

CHAPTER

5

Job Costing

► In Brief

Custom products and services, which are produced singly or in small batches, need to be valued for financial statements, tax reporting, and management monitoring. Job costing is an accounting method used to assign product costs to custom products or services. In job costing, direct costs are traced and overhead costs are allocated to individual jobs. Sometimes defects occur in custom products. Defective units can sometimes be reworked. The costs for both spoilage and rework need to be accounted for, as does the cost of scrap that arises from production.

This Chapter Addresses the Following Questions:

- Q1** How are costs assigned to customized goods and services?
- Q2** How is overhead allocated to individual jobs?
- Q3** What is the difference between actual costing and normal costing?
- Q4** What are the uses and limitations of job cost information?
- Q5** How are spoilage, rework, and scrap handled in job costing?
- Q6** What are the quality and behavioral implications of spoilage?

BOMBARDIER: CUSTOM MANUFACTURING

In 1942, the Canadian company **L'Auto-Neige Bombardier Limitée** began manufacturing tracked vehicles for snow-covered terrain. These vehicles were early models of what later became snowmobiles. In English, L'Auto-Neige means snow car. Over time, the company developed expertise in building engines and expanded into other markets such as personal watercraft, aircraft, subway cars, buses, and jet boats.

The company, eventually known as **Bombardier Inc.**, continued to expand, often by acquiring existing companies. For example, it acquired **Canadair** (the leading Canadian aircraft manufacturer), **Pullman Railcars** in the United States, and an Irish manufacturer of civil and military aircraft and defense systems.

In 1990, Bombardier acquired **Learjet Corporation**, a U.S. manufacturer of business aircraft. Learjet manufactures high-performance business jets. The jets, though relatively small, are well-appointed with interiors designed for personal comfort and convenience. They are often referred to as the limousines of the skies. These jets are



built at Bombardier's plant in Wichita, Kansas. Models include the Learjet 31A (light jet), Learjet 45 (super-light jet), and Learjet 60 (midsize jet).

Bombardier operates Learjet completion centers in Wichita and Tucson, Arizona. The completion centers provide customized services such as exterior painting and installation of cabinetry and furniture. Corporate jet customers often order specialized interiors, including unique fabric, carpet,

wood, and color; ergonomic seating; sound, video, and satellite communication systems; distinctive galleys; water systems; custom wiring; bulkhead reinforcements; and sound-proofing.

The center in Wichita completes approximately 120 Learjet 45 aircraft per year. Different types of work are performed in different areas of the facility. The facility includes two paint booths, two sand-and-strip areas, four preparation areas, and an interior mock-up room. ■

SOURCES: www.aerospace.bombardier.com/ and www.learjet.com.

TRACKING COSTS FOR CUSTOMIZED PRODUCTS AND SERVICES

■ Key Accounting Design Issues for Bombardier

Bombardier's Learjet subsidiary produces corporate jets, and Learjet's completion centers provide services such as exterior painting and installation of cabinetry and furniture. When an organization produces customized products or services, specific accounting methods are required for measuring and monitoring both costs and profits. The following discussion summarizes key aspects of the issues Bombardier's accountants must consider as they design and use a cost system for Learjet completion services.

Knowing. Bombardier's Wichita completion center facility is divided into different areas where different types of work are performed. Each area uses different types of direct materials and requires employees to perform different types of work. To develop an appropriate accounting system, Bombardier's accountants need two major types of knowledge:

1. Types of completion costs and processes
 - The nature of work performed in each area
 - Costs that are common across all jets in a particular work area
 - Costs that vary with customization
 - Points in the completion process where cost information can be captured by the accounting system
2. Design of accounting systems and managers' information needs
 - Categorization of direct and indirect costs within each work area
 - Methods for tracing direct costs to each customized job
 - Methods for allocating indirect costs
 - Creation of meaningful cost and profit reports

Identifying. Accountants face many uncertainties in measuring costs for customized products. Suppose employees in the completion center need special training to properly install a particular type of bulkhead reinforcement. The training cost relates only to jets with this type of bulkhead reinforcement installed. How much of the training cost relates to a single jet with that feature, especially if the number of other orders requesting that feature is unknown? As another example, suppose a variety of supplies such as tool lubrication are used during production. It is generally not possible to measure the precise amount of supplies used for *each* jet; such measurements require estimation. Because of these uncertainties, Bombardier's accountants cannot measure with complete accuracy the costs for customized jet completion services. Instead, their goal is to provide a *reasonable* measure of each jet's cost.

