FUNDAMENTAL COSTING AND CONTROL

PART 2

CHAPTER

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CHAPTER 5

Product and Service Costing: Job-Order System

AFTER STUDYING THIS CHAPTER, YOU SHOULD BE ABLE TO:

1. Differentiate the cost accounting systems of service and manufacturing firms and of unique and standardized products.
2. Discuss the interrelationship of cost accumulation, cost measurement, and cost assignment.
3. Explain the difference between job-order and process costing, and identify the source documents used in job-order costing.
4. Describe the cost flows associated with job-order costing, and prepare the journal entries.
5. Explain why multiple overhead rates may be preferred to a single, plantwide rate.
6. Explain how spoilage is treated in a job order costing stystem.

Now that we have an understanding of basic cost terminology and the ways of applying overhead to production, we need to look more closely at the system that the firm sets up to account for costs. In other words, we need to determine how we accumulate costs and associate them with different cost objects.

Characteristics of the Production Process

In general, a firm's cost management system mirrors the production process. A cost management system modeled after the production process allows managers to better monitor the economic performance of the

firm. A production process may yield a tangible product or a service. Those products or services may be similar in nature or unique. These characteristics of the production process determine the best approach for developing a cost management system.

OBJECTIVE 1

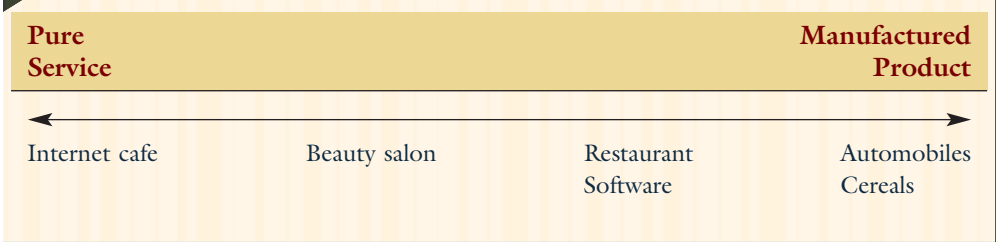
Differentiate the cost accounting systems of service and manufacturing firms and of unique and standardized products.

Manufacturing Firms versus Service Firms

Manufacturing involves joining together direct materials, direct labor, and overhead to produce a new product. The good produced is tangible and can be inventoried and transported from the plant to the customer. A service is characterized by its intangible nature. It is not separable from the customer and cannot be inventoried. Traditional cost accounting has emphasized manufacturing and virtually ignored services. Now, more than ever, that approach will not do. Our economy has become increasingly service oriented. Managers must be able to track the costs of services rendered just as precisely as they must track the costs of goods manufactured. In fact, a company's controller may find it necessary to cost both goods and services as managers take an internal customer approach.

The range of manufacturing and service firms can be represented by a continuum as shown in Exhibit 5-1. The pure service is shown at the left. The pure service involves no raw materials and no tangible item for the customer. There are few pure services. Perhaps an example would be an Internet cafe. In the middle of the continuum and still very much a service is a beauty salon, which uses direct materials on customers when performing the service, e.g., hair spray and styling gel. At the other end of the continuum is the manufactured product. Examples include automobiles, cereals, cosmetics, and drugs. Even these, however, often have a service component. For example, a prescription drug must be prescribed by a physician and dispensed by a licensed pharmacist. Automobile dealers stress the continuing service associated with their cars. And how would we categorize food services? Does **Taco Bell** provide a product or a service? There are elements of both.

EXHIBIT 5-1 Continuum of Services and Manufactured Products



Four areas in which services differ from products are intangibility, inseparability, heterogeneity, and perishability. **Intangibility** refers to the nonphysical nature of services as opposed to products. **Inseparability** means that production and consumption are inseparable for services. **Heterogeneity** refers to the greater chances for variation in the performance of services than in the production of products. **Perishability** means that services cannot be inventoried but must be consumed when performed. These differences affect the types of information needed for planning, control, and decision making in the production of services. Exhibit 5-2 illustrates the features associated with the production of services and their interface with the cost management system.

Intangibility of services leads to a major difference in the accounting for services as opposed to products. A service company cannot inventory the service and therefore has a minimal to moderate inventory of supplies. A manufacturing company has inventories

EXHIBIT 5-2 Features of Service Firms and Their Interface with the Cost Management System

Feature*	Relationship to Business*	Impact on Cost Management System
Intangibility	Services cannot be stored.	There are no inventory accounts.
	Services cannot be protected through patents.	There is a strong ethical code.
	Services cannot readily be displayed or communicated.	
	Prices are difficult to set.	Costs must be related to entire organization.
Inseparability	Consumer is involved in production.	Costs are accounted for by customer type.
	Other consumers are involved in production.	
	Centralized mass production of services is difficult.	System must be generated to encourage consistent quality.
Heterogeneity	Standardization and quality control are difficult.	A strong systems approach is needed.
		Productivity measurement is ongoing.
		TQM is critical.
Perishability	Service benefits expire quickly.	There are no inventories.
	Service may be repeated often for one customer.	There needs to be a standardized system to handle repeat customers.

*First two columns adapted from Valarie Zeithaml, A. Parasuraman, and Leonard L. Berry, "Problems and Strategies in Services Marketing," *Journal of Marketing* 49 (Spring 1985): 34–46.

of raw materials, supplies, work in process, and finished goods. Because of the significance and complexity of inventories in manufacturing, we will spend more time on manufacturing companies in accounting for the cost of inventories.

Service companies typically rank lower than manufacturing companies in ratings of customer satisfaction.[1] An important reason for this is that service firms have a greater degree of heterogeneity of labor. Service firms are keenly aware of the importance of human resources; the service is provided by people. A key assumption of microeconomics is the homogeneity of labor. That is, one direct laborer is assumed to be identical to another. This assumption is the basis of labor standards in standard costing. Service companies know that one worker is not identical to another. For example, **Walt Disney World** hires "backstage employees" and "on-stage employees." The backstage employees may do maintenance, sew costumes, and work in personnel (called "central casting"), but they do not work with the paying public (called guests). On-stage employees, hired both for their particular skills and their ability to interact well with peo-

1. Jaclyn Fierman, "Americans Can't Get No Satisfaction," *Fortune* (December 11, 1995): 186–194.

ple, work directly with the guests. A further aspect of labor heterogeneity is that a worker is not the same from one day to the next. Workers can be affected by the job undertaken, the mix of other individuals with whom they work, their education and experience, and personal factors such as health and home life. These factors make the provision of a consistent level of service difficult. The measurement of productivity and quality in a service company must be ongoing and sensitive to these factors.

Inseparability means that differences in customers affect the service firm more than the manufacturing firm. When **Proctor-Silex** sells a toaster, the mood and personal qualities of the customer are irrelevant. When **Memorial Sloan-Kettering Hospital** sells a service to a customer, however, the disposition of the customer may affect the amount of service required as well as the quality of the service rendered. Inseparability also means that customers evaluate services differently from products. As a result, service companies may need to spend more money on some resources and less on others than would be necessary in a manufacturing plant. For example, consumers may use price and physical facilities as the major cues to service quality. Service firms, then, tend to incur higher costs for attractive places of business than do manufacturing firms. Your initial impression of a manufacturing plant may be how large, noisy, and dingy it is. Floors are concrete; the ceiling is typically unfinished. In short, it is not a pretty sight. However, as long as a high-quality product is made, the consumer does not care. This is very different from most consumers' attitudes toward the service environment. Banks, doctors' offices, and restaurants are pleasant places, tastefully decorated, and filled with plants. This is cost effective to the extent that customers are drawn to such an environment to conduct business. In addition, the environment may allow the service firm to charge a higher price—signaling its higher quality.

Perishability of services is very similar to intangibility. For example, there are no work-in-process or finished goods inventories of services. However, there is a subtle distinction between intangibility and perishability that merits discussion. A service is perishable if the effects are short term. Not all services fall into this category. Plastic surgery is not perishable, but haircuts are. The impact on cost management is that perishable services require systems to easily handle repeat customers. The repetitive nature of the service also leads us to the use of standardized processes and costing. Examples are financial services (e.g., check clearing by banks), janitorial services, and beauty and barber shops.

Customers may perceive greater risk when buying services than when buying products. Ethics are important here. The internal accountant who is responsible for gathering data on service quality must accurately report the bad news as well as the good. A customer who has been stung once by misleading advertising or a firm's failure to deliver the promised performance will be loathe to try that firm again. A manufacturer can offer a warranty or product replacement. But the service firm must consider the customer's wasted time. Therefore, the service firm must be especially careful to avoid promising more than can or will be delivered. Consider the example of **Lexus,** which discovered a defect shortly after introducing the car into the United States. Lexus dealers contacted each buyer personally and arranged for loaner cars while the defect was being fixed. In the case of buyers who lived far from a dealership, Lexus brought the repair people to the buyers. Contrast this experience with service experiences undergone by many **GM** buyers who must go through several layers of automotive hierarchy in order to get a defect repaired. Clearly, Lexus understood the value of customers' time in arranging the service.

Service companies are particularly interested in planning and control techniques that apply to their special types of firms. Productivity measurement and quality control are very important. Pricing may involve different considerations for the service firm.

The important point is that service and manufacturing companies may have different needs for accounting data and techniques. It is important for the accountant

to be aware of relevant differences in order to provide appropriate support. It is critical that the accountant be cross-functionally trained. Take **McDonald's** as an example. Is this a manufacturing or service entity? In the kitchen, McDonald's runs a production line. The product is rigidly consistent. Each hamburger contains the same amount of meat, mustard, ketchup, and pickles. The buns are identical. The burgers are cooked the prescribed amount of time to the right temperature. They are wrapped in a methodical manner and join other burgers in the warming bin. Standard cost accounting techniques work well for this phase, and McDonald's uses them. At the counter, however, the company becomes a service organization. Customers want their orders taken and filled quickly and correctly. In addition, they want pleasant service and maybe some help finding certain items on the menu. Clean restrooms are critical. McDonald's emphasizes nonfinancial measures of performance for service areas: counter customers are to be served within 60 seconds; drive-through customers are to be served within 90 seconds; restrooms are to be checked and cleaned at least once an hour.

Unique versus Standardized Products and Services

A second way of characterizing products and services is according to the degree of uniqueness. If a firm produces unique products in small batches, and if those products incur different costs, then the firm must keep track of the costs of each product or batch. This is referred to as a job-order costing system, the focus of this chapter. At the other extreme, the company may make many identical units of the same product. Since the units are the same, the costs of each unit are also the same. Accounting for the costs of the identical units is relatively easy and is referred to as a process-costing system, examined in Chapter 6.

It is important to note that the uniqueness of the products (or units) for cost accounting purposes relates to unique costs. Consider a large construction company that builds houses in developments across the Midwest. While the houses are based on several standard models, buyers can customize their houses by selecting different types of brick, tile, carpet, and so on. However, these selections are taken from a set menu of choices. Therefore, while one house is painted white and its neighbor house is painted green, the cost is the same. However, if different selections have different costs, then those costs must be accounted for separately. Thus, if one home buyer selects a whirlpool tub while another selects a standard model, the different cost of the two tubs must be tracked to the correct house. As one builder said, "All we can do is offer choices and keep close track of our costs."[2] Therefore, a production process that appears to produce similar products may incur different costs for each product. In this type of situation, the firm should track costs using a job-order costing system.

Both service and manufacturing firms use the job-order costing approach. Custom-cabinet makers and home builders manufacture unique products, which must be accounted for using a job-order costing approach. Dental and medical services also use job-order costing. The costs associated with a simple dental filling clearly differ from those associated with a root canal. Printing, automotive repair, and appliance repair are also services using job-order costing.

Firms in process industries mass-produce large quantities of similar, or homogeneous, products. Each product is essentially indistinguishable from its companion product. Examples of process manufacturers include food, cement, petroleum, and chemical firms. The important point here is that the cost of one product is identical to the cost of another. Therefore, service firms can also use a process-costing ap-

2. June Fletcher, "New Developments: Same Frames, One-of-a-Kind Frills," *The Wall Street Journal* (September 8, 1995): B1, B8.

proach. Discount stockbrokers, for example, incur much the same cost to execute a customer order for one stock as for another; check-clearing departments of banks incur a uniform cost to clear a check, no matter the value of the check or to whom it is written.

Interestingly, companies are gravitating toward job-order costing because of the increased variety of products. Improved technology is making customization possible. For example, Israel's **Indigo, Ltd.**, a new Omnium One-Shot Color printing system, makes it possible to print cans, bottles, labels, etc., in smaller lots than ever before. The Omnium machine could be used to print soft drink cans customized for weekend tailgate parties ("Ride 'em, Cowboys!"), or to print coordinated kitchen curtains and tiles. [3] Thus, a combination of customer demand for specialized products, flexible manufacturing, and improved information technology has led world-class manufacturers to approximate a job-order environment.

