dispatch		444	556					Size of units sold
Stores		356	444					Size of units sent
Others		155	145					
Total	9800	2487	7313					
Divided by the number of units sold		÷ 8000	÷ 10000					
Marketing recovery rates		0.31	0.73					

Profit and loss sheet

Items	Amount (A)	Amount (M)
Value of sales	96,000	90,000
(-) cost of production	48,000	40,000
Net	48,000	50,000
(-) marketing costs	2,487	7,313
Gross Profit	45,513	42,687

Notes:

(1) Gifts to customers was counted in money terms and considered as a part of M's marketing costs.

(2) Sales commission was considered and allocated directly to types of sales.

Questions and Problems

1) Determine the steps of applying the cost centers approach upon marketing costs?

2) Show the difference in preparing the marketing cost analysis sheet when systems of sales deferred?

3) Why is marketing cost analysis is much more difficult than manufacturing cost analysis?

4) What allocation bases are more appropriate in allocating the following marketing items:

- Salesman Salaries
- Transport
- Packing and dispatch
- Storage costs
- Advertising

5) A major trading company is selling two types of goods M and N through two territories East and West, and these are data extracted from the marketing books of the company:

Required: prepare the central and the local marketing costs analysis sheets

Items	Total	East	West
Units sent from type (M)	15,000	8,000	7000
Units sent from type (N)	12,000	6,000	6000
Distance (KM2)	6200	10	-
Advertising cost (EL)	2000		200
Storage costs	3500	-	
Packing and dispatch	3000	-	
Transport	4000	-	
Salesman salaries	-	-	

Data extracted from the marketing books of local territories:

Items	East		West	
	N	M	N	M
Units sold	8000	6000	7000	6000
Advertising	-	-	100	100
Size of units (in fetes)	3	4	3	4
Price	4	5	4	5

6) A company is trading in three types of pounds A_1, A_2 and A_3. Prepare the marketing cost analysis sheet for the selling of the above products, and calculate the cost per unit sold from each type.

Items	Amount	Basis of apportionment
Salesmen salaries	20,000	Direct charge
Salesmen commission	8000	Value of sales
Sales office expense	4000	Number of orders
Advertising : general	5000	Value of sales
Advertising : specific	2000	Direct charge
Packing	3000	Volume in fetes of units sold
Delivery expenses	100	Value of units sold
Warehouse expenses	1200	Volume of sold
Credit collection expenses	800	No. of orders

Date available relating to the products are as follows:

Items	A_1	A_2	A_3
Units sold	4000	5000	7000
Prices	3	2	5
No of orders	700	800	100
Percentage of specific advertising	30%	4%	30%
Volume in fetes of units sold	5	8	12
Sales salaries	6000	7000	7000

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Question 1: (30 Mark)

Aberdeen Company has two service departments (S1 and S2) and two production departments (P1 and P2). The following information has been prepared for the year 2012:

1. The budgeted costs for the departments are as follows:
   Service Departments' budgeted total costs:
   S1 ..... $ 66,000
   S2 ..... $ 52,000
   Producing Departments' budgeted factory overhead costs:
   P1 ..... $ 300,000
   P2 ..... $ 450,000
2. The costs of the service departments are allocated on the basis of percentage of services rendered as follows:
   Department S1: 20% for S2, 40% for P1, and 40% for P2.
   Department S2: 10% for S1, 55% for P1, and 35% for P2.

Required: Assume that Department S1 is allocated first:

a) Allocate the total costs of the service departments to the producing departments by using the following:
   1- Direct method.
   2- Step method.
   3- Algebraic method.
b) Compute the factory overhead application rates for the producing departments in all three solutions. The producing departments use estimated direct labour hours: 150,000 hours in P1 and 220,000 hours in P2.

Question 2: **(**70 Mark)

The LG Company has the following information for the month of March, 2012:

Materials information:

1. The company uses a perpetual inventory system. The company had a beginning **direct materials** inventory on March 1 of 260,000 units with a total costs of $ 3,510,000. During March the company made three **direct materials** purchases and **three direct materials** issuance as follows:

Date	Units purchased	Total purchase costs	Units issued to Job 101
03/3	—	—	28,000
09/3	34,000	510,000	
15/3	26,000	416,000	
20/3	—	—	24,000
24/3	—	—	30,000
27/3	24,000	408,000	

2. The company purchased on account 10,000 units of **indirect materials** costing $ 3 per unit and placed into production (issued) 5,000 units.