Exploring. No single accounting system best measures costs for all customized products. Therefore, Bombardier's accountants must:

- Analyze alternative system design features
- Explore the pros and cons of alternative accounting methods, including costs and benefits
- Explore ways in which the company and its customization services affect the design of the accounting system
- Anticipate the needs of managers and others using the accounting information

Prioritizing. Bombardier's accountants weigh a variety of criteria as they choose among alternative designs for capturing and reporting cost information for customized products, including the following:

- Capturing significant direct costs and tracing them to individual products
- Logically allocating overhead costs
- Reporting relevant cost and profit information to managers and other users
- Motivating employees to use the organization's resources efficiently
- Ensuring that the costs of the accounting system do not exceed the benefits

Envisioning. Bombardier's accountants must continuously monitor and reconsider the design of accounting systems. Changes in the system might be triggered by changes in the business environment, technologies, the products themselves, or production processes.

■ Measuring and Monitoring Product Costs

Managers necessarily measure past costs when producing financial statements and other reports of an organization’s profits. Outsiders, such as shareholders, use profitability to evaluate management performance and to make investment and other decisions. Past cost information is also used by managers to monitor operations, develop estimated costs for bids, and sometimes make long-term decisions such as whether to introduce a new product. To enable these various uses for cost information, we need to distinguish between product costs and other costs that are not directly related to production.

In this chapter, we focus on measuring and monitoring the product cost of customized goods and services. Customized products pose special problems because the nature and levels of costs vary from product to product. Therefore, the accounting systems must be designed to capture costs for individual units or batches of goods or services as the manufacturing or service delivery process unfolds.

ASSIGNING
PRODUCT COSTS
TO INDIVIDUAL
GOODS OR
SERVICES

Q1 How are costs assigned to customized goods and services?

CHAPTER REFERENCE
Chapter 2 defined *overhead costs* as all production costs except direct materials and direct labor.

Product costs are the direct and indirect costs of producing goods or services. For the production of a Bombardier Learjet, direct costs include materials such as metal, wiring, and cabinetry as well as labor directly involved in the production of an individual jet. In addition to direct materials and direct labor costs, product costs also include overhead costs related to production. At Bombardier, production overhead includes costs related to the manufacturing facility, such as depreciation of equipment and insurance costs. Product costs exclude the cost of operating activities that are not directly related to production, such as selling and administration.

The ease with which production costs are traced to individual products or services often depends on the degree of customization. As illustrated in Exhibit 5.1, some goods and services are one of a kind, and some are uniform. Other products require a hybrid process, in which most of the product is uniform but select features are customized. Bombardier’s Learjet 45 model is a hybrid product. It has a single uniform aircraft design and manufacturing process, but the exterior paint and interior furnishings are customized at the completion center.

■ Process Costing

When goods or services are uniform and are mass-produced, tracing product costs to individual units is generally inefficient, if not impossible. For example, it would be impractical to trace the cost of food ingredients to a single box of breakfast cereal that is mass-produced. **Process costing** allocates both direct and overhead costs to continuous-flow processing lines;

EXHIBIT 5.1 Products with Varying Degrees of Customization

Product or Service	Customized	Hybrid	Uniform
Automobiles	One-of-a-kind vehicle (for example, a racing car)	Produced on an assembly line, but customer chooses colors, amenities	Produced on a continuous flow assembly line without customer specifications
Jewelry	Hand-designed and fabricated	Setting a specific diamond into a mass-produced gold ring	Uniform pieces of jewelry produced continuously
Accounting and tax services	Income tax research performed for a specific client	Tax services offered by the hour	Mass-produced tax returns such as 1040EZ
Health care	Hospitals: each patient receives treatment using different resources	Blood donation center	Flu vaccinations

it is the approach generally used for mass-produced products. Direct and indirect costs are traced and allocated to production departments, and then allocated to units. Industries that use process costing include food and beverage manufacturers, petroleum refiners, and plastic and metal manufacturers. The details of process costing are found in Chapter 6.