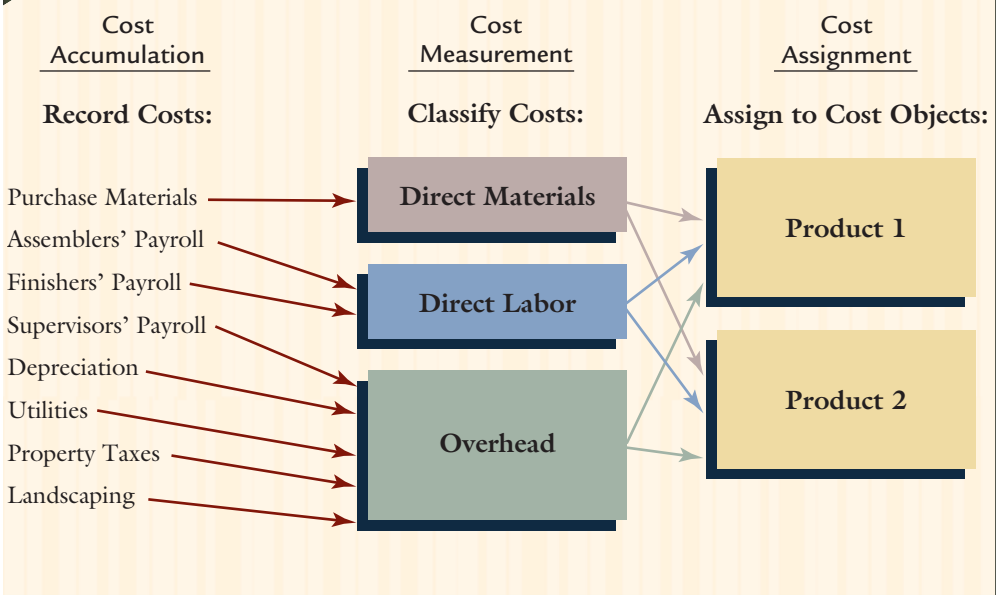
OBJECTIVE 2

Discuss the interrelationship of cost accumulation, cost measurement, and cost assignment.

Setting Up the Cost Accounting System

Given the characteristics of a firm's production process, it is time to set up the system to be used in generating appropriate cost information. A good cost accounting information system is flexible and reliable. It provides information for a variety of purposes and can be used to answer different types of questions. In general, the system is used to satisfy the needs for cost accumulation, cost measurement, and cost assignment. **Cost accumulation** is the recognition and recording of costs. **Cost measurement** involves determining the dollar amounts of direct materials, direct labor, and overhead used in production. **Cost assignment** is the association of production costs with the units produced. Exhibit 5-3 illustrates the relationship of cost accumulation, cost measurement, and cost assignment.

EXHIBIT 5-3 Relationship of Cost Accumulation, Cost Measurement, and Cost Assignment



3. Peter Coy and Neal Sandler, "A Package for Every Person," *Business Week* (February 6, 1995): 44.

COST MANAGEMENT Technology in Action

Enterprise resource planning (ERP) systems are very useful in job-order firms. These programs, used to manage people and materials, can track the availability of various materials and are used to input new orders into the system and arrange them so as to get the fastest delivery. The furniture manufacturing industry is one that has taken to ERP to coordinate and speed up its job-order manufacturing systems.

Previously, ordering furniture was a lengthy and frustrating experience. Typically, a customer browsed in a furniture store and selected a sofa or dining room set. Then, various options were considered and entered into the order (for example, the fabric and frame style of the sofa). The order was submitted to the manufacturer, and the customer was told that the order would be ready in three months or so. Four or five months later, the order was often still not in—and information on its progress was difficult, if not impossible, to come by.

Let's fast-forward to today's furniture-buying experience. Consider **Bassett Furniture Industries, Inc.**, a leading manufacturer of a wide variety of home furnishings—including bedroom and dining room suites, tables, entertainment units, upholstered furniture, and mattress sets. Bassett operates in 11 states and 33 foreign countries; it coordinates its manufacturing and selling processes with **JD Edwards**' ERP system. A Bassett sales representative, working directly with a customer, can access real time data to find out if a desired frame or fabric is in stock. The order can be placed, and the representative can see immediately when the piece will be manufactured and delivered. At any point in time, the progress of the order can be tracked and the customer kept up to date. Dave Bilyeu, CIO for Bassett Furniture, says, "With JD Edwards' software, we can provide our customers with a new level of service, which translates into a competitive advantage."

Source: Taken from JD Edwards' Customer Profile on Bassett Furniture Industries, Inc.

Cost Accumulation

Cost accumulation refers to the recognition and recording of costs. The cost accountant needs to develop source documents which keep track of costs as they occur. A **source document** describes a transaction. Data from these source documents can then be recorded in a database. The recording of data in a database allows accountants and managers the flexibility to analyze subsets of the data as needed to aid in management decision making. The cost accountant can also use the database to see that the relevant costs are recorded in the general ledger and posted to appropriate accounts for purposes of external financial reporting.

Well-designed source documents can supply information in a flexible way. In other words, the information can be used for multiple purposes. For example, the sales receipt written up or input by a clerk when a customer buys merchandise lists the date, the items purchased, the quantities, the prices, the sales tax paid, and the total dollar amount received. Just this one source document can be used in determining sales revenue for the month, the sales by each product, the tax owed to the state, and the cash received or the accounts receivable recorded. Similarly, employees often fill in labor time tickets, indicating which jobs they worked on, on what date, and for how long. Data from the labor time ticket can be used in determining direct labor cost used in production, the amount to pay the worker, the degree of productivity improvement achieved over time, and the amount to budget for direct labor for an upcoming job.

Cost Measurement

Accumulating costs simply means that costs are recorded for use. We must classify or organize these costs in a meaningful way and then associate these costs with the units produced. Cost measurement refers to classifying the costs; it consists of determining the dollar amounts of direct materials, direct labor, and overhead used in production. The dollar amounts may be the actual amounts expended for the manufacturing inputs or they may be estimated amounts. Often, bills for overhead items arrive after the unit

cost must be calculated; therefore, estimated amounts are used to ensure timeliness of cost information and to control costs.

The two commonly used ways to *measure* the costs associated with production are actual costing and normal costing. Actual costing requires the firm to use the actual cost of all resources used in production to determine unit cost. While intuitively reasonable, this method has drawbacks, as we shall see. The second method, normal costing, requires the firm to apply actual costs of direct materials and direct labor to units produced. However, overhead is applied based on a predetermined estimate. Normal costing, introduced in Chapter 4, is more widely used in practice; it will be further discussed in this chapter.

Actual versus Normal Costing

An **actual cost system** uses actual costs for direct materials, direct labor, and overhead to determine unit cost. In practice, strict actual cost systems are rarely used because they cannot provide accurate unit cost information on a timely basis. Per-unit computation of the direct materials and direct labor costs is not the source of the difficulty. Direct materials and direct labor can be traced to units produced. The main problem with using actual costs for calculation of unit cost is with manufacturing overhead. There are three reasons why this is so.

First, a traditional system applies overhead using unit-level drivers. However, many overhead items cannot be traced to units of production. Depreciation on plant and equipment, purchasing, and receiving are costs that are not associated with unit-level drivers. Activity-based costing is a way of overcoming this difficulty by using multiple drivers—both unit-level and non-unit-level.

Second, many overhead costs are not incurred uniformly throughout the year. Thus, they can differ significantly from one period to the next. For example, a factory located in the Northeast may incur higher utilities costs in the winter as it heats the factory. Even if the factory always produced 10,000 units a month, the per-unit overhead cost in December would be higher than the per-unit overhead cost in June. As a result, one unit of product costs more in one month than another, even though the units are identical, and the production process is the same. The difference in the per-unit overhead cost is due to overhead costs that were incurred nonuniformly.

The third reason is that per-unit overhead costs fluctuate dramatically because of nonuniform production levels. For example, suppose a factory has seasonal production. Perhaps it produces 10,000 units in March, but 30,000 units in September as it gears up for the Christmas buying season. Then, if all other costs remain the same, month to month, the per-unit overhead of the product would be approximately three times as high in March as in September. Again, the units are identical; the production process is the same.

The problem of fluctuating per-unit overhead costs can be avoided if the firm waits until the end of the year to assign the overhead costs. Unfortunately, waiting until the end of the year to compute an overhead rate is unacceptable. A company needs unit cost information throughout the year. This information is needed on a timely basis both for interim financial statements and to help managers make decisions such as pricing. Most decisions requiring unit cost information simply cannot wait until the end of the year. Managers must react to day-to-day conditions in the marketplace in order to maintain a sound competitive position.

Normal costing solves these problems associated with actual costing. A cost system that measures overhead costs on a predetermined basis and uses actual costs for direct materials and direct labor is called a **normal costing system**. Predetermined overhead or activity rates are calculated at the beginning of the year and are used to apply overhead to production as the year goes on. Any difference between actual and applied overhead is handled as an overhead variance. Chapter 4 explained the treatment of overhead variances.

Virtually all firms assign overhead to production on a predetermined basis. This fact seems to suggest that most firms successfully approximate the end-of-the-year overhead rate. Thus, the measurement problems associated with the use of actual overhead costs are solved by the use of estimated overhead costs. A job-order costing system that uses actual costs for direct materials and direct labor and estimated costs for overhead is called a *normal job-order costing system*.

Cost Assignment

Once costs have been accumulated and measured, they are assigned to units of product manufactured or units of service delivered. Unit costs are important for a wide variety of purposes. For example, bidding is a common requirement in markets for custom homes and industrial buildings. It is virtually impossible to submit a meaningful bid without knowing the costs associated with the units to be produced. Product cost information is vital in a number of other areas as well. Decisions concerning product design and introduction of new products are affected by expected unit costs. Decisions to make or buy a product, to accept or reject a special order, or to keep or drop a product line require unit cost information.

In its simplest form, computing the unit manufacturing or service cost is easy. The unit cost is the total product cost associated with the units produced divided by the number of units produced. For example, if a toy company manufactures 100,000 tricycles and the total cost of direct materials, direct labor, and overhead for these tricycles is $1,500,000, then the cost per tricycle is $15 ($1,500,000/100,000). Although the concept is simple, the practical reality of the computation is more complex and breaks down when there are products that differ from one another or when the company needs to know the cost of the product before all of the actual costs associated with its production are known.

Importance of Unit Costs to Manufacturing Firms

Unit cost is a critical piece of information for a manufacturer. Unit costs are essential for valuing inventory, determining income, and making a number of important decisions.

Disclosing the cost of inventories and determining income are financial reporting requirements that a firm faces at the end of each period. In order to report the cost of its inventories, a firm must know the number of units on hand and the unit cost. The cost of goods sold, used to determine income, also requires knowledge of the units sold and their unit cost.

Whether or not the unit cost information should include all manufacturing costs depends on the purpose for which the information is going to be used. For financial reporting, full or absorption unit cost information is required. If a firm is operating below its production capacity, however, variable cost information may be much more useful in a decision to accept or reject a special order. Simply put, unit cost information needed for external reporting may not supply the information necessary for a number of internal decisions, especially those decisions that are short run in nature. Different costs are needed for different purposes.

It should be pointed out that full cost information is useful as an input for a number of important internal decisions as well as for financial reporting. In the long run, for any product to be viable, its price must cover its full cost. Decisions to introduce a new product, to continue a current product, and to analyze long-run prices are examples of important internal decisions that rely on full unit cost information.

Importance of Unit Costs to Nonmanufacturing Firms

Service and nonprofit firms also require unit cost information. Conceptually, the way companies accumulate and assign costs is the same whether or not the firm is a manufacturing firm. The service firm must first identify the service "unit" being provided. In

an auto repair shop, the service unit would be the work performed on an individual customer's car. Because each car is different in terms of the work required (an oil change versus a transmission overhaul, for example), the costs must be assigned individually to each job. A hospital would accumulate costs by patient, patient day, and type of procedure (e.g., X-ray, complete blood count test). A governmental agency must also identify the service provided. For example, city government might provide household trash collection and calculate the cost by truck run or by collection per house.

Service firms use cost data in much the same way that manufacturing firms do. They use costs to determine profitability, the feasibility of introducing new services, and so on. However, because service firms do not produce physical products, they do not need to value work-in-process and finished goods inventories. Of course, they may have supplies, and the inventory of supplies is simply valued at historical cost.

Nonprofit firms must track costs to be sure that they provide their services in a cost-efficient way. Governmental agencies have a fiduciary responsibility to taxpayers to use funds wisely. This requires accurate accounting for costs.

Production of Unit Cost Information

To produce unit cost information, both cost measurement and cost assignment are required. We have already considered two types of cost measurement systems, actual costing and normal costing. We have seen that normal costing is preferred because it provides information on a more timely basis. Shortly, we will address the cost assignment method of job-order costing. First, however, it is necessary to take a closer look at determining costs per unit.

Direct materials and direct labor costs are simply traced to units of production. There is a clear relationship between the amount of materials and labor used and the level of production. Actual costs can be used because the actual cost of materials and labor are known reasonably well at any point in time.

Overhead is applied using a predetermined rate based on budgeted overhead costs and budgeted amount of driver. Two considerations arise. One is the choice of the activity base or driver. The other is the activity level.

There are many different measures of production activity. In assigning overhead costs, it is important to select an activity base that is correlated with overhead consumption. This will ensure that individual products receive an accurate assignment of overhead costs. In a traditional costing system, a unit-level driver is used. Five commonly used unit-level drivers are:

1. Units produced
2. Direct labor hours
3. Direct labor dollars
4. Machine hours
5. Direct materials dollars or cost

The most obvious measure of production activity is output. If there is only one product, then overhead costs are clearly incurred to produce that product. In a single-product setting, the overhead costs of the period are directly traceable to the period's output. Clearly, for this case, units produced satisfies the cause-and-effect criterion. Most firms, however, produce more than one product. Since different products typically consume different amounts of overhead, this assignment method is inaccurate. At **Kraft**, for example, one plant produces salad dressing, ketchup, and marshmallow creme—each in a range of sizes from personal application packs to 32-ounce jars. In a multiple-product setting like this, overhead costs are common to more than one product, and different products may consume overhead at different rates.