Labour information:

3. The company accumulated the following payroll data related to Job 101 for the month ending March 31:

Employee	Hours worked per month	Base rate per hour
Mostafa	160	8
Ahmed	208	10
Samir	192	10
Hussien	132	12
Tariq	160	13

4. The union contract requires that employees receive time and a half for any hours worked above 160 hours per month.
5. The union contract requires that employees receive a minimum guaranteed wage equals to 144 hours multiplied by the base rate per hour.
6. Mr Mostafa worked the night shift and will receive an additional $ 2 per hour above his $ 8 base rate.
7. Mr Ahmed overtime resulted from the random scheduling of too many jobs.
8. Mr Samir overtime resulted from the need to finish the job as required by the customer. The customer paid for the special service.
9. Mr Hussien received the guaranteed minimum wage equals $ 1728 (144 hours X 12 per hour).
10. During March Mr Tariq was idle for 5 hours because of setting up a new job (normal idle time).
11. Social security taxes withheld for all employees are $ 500.
12. Income taxes withheld for all employees are $ 300.

Factory overhead information:

13. In addition to the indirect materials and indirect labour, the company incurred the following additional factory overhead for the month of March:
    - Utilities expense..... $ 1,000
    - Factory rent expense..... $ 1,500
    - Depreciation of factory equipment.. $ 1,000

14. Factory overhead is applied to production at a rate of 200% of direct labour dollars (i.e. the factory overhead application rate).

Additional information:

15. Inventories were as follows:

	1/3/2012	31/3/2010
Direct raw materials inventory	(see information 1)	$???
Work-in-process inventory	$ 200,000	$ 100,000
Finished goods inventory	$ 270,000	$ 150,000

16. Selling expenses were $ 40,000.
17. General and administrative expenses were $ 80,000.
18. 20,000 units were produced during the year.
19. Sales for the year were $ 1,750,000.

Required:

A. Using the materials information: (18 mark)

1) Determine the cost of direct materials issued and the cost of the ending direct materials inventory by using the LIFO method.

2) Prepare two journal entries to record the purchase and issuance of direct materials (one entry to record the total costs of direct materials purchased during March and another entry to record total costs of direct materials issued). Assume that all purchases were in cash.

3) Prepare the journal entries to record the purchase and issuance of indirect materials.

B. Using the labour information: (17 Mark)

4) Prepare journal entries to record the payroll for the month of March.

5) Prepare the journal entry to record The employee taxes and pay the payroll for the month of March.

C. Using the factory overhead information: (15 mark)

6) Prepare the journal entry to record the additional factory overhead actually incurred during the month of March.

7) Prepare the journal entry to record the applied factory overhead for the month of March.

8) Prepare the journal entry to record the over- or underapplied factory overhead (i.e. closing the FOH control and FOH applied accounts).

9) Close the over- or underapplied factory overhead account to the Cost of Goods Sold account.

D. Using the additional information and your answers for A, B, and C: (20 Mark)

10) Prepare a combined statement of cost of goods manufactured and cost of goods sold for the month of March 2012.

11) Compute the net income or loss for the month of March 2012.

12) Compute the following:

i. Prime costs
ii. Conversion costs

iii. Product costs
iv. Period costs
v. Unit cost

With best wishes

Dr Hazem Ramadan

Sohag University | **Third Year** | **Time: Three hours**
Faculty of Commerce | **Cost Accounting (1)** | **Four Pages**
Accounting Department (English) | **January 2014**

Question 1: **(**25 Mark)

The Blackwell Clock Company has the following information for year 2010:

1- Sales for the year were $ 1,350,000.
2- Inventories were as follows:

	1/1/2010	**31/12/2010**
Raw materials inventory	$ 200,000	$ 150,000
Work-in-process inventory	$ 115,000	$ 100,000
Finished goods inventory	$ 70,000	$ 50,000

3- The company purchased materials for the year equal to $ 400,000.
4- Costs for the period were as follows:
   a. Total materials put into production (80% direct materials) ???
   b. Total labor costs (25% indirect labor) $ 500,000
   c. Factory overhead 125% of direct labor
5- Selling expenses were $ 30,000.
6- General and administrative expenses were $ 60,000.
7- 125000 units were produced during the year.