■ Job Costing

ALTERNATIVE TERMS

Direct material and direct labor costs are also called *prime costs*.

When goods or services are customized, many costs are easily traced to individual products. For example, the interiors of Bombardier’s Learjets are customized to suit each customer. Costs of direct materials such as carpeting or handcrafted cabinetry can easily be traced to an individual jet. It is also easy to trace the cost of direct labor to install the carpet and cabinetry. Other production costs, such as the completion facility manager’s salary or building insurance are indirect and are allocated as part of overhead to an individual jet.

When a customer with specific product or service requirements places an order, we call the order a job. For example, suppose a famous diva orders a custom Learjet with a pink and white lace interior. Bombardier would consider this order a job. Orders are also placed for batches of product, such as a batch of a particular style and size of men’s running shoes sold under the brand name of a retail shoe store. The shoe manufacturer would consider this order a job. Orders are also placed for services, such as the preparation of a tax return. When a client brings his tax records to an accountant, the accounting firm considers this order a job.

Job costing is the process of assigning costs to custom products or services. Direct materials and direct labor are traced to individual jobs, and production overhead is allocated. Manufacturers that use job costing include aircraft builders, custom motorcycle and automobile manufacturers, and custom designed jewelers, among others. Job costing is also frequently used in service industry organizations such as hospitals, accounting firms, and repair shops. We first learn about job costing in a manufacturing setting. Later in the chapter, we learn about job costing for services.

ALTERNATIVE TERMS

The term *job order costing* means the same as *job costing*.

JOB COSTING IN MANUFACTURING

Q1 How are costs assigned to customized goods and services?

One of the purposes of measuring current and past product costs is to provide information for financial statements. Under generally accepted accounting principles (GAAP), product costs must be assigned to inventory. Then, when products are sold, the cost is transferred to cost of goods sold. This practice allows inventory to be reported at cost on the balance sheet, and cost of goods sold to be matched against revenues on the income statement. Thus, job costing in a manufacturing organization assigns costs first to inventory and then to cost of goods sold when jobs are completed and sold, as shown in Exhibit 5.2.