The position taken in this text is that the assignment of overhead costs should follow, as nearly as possible, a cause-and-effect relationship. Efforts should be made to

identify those factors that cause the consumption of overhead. Once identified, these causal factors, or *activity drivers*, should be used to assign overhead to products. It seems reasonable to argue that for products using the lathe, machine hours reflect differential machine time and consequently the consumption of machine cost. Units produced does not necessarily reflect machine time or consumption of the machine cost; therefore, it can be argued that machine hours is a better activity driver and should be used to assign this overhead cost.

As this example illustrates, activity measures other than units of product are needed when a firm has multiple products. The last four measures listed earlier (direct labor hours, direct labor dollars, machine hours, and direct materials dollars or cost) are all useful for multiple-product settings. Some may be more useful than others, depending on how well they correlate with the actual overhead consumption. As we will discuss later, it may even be appropriate to use multiple rates.

Choosing the Activity Level

Now that we have determined which measure of activity to use, we still need to predict the level of activity usage that applies to the coming year. Although any reasonable level of activity could be chosen, the two leading candidates are expected actual activity and normal activity. **Expected activity level** is simply the production level the firm expects to attain for the coming year. **Normal activity level** is the average activity usage that a firm experiences in the long term (normal volume is computed over more than one year).

For example, assume that Paulos Manufacturing expects to produce 18,000 units next year and has budgeted overhead for the year at $216,000. Exhibit 5-4 gives the data on units produced by Paulos Manufacturing for the past four years, as well as the expected production for next year. If expected actual capacity is used, Paulos Manufacturing will apply overhead using a predetermined rate of $12 ($216,000/18,000). However, if normal capacity is used, then the denominator of the equation for predetermined overhead is the average of the past four years of activity, or 20,000 units [(22,000 + 17,000 + 21,000 + 20,000)/4]. Then the predetermined overhead rate to be used for the coming year is $10.80 ($216,000/20,000).

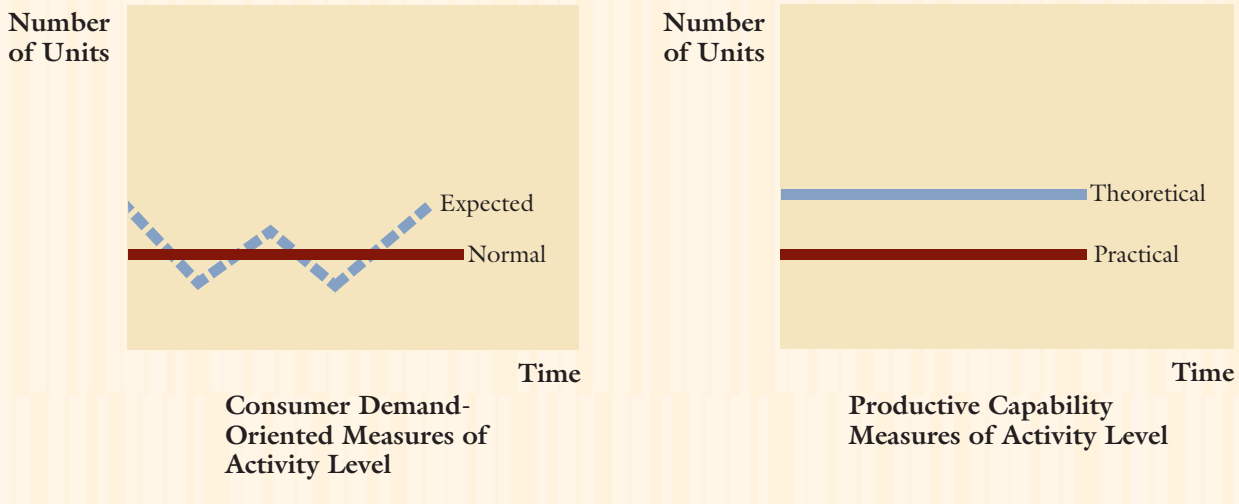
EXHIBIT 5-4 **Paulos Manufacturing Data**

Year	Units Produced
Year 1	22,000
Year 2	17,000
Year 3	21,000
Year 4	20,000
Expected for next year	18,000

Which choice is better? Of the two, normal activity has the advantage of using much the same activity level year after year. As a result, it produces less fluctuation from year to year in the assignment of per-unit overhead cost. Of course, if activity stays fairly stable, then the normal capacity level is roughly equal to the expected actual capacity level.

Other activity levels used for computing predetermined overhead rates are those corresponding to the theoretical and practical levels. **Theoretical activity level** is the absolute maximum production activity of a manufacturing firm. It is the output that can be realized if everything operates perfectly. **Practical activity level** is the maximum output that can be realized if everything operates efficiently. Efficient operation allows for some imperfections such as normal equipment breakdowns, some shortages, and workers operating at less than peak capability. Normal and expected actual activities tend to reflect consumer demand, while theoretical and practical activities reflect a firm's production capabilities. Exhibit 5-5 illustrates these four measures of activity level.

EXHIBIT 5-5 Measures of Activity Level



Given budgeted overhead, an activity driver, and an activity level, a predetermined overhead rate can be computed and applied to production. Understanding exactly how overhead is applied is critical to understanding normal costing.

OBJECTIVE 3

Explain the difference between job-order and process costing, and identify the source documents used in job-order costing.

The Job-Order Costing System: General Description

As we have seen, manufacturing and service firms can be divided into two major industrial types based on the uniqueness of their product. The degree of product or service heterogeneity affects the way in which we track costs. As a result, two different cost assignment systems have been developed: job-order costing and process costing. Job-order costing systems will be described in this chapter.

Overview of the Job-Order Costing System

Firms operating in job-order industries produce a wide variety of products or jobs that are usually quite distinct from each other. Customized or built-to-order products fit into this category, as do services that vary from customer to customer. Examples of job-order

processes include printing, construction, furniture making, automobile repair, and beautician services. In manufacturing, a job may be a single unit such as a house, or it may be a batch of units such as eight tables. Job-order systems may be used to produce goods for inventory that are subsequently sold in the general market. Often, however, a job is associated with a particular customer order. The key feature of job-order costing is that the cost of one job differs from that of another job and must be monitored separately.

For job-order production systems, costs are accumulated by *job*. This approach to assigning costs is called a **job-order costing system**. In a job-order firm, collecting costs by job provides vital information for management. Once a job is completed, the unit cost can be obtained by dividing the total manufacturing costs by the number of units produced. For example, if the production costs for printing 100 wedding announcements total $300, then the unit cost for this job is $3. Given the unit cost information, the manager of the printing firm can determine whether the prevailing market price provides a reasonable profit margin. If not, then this may signal to the manager that the costs are out of line with other printing firms, and action can be taken to reduce costs. Alternatively, other types of jobs for which the firm can earn a reasonable profit margin might be emphasized. In fact, the profit contributions of different printing jobs offered by the firm can be computed, and this information can then be used to select the most profitable mix of printing services to offer.

In illustrating job-order costing, we will assume a normal costing measurement approach. The actual costs of direct materials and direct labor are assigned to jobs along with overhead applied using a predetermined overhead rate. *How* these costs are actually assigned to the various jobs, however, is the central issue. In order to assign these costs, we must identify each job and the direct materials and direct labor associated with it. Additionally, some mechanism must exist to allocate overhead costs to each job.

The document that identifies each job and accumulates its manufacturing costs is the **job-order cost sheet**. An example is shown in Exhibit 5-6. The cost accounting department creates such a cost sheet upon receipt of a production order. Orders are written up in response to a specific customer order or in conjunction with a production plan derived from a sales forecast. Each job-order cost sheet has a job-order number that identifies the new job.

In a manual accounting system, the job-order cost sheet is a document. In today's world, however, most accounting systems are automated. The cost sheet usually corresponds to a record in a work-in-process inventory master file. The collection of all job cost sheets defines a **work-in-process inventory file**. In a manual system, the file would be located in a filing cabinet, whereas in an automated system, it is stored electronically on magnetic tape or disk. In either system, the file of job-order cost sheets serves as a subsidiary work-in-process inventory ledger.

Both manual and automated systems require the same kind of data in order to accumulate costs and track the progress of a job. A job-order costing system must have the capability to identify the quantity of direct materials, direct labor, and overhead consumed by each job. In other words, documentation and procedures are needed to associate the manufacturing inputs used by a job with the job itself. This need is satisfied through the use of materials requisitions for direct material, time tickets for direct labor, and predetermined rates for overhead.

Materials Requisitions

The cost of direct materials is assigned to a job by the use of a source document known as a **materials requisition form**, illustrated in Exhibit 5-7 on page 194. Notice that the form asks for the description, quantity, and unit cost of the direct materials issued and, most importantly, for the job number. Using this form, the cost accounting de-

EXHIBIT 5-6 The Job-Order Cost Sheet

Job Number 16

For Benson Company
Date Ordered April 2, 2007
Item Description Valves
Date Completed April 24, 2007
Quantity Completed 100
Date Shipped April 25, 2007

Direct Materials		Direct Labor				Overhead		
Requisition Number	Amount	Ticket Number	Hours	Rate	Amount	Hours	Rate	Amount
12	$300	68	8	$6	$ 48	8	$10	$ 80
18	450	72	10	7	70	10	10	100
	$750				$118			$180

Cost Summary

Direct materials $750
Direct labor 118
Overhead 180
Total cost $1,048
Unit cost $10.48

partment can enter the total cost of direct materials directly onto the job-order cost sheet. If the accounting system is automated, the data are entered directly at a computer terminal, using the materials requisition forms as source documents. A program then enters the cost of direct materials onto the record for each job.

In addition to providing essential information for assigning direct materials costs to jobs, the materials requisition form may also have other data items such as requisition number, date, and signature. These data items are useful for maintaining proper control over a firm's inventory of direct materials. The signature, for example, transfers responsibility for the materials from the storage area to the person receiving the materials, usually a production supervisor.

No attempt is made to trace the cost of other materials, such as supplies, lubricants, and so on, to a particular job. You will recall that these indirect materials are assigned to jobs through the predetermined overhead rate.

Job Time Tickets

Direct labor also must be associated with each particular job. The means by which direct labor costs are assigned to individual jobs is the source document known as a **time ticket** (see Exhibit 5-8 on page 195). When an employee works on a particular job, she fills out a time ticket that identifies her name, wage rate, hours worked, and job number. These time tickets are collected daily and transferred to the cost

EXHIBIT 5-7 **Materials Requisition Form**

Materials Requisition
Number 678

Date April 8, 2007

Department Grinding

Job Number 62

Description	Quantity	Cost/Unit	Total Cost
Casing	100	$3	$300

Authorized Signature Jim Lawson

accounting department, where the information is used to post the cost of direct labor to individual jobs. Again, in an automated system, posting involves entering the data onto the computer.

Time tickets are used only for direct laborers. Since indirect labor is common to all jobs, these costs belong to overhead and are allocated using the predetermined overhead rate.

Overhead Application

Jobs are assigned overhead costs with the predetermined overhead rate. Typically, direct labor hours is the measure used to calculate overhead. For example, assume a firm has estimated overhead costs for the coming year of $900,000 and expected activity is 90,000 direct labor hours. The predetermined overhead rate is $900,000/90,000 direct labor hours = $10 per direct labor hour.

Since the number of direct labor hours charged to a job is known from time tickets, the assignment of overhead costs to jobs is simple once the predetermined rate has been computed. For instance, Exhibit 5-8 reveals that Ann Wilson worked a total of eight hours on Job 16. From this time ticket, overhead totaling $80 ($10 × 8 hours) would be assigned to Job 16.

What if overhead is assigned to jobs based on something other than direct labor hours? Then the other driver must be accounted for as well. That is, the actual amount used of the other driver (for example, machine hours) must be collected and posted to the job cost sheets. Employees must create a source document that will track the machine hours used by each job. A machine time ticket could easily accommodate this need.

EXHIBIT 5-8 Time Ticket

Time Ticket Number 68

Employee Number 45

Name Ann Wilson

Date April 12, 2007

Start Time	Stop Time	Total Time	Hourly Rate	Amount	Job Number
8:00	10:00	2	$6	$12	16
10:00	11:00	1	6	6	17
11:00	12:00	1	6	6	16
1:00	6:00	5	6	30	16

Approved by Jim Lawson
Department Supervisor

Unit Cost Calculation

Once a job is completed, its total manufacturing cost is computed by first totaling the costs of direct materials, direct labor, and overhead, and then summing these individual totals. The grand total is divided by the number of units produced to obtain the unit cost. (Exhibit 5-6 illustrates these computations.)

All completed job-order cost sheets of a firm can serve as a subsidiary ledger for the finished goods inventory. In a manual accounting system, the completed sheets would be transferred from the work-in-process inventory files to the finished goods inventory file. In an automated accounting system, an updating run would delete the finished job from the work-in-process inventory master file and add this record to the finished goods inventory master file. In either case, adding the totals of all completed job-order cost sheets gives the cost of finished goods inventory at any point in time.

As finished goods are sold and shipped, the cost records would be pulled (or deleted) from the finished goods inventory file. These records then form the basis for calculating a period's cost of goods sold.