Required:

b) Prepare the cost of goods manufactured statement.
c) Prepare the cost of goods sold statement.
d) Compute the net income or loss.
e) Compute the following:
   1- Prime costs
   2- Conversion costs
   3- Product costs
   4- Period costs
   5- Unit cost

Question 2: (20 Mark)

The Golden Arrow Corporation uses a perpetual inventory system. The direct materials beginning inventory, purchases, and issuance for the current year is as follows:

	Date	Units purchased	Total purchase costs	Units issued to Job 101
Opening inventory	01-Jan	5000	130000	
	02-Mar	6550	183400	
	09-May	—	—	5900
	11-Jul	4640	139200	
	01-Sep	—	—	3050
	06-Oct	3810	121920	
	17-Dec	—	—	2300

Required:

1- Using the Weighted Average method, determine the cost of direct materials issued and the cost of the ending direct materials inventory.

2- Prepare two journal entries to record the purchase and issuance of direct materials (one entry to record the total costs of direct materials purchased and another entry to record total costs of direct materials issued). Assume that all purchases were in cash.

3- Prepare the journal entries to record the purchase and issuance of indirect materials given that the corporation purchased on account 10000 units of indirect materials costing $ 20 per unit and placed into production (issued) 6000 units.

Question 3: (20 Mark)

Sohag Corporation accumulated the following payroll data for the week ending May 17:

Employee	Hours worked	Base rate per hour
Ahmed	42	8
Mohamed	54	10
Samy	50	10
Emad	35	12
Tariq	42	13

Additional information:

1- The union contract requires that employees receive time and a half for any hours worked above 42 hours per week.

2- The union contract requires that employees receive a minimum guaranteed wage equals to 38 hours multiplied by the base rate per hour.

3- Mr Ahmed worked the night shift and will receive an additional $ 3 per hour above his $ 8 base rate. He worked the entire week on Job 1.

4- Mr Mohamed worked 36 hours on Job 2 and 18 hours on Job 3. Mr Ahmed overtime resulted from the random scheduling of too many jobs.

5- Mr Samy had to work overtime because he had to correct his own poor workmanship on Job 5.

6- Mr Emad worked the entire week on Job 6 and received the guaranteed minimum wage equals $456 (38 hours X 12 per hour).

7- Mr Tariq is a sales person and worked the entire week in the sale department.
8- Social security taxes withheld for all employees are $ 100.
9- Income taxes withheld for all employees are $ 120.

Required: Prepare journal entries to record the following for the week of May 17:

a) The payroll
b) The employee taxes and pay the payroll

Question 4: (35 Mark)

Aberdeen Company has three service departments (S1, S2, and S3) and two production departments (P1 and P2). The following information has been prepared for the year 2012:

Department	Budgeted costs	Square feet	Total labor hours
S1	$ 120,000	1,500	100,000
S2	$ 96,000	2,000	300,000
S3	$ 104,000	1,000	200,000
P1	$ 1,500,000	4,000	300,000
P2	$ 1,700,000	3,000	400,000
Total	$ 3,520,000	11,500	1300,000

The costs of the service departments S1 and S2 are allocated on the basis of square feet and total labour hours, respectively.

The costs of the service department S3 are allocated on the basis of percentage of services rendered: 60% for P1, and 40% for P2.