EXHIBIT 5.2 Cost Flows in a Manufacturing Job Costing System

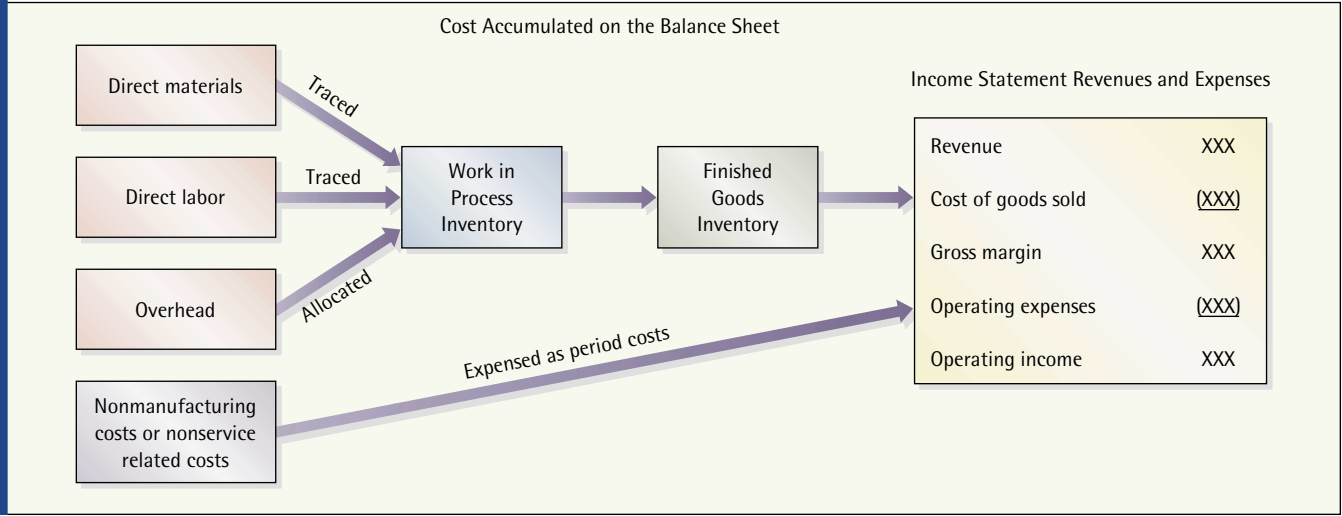
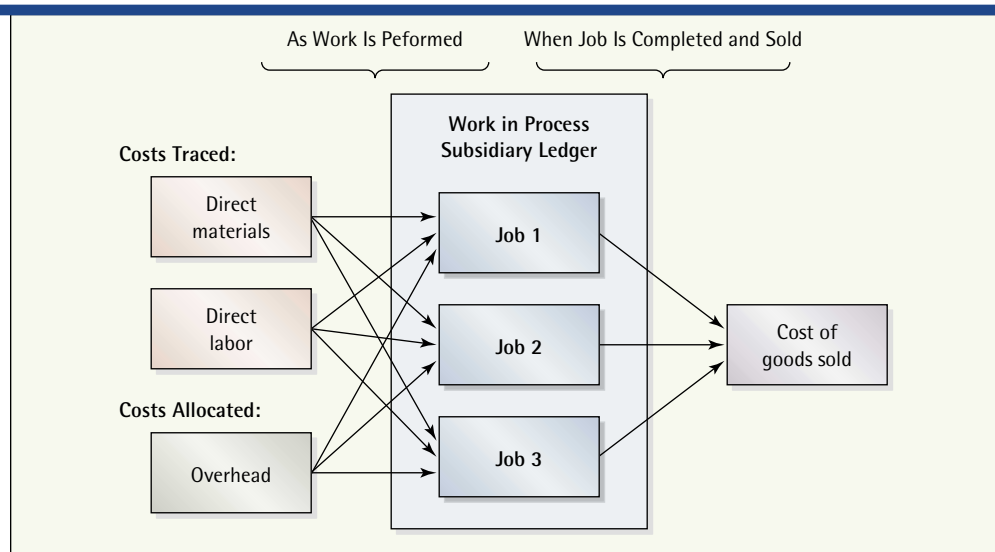


EXHIBIT 5.3
Tracing and Allocating
Product Costs to Jobs



To measure the cost of individual jobs, job costing systems typically include a subsidiary ledger. As shown in Exhibit 5.3, direct costs are traced and overhead costs are allocated to each job. Total work in process (WIP) is equal to the sum of the accumulated costs for all jobs in the subsidiary ledger.

■ Assigning Direct Costs

Accounting records are used to trace the costs of direct materials and direct labor to each job. For example, suppose that Aluminum Benders, Inc., produces aluminum vents for heating and cooling systems. The company works with contractors on large commercial buildings. Each job requires different styles and lengths of vents and joints. Therefore, the company uses job costing. Work is performed in two different departments: machining and assembly.

Source documents are manual or electronic records created to capture and provide information about transactions or events. For example, the direct labor employees at Aluminum Benders create daily time reports that show the time they spend on individual jobs. The accounting department uses the time reports to calculate employee pay and to trace direct labor hours to individual jobs. As shown in Exhibit 5.4, each time report may include several different jobs. Similarly, when materials such as sheet metal or metal joints are requisitioned for each job, they are tracked in the accounting system using the materials requisition form shown in Exhibit 5.4.

The cost and activity information gathered from source documents is used to record costs in a subsidiary ledger for each new job. This record is called a **job cost record** and contains all of the costs traced and assigned to a specific job, as shown in Exhibit 5.4. At Aluminum Benders, the cost per unit of direct materials is obtained from the company's raw materials inventory records. The hourly rate of pay for each employee is obtained from payroll records. Other companies may use an estimated, budgeted, or standard cost for direct materials and direct labor.