OBJECTIVE 4

Describe the cost flows associated with job-order costing, and prepare the journal entries.

Job-Order Costing: Specific Cost Flow Description

Recall that cost flow is how we account for costs from the point at which they are incurred to the point at which they are recognized as an expense on the income statement. Of principal interest in a job-order costing system is the flow of manufacturing costs. Accordingly, we begin with a description of exactly how we account for the three manufacturing cost elements (direct materials, direct labor, and overhead).

A simplified job shop environment is used as the framework for this description. All Signs Company, recently formed by Bob Fredericks, produces a wide variety of customized

signs. Bob leased a small building and bought the necessary production equipment. For the first month of operation (January), Bob has finalized two orders: one for 20 street signs for a new housing development and a second for 10 laser-carved wooden signs for a golf course. Both orders must be delivered by January 31 and will be sold for manufacturing cost plus 50 percent. Bob expects to average two orders per month for the first year of operation.

Bob created two job-order cost sheets and assigned a number to each job. Job 101 is the street signs, and Job 102 is the golf course signs.

Accounting for Direct Materials

Since the company is beginning its business, it has no beginning inventories. To produce the 30 signs in January and retain a supply of direct materials on hand at the beginning of February, Bob purchases, on account, $2,500 of direct materials. This purchase is recorded as follows:

1.	Materials Inventory	2,500	
	Accounts Payable		2,500

Materials Inventory is an inventory account. It also is the controlling account for all raw materials. When materials are purchased, the cost of these materials "flows" into the materials inventory account.

From January 2 to January 19, the production supervisor used three requisition forms to remove $1,000 of direct materials from the storeroom. From January 20 to January 31, two additional requisition forms for $500 of direct materials were used. The first three forms revealed that the direct materials were used for Job 101; the last two requisitions were for Job 102. Thus, for January, the cost sheet for Job 101 would have a total of $1,000 in direct materials posted, and the cost sheet for Job 102 would have a total of $500 in direct materials posted. In addition, the following entry would be made:

2.	Work-in-Process Inventory	1,500	
	Materials Inventory		1,500

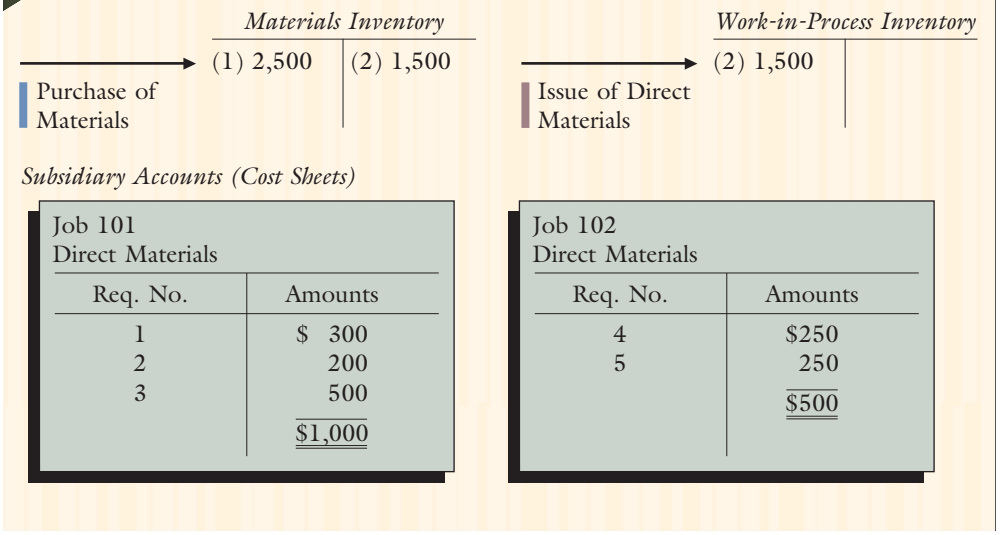
This second entry captures the notion of direct materials flowing from the storeroom to work in process. All such flows are summarized in the work-in-process inventory account as well as being posted individually to the respective jobs. Work-in-Process Inventory is a controlling account, and the job cost sheets are the subsidiary accounts. Exhibit 5-9 summarizes the direct materials cost flows. Notice that the source document that drives the direct materials cost flows is the materials requisition form.

Accounting for Direct Labor Cost

Since two jobs were in progress during January, time tickets filled out by direct laborers must be sorted by each job. Once the sorting is completed, the hours worked and the wage rate of each employee are used to assign the direct labor cost to each job. For Job 101, the time tickets showed 60 hours at an average wage rate of $10 per hour, for a total direct labor cost of $600. For Job 102, the total was $250, based on 25 hours at an average hourly wage of $10. In addition to the postings to each job's cost sheet, the following summary entry would be made:

3.	Work-in-Process Inventory	850	
	Wages Payable		850

EXHIBIT 5-9 Summary of Direct Materials Cost Flows



Subsidiary Accounts (Cost Sheets)

Job 101
Direct Materials

Req. No.	Amounts
1	$ 300
2	200
3	500
	$1,000

Job 102
Direct Materials

Req. No.	Amounts
4	$250
5	250
	$500

Source Documents: Materials Requisition Forms

EXHIBIT 5-10 Summary of Direct Labor Cost Flows

Work-in-Process Inventory Subsidiary Accounts (Cost Sheets)

Job 101
Labor

Ticket	Hours	Rate	Amount
1	15	$10	$150
2	20	10	200
3	25	10	250
	60		$600

Job 102
Labor

Ticket	Hours	Rate	Amount
4	15	$10	$150
5	10	10	100
	25		$250

Source Documents: Time Tickets

The summary of the direct labor cost flows is given in Exhibit 5-10. Notice that the direct labor costs assigned to the two jobs exactly equal the total assigned to Work-in-Process Inventory. Note also that the time tickets filled out by the individual laborers are the source of information for posting the labor cost flows. Remember that the labor cost flows reflect only direct labor cost. Indirect labor is assigned as part of overhead.

Accounting for Overhead

Under a normal costing approach, actual overhead costs are *never* assigned to jobs. Overhead is applied to each individual job using a predetermined overhead rate. Even with this system, however, a company must still account for actual overhead costs incurred. Thus, we will first describe how to account for applied overhead and then discuss accounting for actual overhead.

Accounting for Overhead Application

Assume that Bob has estimated overhead costs for the year at $9,600. Additionally, since he expects business to increase throughout the year as he becomes established, he estimates 2,400 total direct labor hours. Accordingly, the predetermined overhead rate is as follows:

$$\text{Overhead rate} = \$9{,}600/2{,}400 = \$4 \text{ per direct labor hour}$$

Overhead costs flow into Work-in-Process Inventory via the predetermined rate. Since direct labor hours are used to assign overhead into production, the time tickets serve as the source documents for assigning overhead to individual jobs and to the controlling work-in-process inventory account.

For Job 101, with a total of 60 hours worked, the amount of overhead cost posted is $240 ($4 × 60). For Job 102, the overhead cost is $100 ($4 × 25). A summary entry reflects a total of $340 (i.e., all overhead applied to jobs worked on during January) in applied overhead.

4.	Work-in-Process Inventory	340	
	Overhead Control		340

The credit balance in the overhead control account equals the total applied overhead at a given point in time. In normal costing, only applied overhead ever enters the work-in-process inventory account.

Accounting for Actual Overhead Costs

To illustrate how actual overhead costs are recorded, assume that All Signs Company incurred the following indirect costs for January:

Lease payment	$200
Utilities	50
Equipment depreciation	100
Indirect labor	65
Total overhead costs	$415

As indicated earlier, actual overhead costs never enter the work-in-process inventory account. The usual procedure is to record actual overhead costs on the debit side of the overhead control account. For example, the actual overhead costs would be recorded as follows:

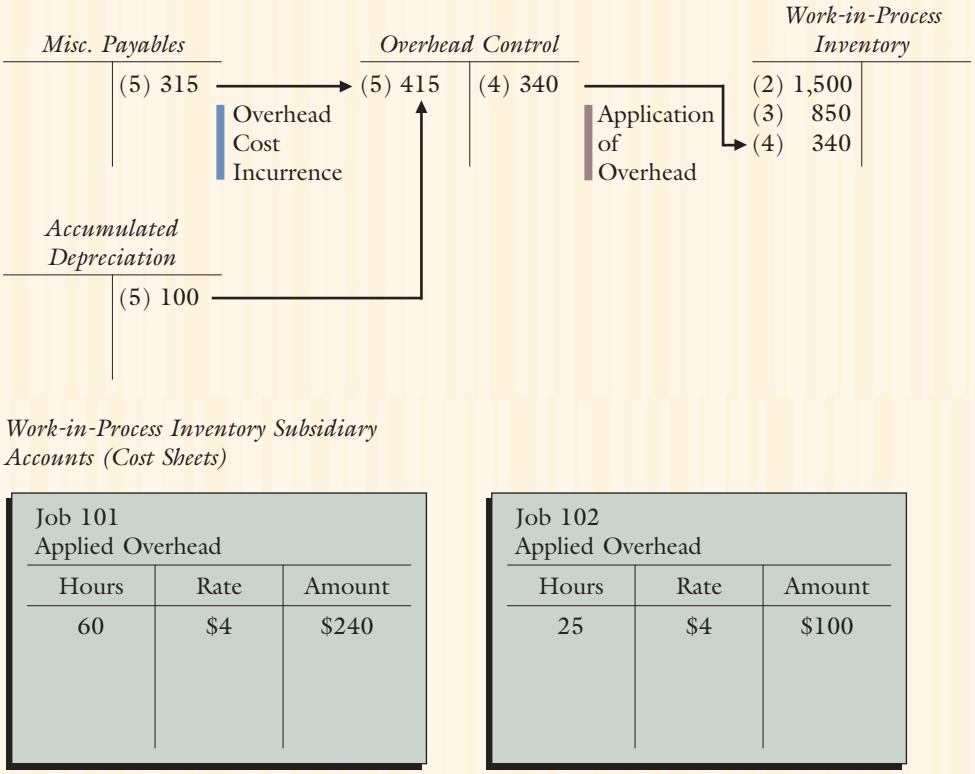
5.	Overhead Control	415	
	Lease Payable		200
	Utilities Payable		50
	Accumulated Depreciation—Equipment		100
	Wages Payable		65

Thus, the debit balance in Overhead Control gives the total actual overhead costs at a given point in time. Since actual overhead costs are on the debit side of this account and applied overhead costs are on the credit side, the balance in Overhead Con-

trol is the overhead variance at a given point in time. For All Signs Company at the end of January, the actual overhead of $415 and applied overhead of $340 produce underapplied overhead of $75 ($415 − $340).

The flow of overhead costs is summarized in Exhibit 5-11. To apply overhead to work-in-process inventory, a company needs information from the time tickets and a predetermined overhead rate based on direct labor hours.

EXHIBIT 5-11 Summary of Overhead Cost Flows



Work-in-Process Inventory Subsidiary Accounts (Cost Sheets)

Job 101
Applied Overhead

Hours	Rate	Amount
60	$4	$240

Job 102
Applied Overhead

Hours	Rate	Amount
25	$4	$100

Source Documents: Time Ticket
Other Source: Predetermined Rate

Accounting for Finished Goods Inventory

We have already seen what takes place when a job is completed. The columns for direct materials, direct labor, and applied overhead are totaled. These totals are then transferred to another section of the cost sheet where they are summed to yield the manufacturing cost of the job. This job cost sheet is then transferred to a finished goods inventory file. Simultaneously, the costs of the completed job are transferred from the work-in-process inventory account to the finished goods inventory account.

For example, assume that Job 101 was completed in January with the completed job-order cost sheet shown in Exhibit 5-12. Since Job 101 is completed, the total manufacturing costs of $1,840 must be transferred from the work-in-process inventory account to the finished goods inventory account. This transfer is described by the following entry:

EXHIBIT 5-12 Completed Job-Order Cost Sheet

Job Number 101

For Housing Development — Date Ordered Jan. 1, 2007

Item Description Street Signs — Date Started Jan. 2, 2007

Quantity Completed 20 — Date Finished Jan. 15, 2007

Direct Materials		Direct Labor				Applied Overhead		
Requisition Number	Amount	Ticket Number	Hours	Rate	Amount	Hours	Rate	Amount
1	$ 300	1	15	$10	$150	15	$4	$ 60
2	200	2	20	10	200	20	4	80
3	500	3	25	10	250	25	4	100
	$1,000				$600			$240

Cost Summary

Direct materials $1,000

Direct labor 600

Overhead 240

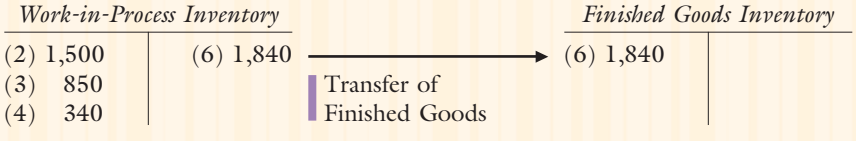
Total cost $1,840

Unit cost $92

6. Finished Goods Inventory 1,840
   Work-in-Process Inventory 1,840

A summary of the cost flows occurring when a job is finished is shown in Exhibit 5-13.