Required:

c) Using the step method:
   4- Allocate the total costs of the service departments to the producing departments (Allocate S1 first, then S2, and finally S3).
   5- Compute the factory overhead application rates for the producing departments. The producing departments use estimated direct labor hours: 200,000 in P1 and 300,000 in P2.
   6- Compute the applied factory overhead for department P1 given that the actual direct hours for the month of March was 50,000 hours.
   7- Prepare the journal entry to record the applied factory overhead.
   8- Compute the over- or underapplied factory overhead for department P1 if the actual factory overhead for department P1 was $ 500,000 for the month of March.
   9- Prepare the journal entries to record the actual factory overhead and the over- or underapplied factory overhead (closing the FOH control and FOH applied accounts).
   10- Close the over- or underapplied factory overhead account to the Cost of Goods Sold account.
d) Allocate the total costs of the service departments to the producing departments using the Algebraic method and Compute the factory overhead application rates for the producing departments. The producing departments use estimated direct labor hours: 200,000 in P1 and 300,000 in P2.

Question (1):

The New Qena Company has the following information for year 2012:

8- Sales for the year were $ 1,400,000.
9- Inventories were as follows:

	1/1/2012	31/12/2012
Raw materials inventory	$ 150,000	$ 135,000
Work-in-process inventory	$ 100,000	$ 120,000
Finished goods inventory	$ 80,000	$ 70,000

10- The company purchased materials for the year equal to $ 350,000.
11- All raw materials are considered direct materials.
12- Costs for the period were as follows:
   a. Direct materials ???
   b. Direct labor $ 350,000
   c. Factory overhead 120% of direct labor
13- Selling expenses were $ 40,000.
14- General and administrative expenses were $ 60,000.

Required:

f) Prepare the cost of goods manufactured statement.
g) Prepare the cost of goods sold statement.
h) Compute the net income or loss.
i) Compute the following:
   1- Prime costs
   2- Conversion costs
   3- Product costs
   4- Period costs

Question (2):

The Golden Arrow Corporation uses a perpetual inventory system. The beginning materials inventory, purchases, and issuance for the current year is as follows:

1 January: The opening materials inventory was 195 units with a total cost equals $ 1950.
15 February: 465 units were purchased in cash with a total cost equals $ 6510.
22 February: 400 units were issued to the production department.
25 May: 270 units were purchased on account with a total cost equals $ 4860.

15 July: 315 units were purchased in cash with a total cost equals $ 6300.
10 August: 600 units were issued to the production department.
25 November: 435 units were purchased on account with a total cost equals $ 9570.
8 December: 500 units were issued to the production department.

Required: Using the Weighted Average method, determine the cost of materials issued and the cost of the ending materials inventory.

Question (3):

Sohag Corporation accumulated the following payroll data for the week ending March 17:

1- Mr Ahmed worked 40 hours with a base rate of $ 10 per hour. He worked the night shift and will receive an additional $ 4 per hour above his $ 10 base rate. He worked the entire week on Job 1.
2- Mr Mohamed worked 50 hours with a base rate of 12. He worked 35 hours on Job 2 and 15 hours on Job 3. Mr Ahmed overtime resulted from the random scheduling of too many jobs.
3- Mr Mostafa worked 40 hours with a base rate of $ 14. However, Mr Mostafa worked 38 hours on Job 4 while the rest of the time he was idle because of setting up a new job (normal idle time).

Additional information:

10- The union contract requires that employees receive time and a half for any hours worked above 40 hours per week.
11- Social security taxes withheld are $ 80.
12- Income taxes withheld are $ 100.

Required: Prepare journal entries to record the following for the week of March 17:

c) The payroll
d) The employee taxes and pay the payroll

Question (4):

Aberdeen Company has two service departments and two production departments:

Service Departments' budgeted total costs:
S1 ..... $ 28,000
S2 ..... $ 22,000
Producing Departments' budgeted factory overhead costs:
P1 ..... $ 105,000
P2 ..... $ 96,000

The costs of the service department S1 are allocated on the basis of square feet. The square feet of the departments are as follow:

Department	Square feet
S1	3,000
S2	3,600
P1	4,000
P2	6,000
Total	16,600

The costs of the service department S2 are allocated on the basis of percentage of services rendered: 47% for S1, 30% for P1, and 23% for P2.

Required:

e) allocate the total costs of the service departments to the producing departments by using the following:
   11- Step method (Allocate S1 first)
   12- Algebraic method

f) Compute the factory overhead application rates for the producing departments in both methods. The producing departments use estimated direct labor hours: 3000 in P1 and 2500 in P2.