The sample job cost record shown in Exhibit 5.4 includes the direct costs of work performed on Job 482 in Aluminum Benders' Machining Department. The record is not yet complete; only some materials and labor have been recorded thus far, and the indirect costs have not yet been allocated. Aluminum Benders' job costing system calculates summary costs (totals for direct materials, direct labor, and manufacturing overhead by department) on each job cost record. The detailed information in the job cost record and the totals in work in process inventory are updated as new costs are incurred, until the job is completed.

■ Computerized and Manual Job Costing Systems

Maintaining the detailed job cost records shown in Exhibit 5.4 can be time-consuming and prone to clerical error. Therefore, job cost records are often part of a software package.

ALTERNATIVE TERMS

Some organizations use the terms *job sheet* or *job record* instead of *job cost record*.

CHAPTER REFERENCE

For more information on standard costs see Chapters 6 and 11.

EXHIBIT 5.4 Job Cost Record for Aluminum Benders

Machining Department Materials Requisition No.: 213

Job Number: 482

Date: March 13, 2005

Description	Stock #	Quantity
Sheet metal	4505	16 sheets
Metal joints	3200	30 joints

Authorization: _____

Machining Department Labor Time Report

Employee Name: Karen Otto

Employee Number: 204

Date: March 13, 2005

Job number	Start time	End time	Hours
482	8:00	12:00	4.00
485	1:00	3:00	2.00
486	3:00	5:00	2.00
Total hours			8.00

Job Cost Record for Job: 482

Customer: Fallon Construction Company

Date started: March 13, 2005

Date completed: _____

Machining Department: Direct Materials

Date	Part number	Quantity	Cost per unit	Total Cost
3/13/05	#4505	16	\$20.00	\$320.00
3/13/05	#3200	30	\$10.00	\$300.00
Total				\$620.00

Machining Department: Direct Materials

Date	Employee #	Hours used	Hourly rate	Total Cost
3/13/05	204	4	\$15.00	\$60.00
3/13/05	206	6	\$14.00	\$84.00
Total				\$144.00

Cost per unit from raw materials inventory records

Hourly rate from payroll records

Direct labor and direct material data are entered into electronic source documents (on-line time records and material requisitions). From there, the data are automatically posted into the job cost record and the general ledger system. This approach allows managers to immediately view job costs even before the job is completed. Specialized software packages are most likely to be used in large organizations or in businesses where jobs are complex or require many resources.

In small businesses, job cost records may be tied less formally to the general ledger system. Instead of using source documents to track direct costs, organizations may use a manual job cost record to track direct costs for individual jobs. The job sheet is physically attached to an individual job. As materials and direct labor hours are added to the job, the amounts are recorded on the sheet. An artist might use this method when producing crafts and art pieces. Carpenters and home contractors also frequently use this method to monitor direct costs. Amounts from the job cost sheet are recorded in the job cost record in the subsidiary ledger on a periodic basis, when the job is complete, or sometimes as resources are used.

CURRENT PRACTICE

Kinko's stores use a manual job sheet to keep track of the work performed and prices charged to customers for individual print jobs.

ALLOCATING OVERHEAD

Q2 How is overhead allocated to individual jobs?

Overhead includes all production costs except direct materials and direct labor. Allocating overhead to individual products is a two-stage process. In the first stage, a variety of overhead costs are collected in an overhead cost pool. A **cost pool** is a group of individual costs that are accumulated for a particular purpose. In the second stage, costs are allocated from the cost pool to individual jobs. Successful completion of the two stages requires four steps as follows.

1. Identify the relevant cost object.
2. Identify one or more overhead cost pools and allocation bases.
3. For each overhead cost pool, calculate an overhead allocation rate.
4. For each overhead cost pool, allocate costs to the cost object.

1. Identify the relevant cost object. In a job costing system, the cost object is a job. Sometimes a job consists of an individual product, and sometimes it consists of a batch of

HELPFUL HINT

In process costing systems, overhead is allocated to departments and then to units. In ABC systems (Chapter 7), overhead is allocated to activities and then to units, batches, product lines, or other cost objects.

CHAPTER REFERENCE

In Chapter 2, a *cost driver* was defined as some input or activity that causes changes in total cost for a cost object.