EXHIBIT 5-13 Summary of Finished Goods Cost Flow



Completion of goods in a manufacturing process represents an important step in the flow of manufacturing costs. Because of the importance of this stage in a manufacturing operation, a schedule of the cost of goods manufactured is prepared periodically to summarize the cost flows of all production activity. This report is an important

input for a firm's income statement and can be used to evaluate a firm's manufacturing effort. The statement of cost of goods manufactured was first introduced in Chapter 2. However, in a normal costing system, the report is somewhat different from the actual cost report presented in that chapter.

The statement of cost of goods manufactured presented in Exhibit 5-14 summarizes the production activity of All Signs Company for January. The key difference between this report and the one appearing in Chapter 2 is the use of applied overhead to arrive at the cost of goods manufactured. Finished goods inventories are carried at normal cost rather than the actual cost.

EXHIBIT 5-14 Statement of Cost of Goods Manufactured

All Signs Company
Statement of Cost of Goods Manufactured
For the Month Ended January 31, 2007

Direct materials:		
Beginning direct materials inventory	$ 0	
Add: Purchases of direct materials	2,500	
Total direct materials available	$2,500	
Less: Ending direct materials	1,000	
Direct materials used		$1,500
Direct labor		850
Manufacturing overhead:		
Lease	$ 200	
Utilities	50	
Depreciation	100	
Indirect labor	65	
	$ 415	
Less: Underapplied overhead	75	
Overhead applied		340
Current manufacturing costs		$2,690
Add: Beginning work-in-process inventory		0
Less: Ending work-in-process inventory		(850)
Cost of goods manufactured		$1,840

Notice that ending work-in-process inventory is $850. Where did we obtain this figure? Of the two jobs, Job 101 was finished and transferred to Finished Goods Inventory at a cost of $1,840. This amount is credited to Work-in-Process Inventory, leaving an ending balance of $850. Alternatively, we can add up the amounts debited to Work-in-Process Inventory for all remaining unfinished jobs. Job 102 is the only job still in process. The manufacturing costs assigned thus far are direct materials, $500; direct labor, $250; and overhead applied, $100. The total of these costs gives the cost of ending work-in-process inventory.

Accounting for Cost of Goods Sold

In a job-order firm, units can be produced for a particular customer or they can be produced with the expectation of selling the units as market conditions warrant. When the

job is shipped to the customer, the cost of the finished job becomes the cost of the goods sold. When Job 101 is shipped, the following entries would be made. (Recall that the selling price is 150 percent of manufacturing cost.)

7a.	Cost of Goods Sold	1,840	
	Finished Goods Inventory		1,840
7b.	Accounts Receivable	2,760	
	Sales Revenue		2,760

In addition to these entries, a statement of cost of goods sold usually is prepared at the end of each reporting period (e.g., monthly and quarterly). Exhibit 5-15 presents such a statement for All Signs Company for January. Typically, the overhead variance is not material and is therefore closed to the cost of goods sold account. Cost of goods sold *before* adjustment for an overhead variance is called **normal cost of goods sold**. After adjustment for the period's overhead variance takes place, the result is called the **adjusted cost of goods sold**. It is this latter figure that appears as an expense on the income statement.

EXHIBIT 5-15 Statement of Cost of Goods Sold

All Signs Company
Statement of Cost of Goods Sold
For the Month Ended January 31, 2007

Beginning finished goods inventory	$ 0
Cost of goods manufactured	1,840
Goods available for sale	$1,840
Less: Ending finished goods inventory	0
Normal cost of goods sold	$1,840
Add: Underapplied overhead	75
Adjusted cost of goods sold	$1,915

However, closing the overhead variance to the cost of goods sold account is not done until the end of the year. Variances are expected each month because of nonuniform production and nonuniform actual overhead costs. As the year unfolds, these monthly variances should, by and large, offset each other so that the year-end variance is small. Nonetheless, to illustrate how the year-end overhead variance would be treated, we will close out the overhead variance experienced by All Signs Company in January.

Closing the underapplied overhead to cost of goods sold requires the following entry:

8.	Cost of Goods Sold	75	
	Overhead Control		75

Notice that debiting Cost of Goods Sold is equivalent to adding the underapplied amount to the normal cost of goods sold figure. If the overhead variance had been overapplied, then the entry would reverse, and Cost of Goods Sold would be credited.

If Job 101 had not been ordered by a customer but had been produced with the expectation that the signs could be sold to various other developers, then all 20 units

may not be sold at the same time. Assume that on January 31, fifteen signs were sold. In this case, the cost of goods sold figure is the unit cost times the number of units sold ($92 × 15, or $1,380). The unit cost figure is found on the job-order cost sheet in Exhibit 5-12 (page 200).

Closing out the overhead variance to Cost of Goods Sold completes the description of manufacturing cost flows. To facilitate a review of these important concepts, Exhibit 5-16 shows a complete summary of the manufacturing cost flows for All Signs Company. Notice that these entries summarize information from the underlying job-order cost sheets. Although the description in this exhibit is specific to the example, the pattern of cost flows shown would be found in any manufacturing firm that uses a normal job-order costing system.

EXHIBIT 5-16 All Signs Company Summary of Manufacturing Cost Flows

Materials Inventory

(1)	2,500	(2)	1,500

Wages Payable

		(3)	850

Overhead Control

(5)	415	(4)	340
		(8)	75

Work-in-Process Inventory

(2)	1,500	(6)	1,840
(3)	850		
(4)	340		

Finished Goods Inventory

(6)	1,840	(7a)	1,840

Cost of Goods Sold

(7a)	1,840		
(8)	75		

(1) Purchase of direct materials	$2,500
(2) Issue of direct materials	1,500
(3) Incurrence of direct labor cost	850
(4) Application of overhead	340
(5) Incurrence of actual overhead cost	415
(6) Transfer of Job 101 to finished goods	1,840
(7a) Cost of goods sold of Job 101	1,840
(8) Closing out underapplied overhead	75

Manufacturing cost flows, however, are not the only cost flows experienced by a firm. Nonmanufacturing costs are also incurred. A description of how we account for these costs follows.

Accounting for Nonmanufacturing Costs

Recall that costs associated with selling and general administrative activities are classified as nonmanufacturing costs. These costs are period costs and are never assigned to the product in a traditional costing system. They are not part of the manufacturing cost flows. They do not belong to the overhead category and are treated as a totally separate category.

To illustrate how these costs are accounted for, assume All Signs Company had the following additional transactions in January:

Advertising circulars	$ 75
Sales commission	125
Office salaries	500
Depreciation, office equipment	50

The following compound entry could be used to record the preceding costs:

Selling Expense Control	200	
Administrative Expense Control	550	
Accounts Payable		75
Wages Payable		625
Accumulated Depreciation—Office Equipment		50

Controlling accounts accumulate all of the selling and administrative expenses for a period. At the end of the period, all of these costs flow to the period's income statement. An income statement for All Signs Company is shown in Exhibit 5-17.

EXHIBIT 5-17 Income Statement

All Signs Company
Income Statement
For the Month Ended January 31, 2007

Sales		$2,760
Less: Cost of goods sold		1,915
Gross margin		$ 845
Less selling and administrative expenses:		
Selling expenses	$200	
Administrative expenses	550	750
Operating income		$ 95

With the description of the accounting procedures for selling and administrative expenses completed, the basic essentials of a normal job-order costing system are also complete. This description has assumed that a single plantwide overhead rate was being used.

Single versus Multiple Overhead Rates

OBJECTIVE 5

Explain why multiple overhead rates may be preferred to a single, plantwide rate.

Using a single rate based on direct labor hours to assign overhead to jobs may result in unfair cost assignments (unfair in the sense that too much or too little overhead is assigned to a job). This can occur if direct labor hours do not correlate well with the consumption of overhead resources.

To illustrate, consider a company with two departments, one that is labor-intensive (department A) and another that is machine-intensive (department B). The expected annual overhead costs and the expected annual usage of direct labor hours and machine hours for each department are shown in Exhibit 5-18.

Currently, the company uses a plantwide overhead rate based on direct labor hours. Thus, the overhead rate used for product costing is $12 per direct labor hour ($240,000/20,000).

Now consider two recently completed jobs, Job 23 and Job 24. Exhibit 5-19 provides production-related data concerning each job. The data reveal that Job 23 spent all of its time in department A, while Job 24 spent all of its time in department B. Using the plantwide overhead rate, Job 23 would receive a $6,000 overhead assignment ($12 × 500 direct labor hours), and Job 24 would receive a $12 overhead assignment

EXHIBIT 5-18 Departmental Overhead Costs and Activity

	Department A	Department B	Total
Overhead costs	$60,000	$180,000	$240,000
Direct labor hours	15,000	5,000	20,000
Machine hours	5,000	15,000	20,000

($12 × 1 direct labor hour). Thus, the total manufacturing cost of Job 23 is $11,000 ($5,000 + $6,000), yielding a unit cost of $11. The total manufacturing cost of Job 24 is $5,012 ($5,000 + $12), yielding a unit cost of $5.012. Clearly, something is wrong. Using a plantwide rate, Job 23 received 500 times the overhead cost assignment that Job 24 received. Yet, as Exhibit 5-18 shows, Job 24 was produced in a department that is responsible for producing 75 percent of the plant's total overhead. Imagine the difficulties that this type of costing distortion can cause for a company. Some products would be overcosted, while others would be undercosted; the result could be incorrect pricing decisions that adversely affect the firm's competitive position.

EXHIBIT 5-19 Production Data for Jobs 23 and 24

	Job 23		
	Department A	Department B	Total
Prime costs	$5,000	$0	$5,000
Direct labor hours	500	0	500
Machine hours	1	0	1
Units produced	1,000	0	1,000

	Job 24		
	Department A	Department B	Total
Prime costs	$0	$5,000	$5,000
Direct labor hours	0	1	1
Machine hours	0	500	500
Units produced	0	1,000	1,000

This distortion in product costs is caused by the assumption that direct labor hours properly reflect the overhead consumed by the individual jobs. One driver for the firm as a whole does not seem to work. This type of problem can be resolved by using multiple overhead rates, where each rate uses a different activity driver. For this example, a satisfactory solution might be to develop an overhead rate for each department. In the case of the machine-intensive department B, the rate could be based on machine hours instead of direct labor hours. It seems reasonable to believe that machine hours relate better to machine-related overhead than direct labor hours do and that direct labor hours would be a good driver for a labor-intensive department. If so, more accurate product costing can be achieved by computing two departmental rates instead of

one plantwide rate. Therefore, in this example, we are making two improvements: using departmental overhead rates and basing the rates on different drivers.

Using data from Exhibit 5-18, the overhead rate for department A is $4 per direct labor hour ($60,000/15,000), and the overhead rate for department B is $12 per machine hour ($180,000/15,000). Using these rates, Job 23 would be assigned $2,000 of overhead ($4 × 500 direct labor hours) and Job 24 $6,000 of overhead ($12 × 500 machine hours). Job 24 now receives three times as much overhead cost as Job 23, which seems more sensible, since department B incurs three times as much overhead cost as does department A.

	Department A	*Department B*
Overhead cost	$60,000	$180,000
Cost driver	15,000 DLH	15,000 MHr
Department overhead rate	$4/DLH	$12/MHr
Overhead applied to Job 23	$2,000	—
Overhead applied to Job 24	—	$6,000

Moving to departmental rates may be considered a step toward activity-based costing, especially in the example just used where different activity drivers were chosen based on the types of overhead incurred in each department. While departmental rates may provide sufficient product costing accuracy for some firms, even more attention to how overhead is assigned may be necessary for other firms. This chapter has focused on activity drivers that are correlated with production volume (e.g., direct labor hours and machine hours). Greater product costing accuracy may be possible through the use of non-volume-related activity drivers. However, this discussion is left to a later chapter.

SUMMARY

In this chapter, we have examined the cost accounting system and its relationship to the production process. Two characteristics of the production process were shown to have an impact on cost accounting. These characteristics are the tangible product versus service nature of the firm and the degree of uniqueness of the product or service.

The cost accounting system is set up to serve the company's needs for cost accumulation, cost measurement, and cost assignment. In general, normal costing is preferred to actual costing in determining unit production costs. In normal costing, actual prime costs are assigned to units, but overhead is applied based on a predetermined rate.

Job-order costing is used for both manufacturing and service firms that produce unique or heterogeneous products. Cost is accounted for by the individual job using a subsidiary account called the job-order cost sheet.

Sometimes, a single overhead rate may not adequately capture the cause-and-effect relationship between overhead cost and production. In such cases, multiple overhead rates may be required.

Appendix: Accounting for Spoilage in a Traditional Job-Order System

OBJECTIVE 6

Explain how spoilage is treated in a job-order costing system.

Throughout this chapter, we have assumed that the units produced are good units. In this case, all manufacturing costs are associated with good units and flow into cost of goods sold. However, on occasion, mistakes are made; defective units are produced and are either thrown away or reworked and sold. How do we account for those costs?

Traditional job-order costing makes a distinction between normal and abnormal spoilage. To understand this distinction, let's look at an example. Petris, Inc., manufactures cabinets on a job-order basis. Job 98-12 calls for 100 units with the following costs.

Direct materials	$2,000
Direct labor (100 hours)	1,000

Overhead is applied at the rate of 150 percent of direct labor dollars. At the end of the job, 100 units are produced. However, three of the cabinets required rework due to improper installation of shelving. The rework involved six extra direct labor hours and an additional $50 of material. How is the rework accounted for? It depends on the reason for the defective work.

If the defective work was a consequence of the demanding nature of this particular job, then rework is assigned to the job as follows.

Direct materials	$2,050
Direct labor	1,060
Overhead	1,590
Total job cost	$4,700
Unit job cost	$ 47

On the other hand, suppose that the defective work was a consequence of assigning new, untrained labor to the job. Defects are expected in that case, and the rework is not assigned to the job but instead to overhead control. The costs are assigned as follows.

Job 98-12	
Direct materials	$2,000
Direct labor	1,000
Overhead	1,500
Total job cost	$4,500
Unit job cost	$ 45

Debited to Overhead Control	
Direct materials	$ 50
Direct labor	60
Overhead	90
Total	$200

The cost of spoiled units that cannot be reworked are similarly charged to the job if caused by the demands of the job, and to overhead control if not.

REVIEW PROBLEM AND SOLUTION

Job Cost, Applied Overhead, Unit Cost

Bostian Company uses a normal job-order costing system. It processes most jobs through two departments. Selected budgeted and actual data for the past year follow. Data for one of several jobs completed during the year also follow.

	Department A	*Department B*
Budgeted overhead	$100,000	$500,000
Actual overhead	$110,000	$520,000
Expected activity (direct labor hours)	50,000	10,000
Expected machine hours	10,000	50,000

(continued)

	Job 10
Direct materials	$20,000
Direct labor cost:	
Department A (5,000 hrs. @ $6 per hr.)	$30,000
Department B (1,000 hrs. @ $6 per hr.)	$6,000
Machine hours used:	
Department A	100
Department B	1,200
Units produced	10,000

Bostian Company uses a plantwide, predetermined overhead rate to assign overhead (OH) to jobs. Direct labor hours (DLH) is used to compute the predetermined overhead rate. Bostian prices its jobs at cost plus 30 percent.

Required:

1. Compute the predetermined overhead rate.
2. Using the predetermined rate, compute the per-unit manufacturing cost for Job 10.
3. Assume that Job 10 was completed in May and sold in September. Prepare journal entries for the completion and sale of Job 10.
4. Recalculate the unit manufacturing cost for Job 10 using departmental overhead rates. Use direct labor hours for department A and machine hours for department B. Does this approach provide a more accurate unit cost? Explain.
5. Assume that Job 10 was completed in May and sold in September. Using your work from Requirement 4, prepare journal entries for the completion and sale of Job 10.

SOLUTION

1. Predetermined overhead rate = $600,000/60,000 = $10 per DLH. Add the budgeted overhead for the two departments, and divide by the total expected direct labor hours (DLH = 50,000 + 10,000).

2.

Direct materials	$ 20,000
Direct labor	36,000
Overhead ($10 × 6,000 DLH)	60,000
Total manufacturing costs	$116,000
Unit cost ($116,000/10,000)	$ 11.60

3.

Finished Goods	116,000	
Work in Process		116,000
Cost of Goods Sold	116,000	
Finished Goods		116,000
Sales*	150,800	
Accounts Receivable		150,800

*Sales = $116,000 + (0.3)($116,000) = $150,800.

4. Predetermined rate for department A: $100,000/50,000 = $2 per DLH. Predetermined rate for department B: $500,000/50,000 = $10 per machine hour.

Direct materials	$20,000
Direct labor	36,000
Overhead:	
Department A: $2 × 5,000	10,000
Department B: $10 × 1,200	12,000
Total manufacturing costs	$78,000
Unit cost ($78,000/10,000)	$ 7.80

Overhead assignment using departmental rates is more accurate because there is a higher correlation with the overhead assigned and the overhead consumed. Notice that Job 10 spends most of its time in department A, the least overhead intensive of the two departments. Departmental rates reflect this differential time and consumption better than plantwide rates do.

5.

Finished Goods	78,000	
Work in Process		78,000
Cost of Goods Sold	78,000	
Finished Goods		78,000
Sales*	101,400	
Accounts Receivable		101,400

*Sales = $78,000 + (0.3)($78,000) = $101,400.

KEY TERMS

Actual cost system 187
Adjusted cost of goods sold 202
Cost accumulation 185
Cost assignment 185
Cost measurement 185
Expected activity level 190
Heterogeneity 181
Inseparability 181
Intangibility 181
Job-order cost sheet 192
Job-order costing system 192
Materials requisition form 192
Normal activity level 190
Normal cost of goods sold 202
Normal costing system 187
Perishability 181
Practical activity level 191
Source document 186
Theoretical activity level 191
Time ticket 193
Work-in-process inventory file 192

QUESTIONS FOR WRITING AND DISCUSSION

1. What is cost measurement? Cost accumulation? What is the difference between the two?
2. Why is actual costing rarely used for product costing?
3. Explain the differences between job-order costing and process costing.
4. What are some differences between a manual job-order costing system and an automated job-order costing system?
5. What is the role of materials requisition forms in a job-order costing system? Time tickets? Predetermined overhead rates?

6. Explain why multiple overhead rates are often preferred to a plantwide overhead rate.
7. Explain the role of activity drivers in assigning costs to products.
8. Define the following terms: *expected actual activity*, *normal activity*, *practical activity*, and *theoretical activity*.
9. Why would some prefer normal activity to expected actual activity to compute a predetermined overhead rate?
10. When computing a predetermined overhead rate, why are units of output not commonly used as a measure of production?
11. Wilson Company has a predetermined overhead rate of $5 per direct labor hour. The job-order cost sheet for Job 145 shows 1,000 direct labor hours costing $10,000 and materials requisitions totaling $7,500. Job 145 had 500 units completed and transferred to finished goods inventory. What is the cost per unit for Job 145?
12. Why are the accounting requirements for job-order costing more demanding than those for process costing?
13. Explain the difference between normal cost of goods sold and adjusted cost of goods sold.
14. (Appendix) Amber Company produces custom framing. For one job, the trainee assigned to cut the mat entered the mat dimensions incorrectly into the computer. The mat was unusable and had to be discarded; another mat was cut to the correct dimensions. How is the cost of the spoiled mat handled?
15. (Appendix) Amber Company produces custom framing. For one job, the dimensions of the picture were such that the computer-controlled, mat-cutting device could not be used. Amber warned the customer that this was a particularly difficult job, and her normal price would be increased to reflect its difficulty. Amber cut the mat by hand, but the cut was not as straight as she would have liked. So, she threw out the first mat and cut another one. How is the cost of the spoiled mat handled?

EXERCISES

5-1 Classifying Firms as Either Manufacturing or Service

LO1 Classify the following types of firms as either manufacturing or service. Explain the reasons for your choice in terms of the four features of service firms (heterogeneity, inseparability, intangibility, and perishability).

a. Bicycle production
b. Pharmaceuticals
c. Income tax preparation
d. Application of artificial nails
e. Glue production
f. Child care

5-2 Characteristics of Production Process, Cost Measurement

LO1, LO2 Tony Jefferson, of Rainking Company, designs and installs custom lawn and garden irrigation systems for homes and businesses throughout the state. Each job is different,

requiring different materials and labor for installing the systems. Rainking estimated the following for the year:

Number of installations	250
Number of direct labor hours	5,000
Direct material cost	$60,000
Direct labor cost	$75,000
Overhead cost	$65,000

During the year, the following actual amounts were experienced:

Number of installations	245
Number of direct labor hours	5,040
Direct materials used	$59,350
Direct labor incurred	$75,600
Overhead incurred	$64,150

Required:

1. Should Rainking use process costing or job-order costing? Explain.
2. If Rainking uses a normal costing system and overhead is applied on the basis of direct labor hours, what is the cost of an installation that takes $3,500 of direct materials and 50 direct labor hours?
3. Explain why Rainking would have difficulty using an actual costing system.

5-3 Characteristics of Production Process, Cost Measurement

LO1, LO2

Tony Jefferson, owner of Rainking of **Exercise 5-2**, noticed that the watering systems for many houses in a local subdivision had the same layout and required virtually identical amounts of prime cost. Tony met with the subdivision builders and offered to install a basic watering system in each house. The idea was accepted enthusiastically, so Tony created a new company, Waterpro, to handle the subdivision business. In its first three months in business, Waterpro experienced the following:

	June	*July*	*August*
Number of systems installed	25	50	100
Direct materials used	$5,000	$10,000	$20,000
Direct labor incurred	$5,250	$10,500	$21,000
Overhead	$15,000	$6,000	$8,400

Required:

1. Should Waterpro use process costing or job-order costing? Explain.
2. If Waterpro uses an actual costing system, what is the cost of a single system installed in June? In July? In August?
3. Now assume that Waterpro uses a normal costing system. Estimated overhead for the year is $60,000, and estimated production is 600 watering systems. What is the predetermined overhead rate per system? What is the cost of a single system installed in June? In July? In August?

5-4 Activity Levels Used to Compute Overhead Rates

LO2

Landon Poteet has just started a new business—building and installing custom garage organization systems. Landon builds the cabinets and work benches in his workshop

and then installs them in clients' garages. Landon figures his overhead for the coming year will be $9,000. Since his business is labor intensive, he plans to use direct labor hours as his overhead driver. For the coming year, he expects to complete 75 jobs, averaging 20 direct labor hours each. However, he has the capacity to complete 125 jobs averaging 20 direct labor hours each.

Required:

1. Four measures of activity level were mentioned in the text. Which two measures is Landon considering in computing a predetermined overhead rate?
2. Compute the predetermined overhead rates using each of the measures in your answer to Requirement 1.
3. Which one should Landon use? Why?

5-5 Source Documents, Job Cost Flows

LO3, LO4

Refer to **Exercise 5-4**.

Required:

1. What source documents will Landon need to account for costs in his new business?
2. Suppose Landon's business grows, and he expands his workshop and hires three additional carpenters to help him. What source documents will he need now?

5-6 Job Costs, Ending Work in Process

LO4

During March, Molson Company worked on three jobs. Data relating to these three jobs follow:

	Job 62	*Job 63*	*Job 64*
Units in each order	110	200	165
Units sold	—	200	—
Materials requisitioned	$560	$740	$1,600
Direct labor hours	260	300	500
Direct labor cost	$3,120	$3,600	$6,000

Overhead is assigned on the basis of direct labor hours at a rate of $7 per direct labor hour. During March, Jobs 62 and 63 were completed and transferred to finished goods inventory. Job 63 was sold by the end of the month. Job 64 was the only unfinished job at the end of the month.

Required:

1. Calculate the per-unit cost of Jobs 62 and 63.
2. Compute the ending balance in the work-in-process inventory account.
3. Prepare the journal entries reflecting the completion of Jobs 62 and 63 and the sale of Job 63. The selling price is 140 percent of cost.

5-7 Predetermined Overhead Rate, Application of Overhead to Jobs, Job Cost

LO3 LO4

On April 1, Kurena Company had the following balances in its inventory accounts:

Materials Inventory	$16,350
Work-in-Process Inventory	21,232
Finished Goods Inventory	15,200

Work-in-process inventory is made up of three jobs with the following costs:

	Job 30	*Job 31*	*Job 32*
Direct materials	$2,650	$1,900	$3,650
Direct labor	1,900	1,340	4,000
Applied overhead	1,520	1,072	3,200

During April, Kurena experienced the following transactions:

a. Purchases materials on account for $21,000.
b. Requisitioned materials: Job 30, $12,500; Job 31, $11,200; and Job 32, $5,500.
c. Collected and summarized job tickets: Job 30, 250 hours at $12 per hour; Job 31, 275 hours at $15 per hour; and Job 32, 140 hours at $20 per hour.
d. Applied overhead on the basis of direct labor cost.
e. Actual overhead was $8,718.
f. Completed and transferred Job 31 to the finished goods warehouse.
g. Shipped Job 31 and billed the customer for 130 percent of the cost.

Required:

1. Calculate the predetermined overhead rate based on direct labor cost.
2. Calculate the ending balance for each job as of April 30.
3. Calculate the ending balance of Work in Process as of April 30.
4. Calculate the cost of goods sold for April.
5. Assuming that Kurena prices its jobs at cost plus 30 percent, calculate the price of the one job that was sold during April. (Round to the nearest dollar.)

5-8 Job Cost Flows, Journal Entries

LO4

Refer to **Exercise 5-7**.

Required:

1. Prepare journal entries for the April transactions.
2. Calculate the ending balances of each of the inventory accounts as of April 30.

5-9 Predetermined Overhead Rate, Application of Overhead to Jobs, Job Cost, Unit Cost

LO2, LO4

On June 1, Dabo Company's work-in-process inventory consisted of three jobs with the following costs:

	Job 70	*Job 71*	*Job 72*
Direct materials	$1,600	$2,000	$850
Direct labor	1,900	1,300	900
Applied overhead	1,425	975	675

During June, four more jobs were started. Information on costs added to the seven jobs during June is as follows:

	Job 70	*Job 71*	*Job 72*	*Job 73*	*Job 74*	*Job 75*	*Job 76*
Direct materials	$ 800	$1,235	$3,550	$5,000	$300	$560	$ 80
Direct labor	1,000	1,400	2,200	1,800	600	860	172

Before the end of June, Jobs 70, 72, 73, and 75 were completed. On June 30, Jobs 72 and 75 were sold.

Required:

1. Calculate the predetermined overhead rate based on direct labor cost.
2. Calculate the ending balance for each job as of June 30.
3. Calculate the ending balance in Work-in-Process Inventory as of June 30.
4. Calculate the cost of goods sold for June.
5. Assuming that Dabo prices its jobs at cost plus 20 percent, calculate Dabo's sales revenue for June.