ALTERNATIVE TERMS

The terms *cost application base* and *application base* mean the same as *allocation base*.

products. For example, a job at a **Bombardier** completion center consists of the exterior and interior completion of one Learjet. A job at Aluminum Benders consists of a large number of aluminum vents required for a specific building.

2. Identify one or more overhead cost pools and allocation bases. Overhead costs are accumulated in one or more cost pools. Some organizations use a single company-wide or plantwide cost pool for all fixed and variable overhead costs. Other organizations use separate cost pools for fixed and variable overhead costs. Fixed overhead includes costs such as production management salaries and space rental. Variable overhead includes any cost that varies with activity levels, such as supplies and, sometimes, electricity. If work is performed in separate departments or work areas, separate overhead cost pools may be designated for each department or activity. Accountants use judgment in choosing the number and type of overhead cost pools for a given organization.

The choice of overhead cost pools depends on the organization of production, the nature of overhead costs, and the usefulness of different types of overhead information to management. For example, Bombardier's Wichita completion center has two paint booths, two sand-and-strip areas, four preparation areas, and an interior mock-up room. Each work area might be under the supervision of a different manager who is responsible for controlling costs. The use of separate overhead cost pools for each area would help top management monitor the performance of area managers. Alternatively, a single manager might oversee multiple work areas. If one manager is responsible for the exterior paint operation, overhead costs might be combined for the two paint booths. Organizations are also more likely to use different overhead cost pools for different types of work activities. For example, exterior painting is a different type of activity from preparation work such as installing carpeting, seating, and wiring. It is appropriate to use different cost pools when the nature or level of overhead costs differs across activities.

For each overhead cost pool, an **allocation base** is chosen to assign overhead costs to cost objects. If some portion of an overhead cost pool varies with a cost driver, it can be used as the allocation base. For example, the cost of some employee benefits varies with labor hours and labor costs. Indirect costs such as supplies in a paint area may vary with machine use. For cost pools that consist only of variable costs or a mixture of fixed and variable costs, accountants use allocation bases that are likely to affect at least a portion of the costs. For a fixed overhead cost pool, accountants choose an allocation base that is related to activities even though fixed costs are not expected to vary with the allocation base. Manufacturing job costing systems frequently allocate overhead using one of the following bases:

- Direct labor hours
- Direct labor costs
- Machine hours

3. For each overhead cost pool, calculate an overhead allocation rate. The **allocation rate** is the dollar amount per unit of allocation base used to allocate overhead to each cost object. (In a job costing system, each job is a cost object.) If we know the total amount of overhead cost and the total quantity of the allocation base, the **actual overhead allocation rate** is calculated as follows:

$$\text{Actual allocation rate} = \frac{\text{Actual overhead cost}}{\text{Actual quantity of allocation base}}$$

Alternatively, overhead may be allocated using an **estimated allocation rate**. To compute an estimated rate for the next period, we estimate total overhead costs and the total quantity of the allocation base, and then calculate the rate as follows:

$$\text{Estimated allocation rate} = \frac{\text{Estimated overhead cost}}{\text{Estimated quantity of allocation base}}$$

Suppose we estimate overhead costs for Bombardier's exterior painting areas as \$216,000 for the next three months and the hours paint employees will work as 5,400. If we use direct labor hours to allocate overhead costs, then the overhead allocation rate will be

$$\$216,000 \div 5,400 \text{ hours} = \$40 \text{ per direct labor hour}$$

EXHIBIT 5.5
Partial Job Cost Record
Showing Overhead
Allocation for Aluminum
Benders

Job Cost Record for Job: <u>482</u>		Customer: Fallon Construction Company		
Date started: <u>March 13, 2005</u>		Date completed: _____		
Machining Department: Overhead				
Date	Allocation Base	Hours Used	Allocation Rate per Hour	Allocated Overhead
3/13/05	Machine hours	3	\$56.00	\$168.00
Total				\$168.00

INTERNATIONAL

In Japan, fixed overhead is allocated using labor hours because accountants and managers believe that this allocation base encourages the substitution of capital for labor in advanced manufacturing technology.¹

4. For each overhead cost pool, allocate costs to the cost object. We allocate overhead costs by multiplying the overhead allocation rate times the quantity of the allocation base used by each job. In the previous example, we calculated the painting area’s overhead allocation rate to be \$40 per direct labor hour. When an exterior painting job requires 64 direct labor hours, the overhead cost allocation is

$$64 \text{ direct labor hours} \times \$40 \text{ per direct labor hour} = \$2,560$$

The overhead rate is also useful when completion center managers need to prepare bids for new jobs. Once the labor hours are estimated for a bid, the estimated allocation rate is used to estimate overhead cost for the job.