5-10 Income Statement

LO4

Refer to **Exercise 5-9**. Dabo's marketing and administrative expense for June was $1,200.

Required:

Prepare an income statement for Dabo Company for June.

5-11 Journal Entries, T-Accounts

LO4

Kaycee, Inc., manufactures brown paper grocery bags. During the month of May, the following occurred:

a. Purchased materials on account for $23,175.
b. Requisitioned materials totaling $19,000 for use in production.
c. Incurred direct labor payroll for the month of $17,850, with an average wage of $8.50 per hour.
d. Incurred and paid actual overhead of $15,500.
e. Charged manufacturing overhead to production at the rate of $7 per direct labor hour.
f. Transferred completed units costing $36,085 to finished goods.
g. Sold bags costing $30,000 on account for $36,000.

Beginning balances as of May 1 were:

Materials	$ 5,170
Work-in-Process Inventory	11,200
Finished Goods Inventory	2,630

Required:

1. Prepare the journal entries for the preceding events.
2. Calculate the ending balances of:
   a. Materials Inventory
   b. Work-in-Process Inventory
   c. Overhead Control
   d. Finished Goods Inventory

5-12 Unit Cost, Ending Work-in-Process Inventory, Journal Entries

LO4, LO5

During October, Molson Company worked on three jobs. Data relating to these three jobs follow:

	Job 43	*Job 44*	*Job 45*
Units in each order	120	200	165
Units sold	—	200	—
Materials requisitioned	$744	$640	$600
Direct labor hours	360	400	200
Direct labor cost	$1,980	$2,480	$1,240

Overhead is assigned on the basis of direct labor hours at a rate of $5.30 per direct labor hour. During October, Jobs 43 and 44 were completed and transferred to finished goods inventory. Job 44 was sold by the end of the month. Job 45 was the only unfinished job at the end of the month.

Required:

1. Calculate the per-unit cost of Jobs 43 and 44.
2. Compute the ending balance in the work-in-process inventory account.
3. Prepare the journal entries reflecting the completion of Jobs 43 and 44 and the sale of Job 44. The selling price is 140 percent of cost.

5-13 Activity-Based Costing, Unit Cost, Ending Work-in-Process Inventory, Journal Entries

LO4, LO5

Smeyak Company uses an ABC system to apply overhead. There are three activity rates:

Purchasing	$30 per purchase order
Machining	$5 per machine hour
Other overhead	60% of direct labor cost

During August, Smeyak worked on three jobs. Data relating to these jobs follow:

	Job 80	*Job 81*	*Job 82*
Units in each order	110	400	100
Units sold	—	200	—
Materials requisitioned	$1,730	$3,000	$1,200
Direct labor cost	$2,000	$4,600	$800
Machine hours	60	40	20
Purchase orders	20	16	25

During August, Jobs 80 and 82 were completed and transferred to finished goods inventory. Job 80 was sold by the end of the month. Job 81 was the only unfinished job at the end of the month.

Required:

1. Calculate the per-unit cost of Jobs 80 and 82.
2. Compute the ending balance in the work-in-process inventory account.
3. Prepare the journal entries reflecting the completion of Jobs 80 and 82 and the sale of Job 80. The selling price is 140 percent of cost.

5-14 Journal Entries, T-Accounts

LO4

Porter Company uses job-order costing. During January, the following data were reported:

a. Purchased materials on account: direct materials, $82,000; indirect materials, $10,500.
b. Issued materials: direct materials, $72,500; indirect materials, $7,000.
c. Incurred labor cost: direct labor, $52,000; indirect labor, $15,750.
d. Incurred other manufacturing costs (all payables) of $49,000.
e. Applied overhead on the basis of 125 percent of direct labor cost.
f. Finished and transferred work to Finished Goods Inventory costing $160,000.
g. Sold finished goods costing $140,000 on account for 150 percent of cost.
h. Closed any over- or underapplied overhead to Cost of Goods Sold.

Required:

1. Prepare journal entries to record these transactions.
2. Prepare a T-account for Overhead Control. Post all relevant information to this account. What is the ending balance in this account?
3. Prepare a T-account for Work-in-Process Inventory. Assume a beginning balance of $10,000, and post all relevant information to this account. Did you assign any actual overhead costs to Work-in-Process Inventory? Why or why not?

5-15 Activity-Based Costing, Unit Cost, Ending Work-in-Process Inventory

LO4, LO5

Zavner Company is a job-order costing firm that uses activity-based costing to apply overhead to jobs. Zavner identified three overhead activities and related drivers. Budgeted information for the year is as follows:

Activity	*Cost*	*Driver*	*Amount of Driver*
Engineering design	$120,000	Engineering hours	3,000
Purchasing	80,000	Number of parts	10,000
Other overhead	250,000	Direct labor hours	40,000

Zavner worked on five jobs in July. Data are as follows:

	Job 60	*Job 61*	*Job 62*	*Job 63*	*Job 64*
Balance, July 1	$32,450	$40,770	$29,090	$0	$0
Direct materials	$26,000	$37,900	$25,350	$11,000	$13,560
Direct labor	$40,000	$38,500	$43,000	$20,900	$18,000
Engineering hours	20	10	15	100	200
Number of parts	150	180	200	500	300
Direct labor hours	2,500	2,400	2,600	1,200	1,100

By July 31, Jobs 60 and 62 were completed and sold. The remaining jobs were in process.

Required:

1. Calculate the activity rates for each of the three overhead activities.
2. Prepare job-order cost sheets for each job showing all costs through July 31.
3. Calculate the balance in Work in Process on July 31.
4. Calculate cost of goods sold for July.

PROBLEMS

5-16 Journal Entries, T-Accounts, Cost of Goods Manufactured and Sold

LO4, LO5

During May, the following transactions were completed and reported by Perlmutter Products, Inc.:

a. Purchased materials on account for $50,100.
b. Issued materials to production to fill job-order requisitions: direct materials, $30,000; indirect materials, $15,000.
c. Accumulated payroll for the month: direct labor, $70,000; indirect labor, $32,000; administrative, $18,000; sales, $9,900.
d. Accrued depreciation on factory plant and equipment of $13,400.
e. Accrued property taxes during the month for $1,450 (on factory).
f. Recorded expired insurance with a credit to the prepaid insurance account of $6,200.
g. Incurred factory utilities costs of $6,000.
h. Paid advertising costs of $7,200.
i. Accrued depreciation: office equipment, $1,500; sales vehicles, $650.
j. Paid legal fees for preparation of lease agreements of $750.
k. Charged overhead to production at a rate of $9 per direct labor hour. Recorded 8,000 direct labor hours during the month.
l. Incurred cost of jobs completed during the month of $158,000.

The company also reported the following beginning balances in its inventory accounts:

Materials Inventory	$ 5,000
Work-in-Process Inventory	30,000
Finished Goods Inventory	60,000

Required:

1. Prepare journal entries to record the transactions occurring in May.
2. Prepare T-accounts for Materials Inventory, Overhead Control, Work-in-Process Inventory, and Finished Goods Inventory. Post all relevant entries to these accounts.
3. Prepare a schedule of cost of goods manufactured.
4. If the overhead variance is all allocated to Cost of Goods Sold, by how much will Cost of Goods Sold decrease or increase?

5-17 Overhead Application, Activity-Based Costing, Bid Prices

LO4, LO5

Karanth Company manufactures specialty tools to customer order. Budgeted overhead for the coming year is as follows:

Purchasing	$30,000
Setups	35,000
Engineering	15,000
Other	10,000

Previously, Sharon Benetton, Karanth Company's controller, had applied overhead on the basis of machine hours. Expected machine hours for the coming year are 10,000. Sharon has been reading about activity-based costing, and she wonders whether or not it might offer some advantages to her company. She decided that appropriate drivers for overhead activities are purchase orders for purchasing, number of setups for setup cost, engineering hours for engineering cost, and machine hours for other. Budgeted amounts for these drivers are 5,000 purchase orders, 500 setups, and 500 engineering hours.

Sharon has been asked to prepare bids for two jobs with the following information:

	Job 1	*Job 2*
Direct materials	$3,700	$8,900
Direct labor	$1,000	$2,000
Number of setups	2	3
Number of purchase orders	15	20
Number of engineering hours	25	10
Number of machine hours	200	200

The typical bid price includes a 30 percent markup over full manufacturing cost.

Required:

1. Calculate a plantwide rate for Karanth Company based on machine hours. What is the bid price of each job using this rate?
2. Calculate activity rates for the four overhead activities. What is the bid price of each job using these rates?
3. Which bids are more accurate? Why?

5-18 Plantwide Overhead Rate, Activity-Based Costing, Job Costs

LO5

Anselmo's Kwik Print provides a variety of photocopying and printing services. On June 5, Anselmo invested in some computer-aided photography equipment that enables customers to reproduce a picture or illustration, input it digitally into the computer, enter text into the computer, and then print out a 4-color professional quality brochure. Prior to the purchase of this equipment, Kwik Print's overhead averaged $35,000 per year. After the installation of the new equipment, the total overhead increased to $85,000 per year. Kwik Print has always costed jobs on the basis of actual materials and labor plus overhead assigned using a predetermined overhead rate based on direct labor hours. Budgeted direct labor hours for the year are 5,000, and the wage rate is $6 per hour.

Required:

1. What was the predetermined overhead rate prior to the purchase of the new equipment?
2. What was the predetermined overhead rate after the new equipment was purchased?
3. Suppose Jim Hargrove brought in several items he wanted photocopied. The job required 100 sheets of paper at $0.015 each and 12 minutes of direct labor time. What would have been the cost of Jim's job on May 20? On June 20?
4. Suppose that Anselmo decides to calculate two overhead rates, one for the photocopying area based on direct labor hours as before, and one for the computer-aided printing area based on machine time. Estimated overhead applicable to the computer-aided printing area is $50,000, and forecasted usage of the machines is

2,000 hours. What are the two overhead rates? Which overhead rate system is better—one rate or two?

5-19 Plantwide Overhead Rate versus Departmental Rates, Effects on Pricing Decisions

LO5

Cherise Ortega, marketing manager for Romer Company, was puzzled by the outcome of two recent bids. The company's policy was to bid 150 percent of the full manufacturing cost. One job (labeled Job 97-28) had been turned down by a prospective customer, who had indicated that the proposed price was $3 per unit higher than the winning bid. A second job (Job 97-35) had been accepted by a customer, who was amazed that Romer could offer such favorable terms. This customer revealed that Romer's price was $43 per unit lower than the next lowest bid.

Cherise has been informed that the company was more than competitive in terms of cost control. Accordingly, she began to suspect that the problem was related to cost assignment procedures. Upon investigating, Cherise was told that the company uses a plantwide overhead rate based on direct labor hours. The rate is computed at the beginning of the year using budgeted data. Selected budgeted data are as follows:

	Department A	*Department B*	*Total*
Overhead	$500,000	$2,000,000	$2,500,000
Direct labor hours	200,000	50,000	250,000
Machine hours	20,000	120,000	140,000

Cherise also discovered that the overhead costs in department B were higher than those in department A because B has more equipment, higher maintenance, higher power consumption, higher depreciation, and higher setup costs. In addition to the general procedures for assigning overhead costs, Cherise was supplied with the following specific manufacturing data on Jobs 97-28 and 97-35:

	Job 97-28		
	Department A	*Department B*	*Total*
Direct labor hours	5,000	1,000	6,000
Machine hours	200	500	700
Prime costs	$100,000	$20,000	$120,000
Units produced	14,400	14,400	14,400

	Job 97-35		
	Department A	*Department B*	*Total*
Direct labor hours	400	600	1,000
Machine hours	200	3,000	3,200
Prime costs	$10,000	$40,000	$50,000
Units produced	1,500	1,500	1,500

Required:

1. Using a plantwide overhead rate based on direct labor hours, develop the bid prices for Jobs 97-28 and 97-35 (express the bid prices on a per-unit basis).
2. Using departmental overhead rates (use direct labor hours for department A and machine hours for department B), develop per-unit bid prices for Jobs 97-28 and 97-35.

3. Compute the difference in gross profit that would have been earned had the company used departmental rates in its bids instead of the plantwide rate.
4. Explain why the use of departmental rates in this case provides a more accurate product cost.

5-20 Appendix: Cost of Spoiled Units

LO6 Garvey Company is a specialty print shop. Usually, printing jobs are priced at standard cost plus 50 percent. Job 95-301 involved printing 500 wedding invitations with the following standard costs:

Direct materials	$200
Direct labor	20
Overhead	30
Total	$250

Normally, the invitations would be taken from the machine, the top one inspected for correct wording, spelling, and quality of print, and all of the invitations wrapped in plastic and stored on shelves designated for completed jobs. In this case, however, the technician decided to go to lunch before inspecting and wrapping the job. He stacked the unwrapped invitations beside the printing press and left. One hour later, he returned and found the invitations had fallen on the floor and been stepped on. It turned out that about 100 invitations were ruined and had to be discarded. An additional 100 invitations were then printed to complete the job.