Software packages that trace direct costs to jobs can also automatically allocate overhead. Suppose labor cost is used to allocate overhead. As the software package records labor costs in specific job cost records, overhead is allocated to the job at the same time. However, the accounting department might need to create a source document to gather the allocation base information (such as machine hours) needed to allocate overhead costs. Data for direct labor hours and direct labor costs are automatically collected for payroll calculations, but specific details about each job’s use of labor or machine hours need to be recorded by job in a job costing system. Appropriate data about machine hour usage might not be available unless special records are maintained.

For Aluminum Benders, suppose overhead in the machining department is allocated using machine hours. The company’s accountants created an on-line system so that the machine operator records the machine hours used for each job. If three machine hours are recorded for Job 482 and the overhead is allocated based on an estimated allocation rate of \$56.00 per machine hour, then the computer automatically allocates \$168.00 in machining department overhead to Job 482, as shown in Exhibit 5.5.

Actual and Normal Costing

Q3 What is the difference between actual costing and normal costing?

Under **actual costing**, overhead is allocated using the actual volume of the allocation base times the actual allocation rate. Because managers often need cost information before total actual cost and resource use information is available at the end of the period, estimates are typically used to allocate overhead. When the estimated allocation rate and actual quantity of the allocation base are used to allocate overhead, as in the preceding example, the method is called **normal costing**. Information from normal costing systems is used to prepare interim income statements, manage costs, and estimate costs for bids throughout a period. Exhibit 5.6 compares actual costing and normal costing. Under both methods, actual direct materials and direct labor are traced to each job.

Following is a more complete example of the normal costing method for Aluminum Benders.

¹M. Lucas, “Absorption Costing for Decision Making,” *Management Accounting*, October 1997, pp. 42–44.

EXHIBIT 5.6 Similarities and Differences Between Actual and Normal Costing

	Actual Costing	Normal Costing
Direct Costs Recorded	Actual cost of direct materials and direct labor	Actual cost of direct materials and direct labor
Overhead Cost Allocation Rate	$\frac{\text{Actual overhead cost}}{\text{Actual quantity of allocation base}}$	$\frac{\text{Estimated overhead cost}}{\text{Estimated quantity of allocation base}}$
Overhead Allocation	Actual allocation rate \times Actual quantity of allocation base	Estimated allocation rate \times Actual quantity of allocation base

GUIDE YOUR LEARNING 5.1 Key Terms

Stop to confirm that you understand the new terms introduced in the last several pages:

*Product costs (p. 177)	*Allocation base (p. 181)
Process costing (p. 177)	Allocation rate (p. 181)
Job costing (p. 178)	Actual allocation rate (p. 181)
*Source documents (p. 179)	Estimated allocation rate (p. 181)
Job cost record (p. 179)	Actual costing (p. 182)
*Cost pool (p. 180)	Normal costing (p. 182)

For each of these terms, write a definition in your own words. For starred terms, list at least one example that is different from the ones given in this textbook.



ALUMINUM BENDERS (PART 1)
ALLOCATING OVERHEAD COSTS IN JOB COSTING

Sean Hardy, recently hired as the accountant for Aluminum Benders, is responsible for producing annual financial statements for the owners, creditors, and employees. He knows that product costs must be allocated to each job for the financial statements and also for preparing the organization's income tax returns. Sean is also responsible for preparing cost reports to help management monitor direct and indirect job costs. Because he is new to the company, Sean needs to learn about the company's past job costing methods. He also plans to evaluate the quality of the methods to determine whether changes are needed.