Required:

1. Calculate the cost of the spoiled invitations. How should the spoilage cost be accounted for?
2. What is the price of Job 95-301?
3. Suppose that another job, 95-442, also required 500 wedding invitations. The standard costs are identical to those of Job 95-301. However, Job 95-442 required an unusual color of ink which could only be obtained in a formula which was difficult to use. Garvey printers know from experience that getting this ink color to print correctly requires trial and error. In the case of Job 95-442, the first 100 invitations had to be discarded due to inconsistencies in the color of ink. What is the cost of the spoilage, and how would it be treated?
4. What is the price of Job 95-442?

5-21 Appendix: Cost of Reworked Units

LO6 Jackson's Sporting Goods Store sells a variety of sporting goods and clothing. In a back room, Jackson's has set up heat-transfer equipment to personalize T-shirts for Little League teams. Typically, each team has the name of the individual player put on the back of the T-shirt. Last week, Taffy Barnhart, coach of the Stingers, brought in a list of names for her team. Her team consisted of 12 players with the following names: Freda, Cara, Katie, Tara, Heather, Sarah, Kim, Jennifer, Mary Beth, Elizabeth, Kyle, and Wendy. Taffy was quoted a price of $0.50 per letter.

Chip Russell, Jackson's newest employee, was assigned to Taffy's job. He selected the appropriate letters, arranged the letters in each name carefully on a shirt, and heat-pressed them on. When Taffy returned, she was appalled to see that the names were on the front of the shirts. Jim Jackson, owner of the sporting goods store, assured Taffy that the letters could easily be removed by applying more heat and lifting them off. This process ruins the old letters, so new letters must then be placed correctly on the

shirt backs. He promised to correct the job immediately and have it ready in an hour and a half.

Costs for heat-transferring are as follows:

Letters (each)	$0.15
Direct labor (per hour)	8.00
Overhead (per direct labor hour)	4.00

Taffy's job originally took one hour of direct labor time. The removal process goes more quickly and should take only 15 minutes.

Required:

1. What was the original cost of Taffy's job?
2. What is the cost of rework on Taffy's job? How should the rework cost be treated?
3. How much did Jim Jackson charge Taffy?

5-22 Job-Order Costing, Housing

LO3, LO4

Sutton Construction, Inc., is a privately held, family-founded corporation that builds single- and multiple-unit housing. Most projects Sutton Construction undertakes involve the construction of multiple units. Sutton Construction has adopted a job-order costing system for determining the cost of each unit. The costing system is fully computerized. Each project's costs are divided into the following five categories:

1. *General conditions*, including construction site utilities, project insurance permits and licenses, architect's fees, decorating, field office salaries, and cleanup costs.
2. *Hard costs*, such as subcontractors, direct materials, and direct labor.
3. *Finance costs*, including title and recording fees, inspection fees, and taxes and discounts on mortgages.
4. *Land costs*, which refer to the purchase price of the construction site.
5. *Marketing costs*, such as advertising, sales commissions, and appraisal fees.

Recently, Sutton Construction purchased land for the purpose of developing 20 new single-family houses. The cost of the land was $250,000. Lot sizes vary from 1/4 to 1/2 acre. The 20 lots occupy a total of eight acres.

General conditions costs for the project totaled $120,000. This $120,000 is common to all 20 units that were constructed on the building site.

Job 3, the third house built in the project, occupied a 1/4-acre lot and had the following hard costs:

Direct materials	$ 8,000
Direct labor	6,000
Subcontractor	14,000

For Job 3, finance costs totaled $4,765 and marketing costs, $800. General conditions costs are allocated on the basis of units produced. Each unit's selling price is determined by adding 40 percent to the total of all costs.

Required:

1. Identify all production costs that are directly traceable to Job 3. Are all remaining production costs equivalent to overhead found in a manufacturing firm? Are there nonproduction costs that are directly traceable to the housing unit? Which ones?

2. Develop a job-order cost sheet for Job 3. What is the cost of building this house? Did you include finance and marketing costs in computing the unit cost? Why or why not? How did you determine the cost of land for Job 3?
3. Which of the five cost categories corresponds to overhead? Do you agree with the way in which this cost is allocated to individual housing units? Can you suggest a different allocation method?
4. Calculate the selling price of Job 3. Calculate the profit made on the sale of this unit.

5-23 Case on Job-Order Costing: Dental Practice

LO3, LO4

Dr. Sherry Bird is employed by Dental Associates. Dental Associates recently installed a computerized job-order costing system to help monitor the cost of its services. Each patient is treated as a job and assigned a job number when he or she checks in with the receptionist. The receptionist-bookkeeper notes the time the patient enters the treatment area and when the patient leaves the area. This difference between the entry and exit times is the number of patient hours used and the direct labor time assigned to the dental assistant. (A dental assistant is constantly with the patient.) The direct labor time assigned to the dentist is 50 percent of the patient hours. (The dentist typically splits her time between two patients.)

The chart filled out by the dental assistant provides additional data that are entered into the computer. For example, the chart contains service codes that identify the nature of the treatment, such as whether the patient received a crown, a filling, or a root canal. The chart not only identifies the type of service but its level as well. For example, if a patient receives a filling, the dental assistant indicates (by a service-level code) whether the filling was one, two, three, or four surfaces. The service and service-level codes are used to determine the rate to be charged to the patient. The costs of providing different services and their levels also vary.

Costs assignable to a patient consist of materials, labor, and overhead. The types of materials used—and the quantity—are identified by the assistant and entered into the computer by the bookkeeper. Material prices are kept on file and accessed to provide the necessary cost information. Overhead is applied on the basis of patient hours. The rate used by Dental Associates is $20 per patient hour. Direct labor cost is also computed using patient hours and the wage rates of the direct laborers. Dr. Bird is paid an average of $36 per hour for her services. Dental assistants are paid an average of $6 per hour. Given the treatment time, the software program calculates and assigns the labor cost for the dentist and her assistant; overhead cost is also assigned using the treatment time and the overhead rate.

The overhead rate does not include a charge for any X-rays. The X-ray department is separate from dental services; X-rays are billed and costed separately. The cost of an X-ray is $3.50 per film; the patient is charged $5 per film. If cleaning services are required, cleaning labor costs $9 per patient hour.

Glen Johnson, a patient (Job 267), spent 30 minutes in the treatment area and had a 2-surface filling. He received two Novocain shots and used three ampules of amalgam. The cost of the shots was $1. The cost of the amalgam was $3. Other direct materials used are insignificant in amount and are included in the overhead rate. The rate charged to the patient for a 2-surface filling is $45. One X-ray was taken.

Required:

1. Prepare a job-order cost sheet for Glen Johnson. What is the cost for providing a 2-surface filling? What is the gross profit earned? Is the X-ray a direct cost of the service? Why are the X-rays costed separately from the overhead cost assignment?
2. Suppose that the patient time and associated patient charges are given for the following fillings:

	1-Surface	*2-Surface*	*3-Surface*	*4-Surface*
Time	20 minutes	30 minutes	40 minutes	50 minutes
Charge	$35	$45	$55	$65

Compute the cost for each filling and the gross profit for each type of filling. Assume that the cost of Novocain is $1 for all fillings. Ampules of amalgam start at two and increase by one for each additional surface. Assume also that only one X-ray film is needed for all four cases. Does the increase in billing rate appear to be fair to the patient? Is it fair to the dental corporation?

5-24 Case on Job-Order Costing and Pricing Decisions

LO3, LO4

Nutratask, Inc., is a pharmaceutical manufacturer of amino-acid-chelated minerals and vitamin supplements. The company was founded in 1974 and is capable of performing all manufacturing functions, including packaging and laboratory functions. Currently, the company markets its products in the United States, Canada, Australia, Japan, and Belgium.

Mineral chelation enhances the mineral's availability to the body, making the mineral a more effective supplement. Most of the chelates supplied by Nutratask are in powder form, but the company has the capability to make tablets or capsules.

The production of all chelates follows a similar pattern. Upon receiving an order, the company's chemist prepares a load sheet (a bill of materials that specifies the product, the theoretical yield, and the quantities of materials that should be used). Once the load sheet is received by production, the materials are requisitioned and sent to the blending room. The chemicals and minerals are added in the order specified and blended together for two to eight hours, depending on the product. After blending, the mix is put on long trays and sent to the drying room, where it is allowed to dry until the moisture content is 7 to 9 percent. Drying time for most products is from one to three days.

After the product is dry, several small samples are taken and sent to a laboratory to be checked for bacterial level and to determine whether the product meets customer specifications. If the product is not fit for human consumption or if it fails to meet customer specifications, additional materials are added under the direction of the chemist to bring the product up to standard. Once the product passes inspection, it is ground into a powder of different meshes (particle sizes) according to customer specifications. The powder is then placed in heavy cardboard drums and shipped to the customer (or, if requested, put in tablet or capsule form and then shipped).

Since each order is customized to meet the special needs of its customers, Nutratask uses a job-order costing system. Recently, Nutratask received a request for a 300-kilogram order of potassium aspartate. The customer offered to pay $8.80 per kilogram. Upon receiving the request and the customer's specifications, Lanny Smith, the marketing manager, requested a load sheet from the company's chemist. The load sheet prepared showed the following material requirements:

Material	*Amount Required*
Aspartic acid	195.00 kg
Citric acid	15.00
K_2CO_3 (50%)	121.50
Rice	30.00

The theoretical yield is 300 kg.

Lanny also reviewed past jobs that were similar to the requested order and discovered that the expected direct labor time was 16 hours. The production workers at Nutratask earn an average of $6.50 per hour plus $6 per hour for taxes, insurance, and additional benefits.

Purchasing sent Lanny a list of prices for the materials needed for the job.

	Material Price per Kilogram
Aspartic acid	$5.75
Citric acid	2.02
K_2CO_3	4.64
Rice	0.43

Overhead is applied using a companywide rate based on direct labor dollars. The rate for the current period is 110 percent of direct labor dollars.

Whenever a customer requests a bid, Nutratask usually estimates the manufacturing costs of the job and then adds a markup of 30 percent. This markup varies depending on the competition and general economic conditions. Currently, the industry is thriving, and Nutratask is operating at capacity.

Required:

1. Prepare a job-order cost sheet for the proposed job. What is the expected per-unit cost? Should Nutratask accept the price offered by the prospective customer? Why or why not?
2. Suppose Nutratask and the prospective customer agree on a price of cost plus 30 percent. What is the gross profit that Nutratask expects to earn on the job?
3. Suppose that the actual costs of producing 300 kg of potassium aspartate were as follows:

Direct materials:	
Aspartic acid	$1,170.00
Citric acid	30.00
K_2CO_3	577.00
Rice	13.00
Total materials cost	$1,790.00
Direct labor	$ 225.00
Overhead	247.50

   What is the actual per-unit cost? The bid price is based on expected costs. How much did Nutratask gain (or lose) because of the actual costs differing from the expected costs? Suggest some possible reasons why the actual costs differed from the projected costs.
4. Assume that the customer had agreed to pay *actual* manufacturing costs plus 30 percent. Suppose the actual costs are as described in Requirement 3 with one addition: an underapplied overhead variance is allocated to Cost of Goods Sold and spread across all jobs sold in proportion to their total cost (unadjusted cost of goods sold). Assume that the underapplied overhead cost added to the job in question is $30. Upon seeing the addition of the underapplied overhead in the itemized bill, the customer calls and complains about having to pay for Nutratask's inefficient use of overhead costs. If you were assigned to deal with this customer, what kind of response would you prepare? How would you explain and justify the addition of the underapplied overhead cost to the customer's bill?

5-25 Research Assignment

LO1, LO2, LO3

Interview an accountant who works for a service organization that uses job-order costing. For a small firm, you may need to talk to an owner/manager. Examples are a fu-

neral home, insurance firm, repair shop, medical clinic, and dental clinic. Write a paper that describes the job-order costing system used by the firm. Some of the questions that the paper should address are:

a. What service(s) does the firm offer?
b. What document or procedure do you use to collect the costs of the services performed for each customer?
c. How do you assign the cost of direct labor to each job?
d. How do you assign overhead to individual jobs?
e. How do you assign the cost of direct materials to each job?
f. How do you determine what to charge each customer?
g. How do you account for a completed job?

As you write the paper, state how the service firm you investigated adapted the job-order accounting procedures described in this chapter to its particular circumstances. Were the differences justified? If so, explain why. Also, offer any suggestions you might have for improving the approach that you observed.

5-26 Collaborative Learning Exercise

LO1, LO2, LO3

Use "think-pair-share" to work on this exercise. First, read the following exercise. Then, take one to two minutes to think of your answers. Pair with another student to discuss your answers. Finally, be prepared to share your responses with the rest of the class.

Name a product and a service you have purchased that you believe was accounted for using job-order costing. Explain why you think so. Then, think how that product and service can be transformed such that process costing would be appropriate.

5-27 Cyber Research Case

Hospitals, clinics, and doctors' offices use a job-order costing system. This has led to extensive paperwork involving patients' records, billings, and insurance company reimbursements. A number of medical offices are exploring the possibility of paperless offices. For example, Kaiser Permanente, Hawaii's largest HMO, began its move to paperless records in 2004. (See Kristen Sawada, "Kaiser Prepares Switch to Paperless Medical Records," *Pacific Business News*, March 19, 2004, http://www.bizjournals.com/pacific/stories/2004/03/22/focus3.html?jst=s_rs_hl.) Discuss the problems that are driving medical offices to electronic record keeping, and the systems that have been developed to serve this field. Use the Internet to find firms that have developed software to improve productivity and efficiency in medical environments. What problems remain to be solved?