Evaluating Overhead Cost Pools and Allocation Bases

Sean learns that the company consists of two departments, machining and assembly. Separate overhead cost pools are used in each department, but fixed and variable costs are combined in each pool. In the machining department, overhead is allocated to production jobs using machine hours as the allocation base. In the assembly department, direct labor cost is used as the allocation base. In addition, the company uses a normal costing method to allocate an estimated overhead rate to each job.

Sean meets with the supervisor of each department to discuss the best allocation bases to use. In machining, he learns that the machines require little direct labor. A large portion of cost in the overhead pool relates to operating the machines, such as depreciation, maintenance, and replacement parts. Thus, Sean concludes that machine hours are a reasonable allocation base.

The assembly department has few machines, but labor is used heavily. The labor mix is varied, with both skilled and unskilled workers. Sean agrees that direct labor cost is a reasonable allocation base because some overhead expenses, such as vacation and sick leave pay, vary with labor cost.

Understanding the Overhead Cost Allocation Method

The following estimates were developed by Sean's predecessor for all manufacturing during 2005:

	Machining	Assembly
Production overhead	\$1,400,000	\$2,400,000
Direct labor cost	\$ 700,000	\$1,000,000
Direct labor hours	35,000	100,000
Machine hours	25,000	10,000

(continued)

Sean uses this information to verify computations for the estimated overhead allocation rate for each department:

Machining: $\$1,400,000 \div 25,000 \text{ machine hours} = \$56.00 \text{ per machine hour}$
Assembly: $\$2,400,000 \div \$1,000,000 \text{ direct labor cost} = 240\% \text{ of direct labor cost}$

Sean wants to be sure he understands how the company's job costing system allocates overhead cost, so he recalculates the allocations for Job 482. This job was completed this week and shipped to a large office building construction site. He obtains the following information from the job cost record for Job 482:

	Machining	Assembly
Direct materials requisitioned	\$40,000	\$70,000
Direct labor cost	\$28,000	\$10,000
Direct labor hours	200	1,000
Machine hours	100	500

Using the allocation rates computed previously, Sean recalculates the amount of overhead for Job 482 as follows:

Machining: $100 \text{ machine hours} \times \$56.00 \text{ per machine hour} = \$5,600$
Assembly: $\$10,000 \text{ direct labor cost} \times 240\% \text{ of direct labor cost} = \$24,000$

Next, Sean queries the job costing system to create a report for management of the total costs for Job 482 as follows:

	Machining	Assembly	Total
Direct materials requisitioned	\$40,000	\$ 70,000	\$110,000
Direct labor cost	28,000	10,000	38,000
Overhead allocated	5,600	24,000	29,600
Total cost	<u>\$73,600</u>	<u>\$104,000</u>	<u>\$177,600</u>

Sean believes it would be helpful to management if the report also included the revenue and profit, as well as the original job bid. However, the job costing system currently cannot access those pieces of information. Sean decides to investigate ways to link the job costing system with revenue and job bid data.

GUIDE YOUR LEARNING 5.2 Aluminum Benders (Part 1)

Aluminum Benders (Part 1) illustrates job costing entries. For this illustration:

Define It	Identify Uncertainties	Explore Pros and Cons
In your own words, explain the purpose of allocating overhead to jobs.	What types of uncertainties were there? Consider uncertainties about: <ul style="list-style-type: none">• Choice of overhead cost pools• Choice of overhead allocation bases• Estimated overhead allocation rates	<ul style="list-style-type: none">• In your own words, explain why Sean decided that each overhead allocation base was reasonable.• Provide possible arguments that the overhead allocation bases were not appropriate.• Provide possible reasons why fixed and variable costs were combined in the overhead cost pools.

GENERAL LEDGER ENTRIES FOR A MANUFACTURER

The general ledger in a manufacturer's job costing system typically includes separate inventory accounts for raw materials, work in process, and finished goods. These accounts are illustrated in Exhibit 5.7, which shows the entries that would be used by Aluminum Benders for Job 482. Purchases of raw materials (not illustrated) are recorded in the raw materials inventory account. As direct materials are traced to a job, the cost of the materials is transferred to

EXHIBIT 5.7 T-Accounts and Journal Entries for Job 482

Raw Material Inventory		Job 482 Work in Process Inventory		Finished Goods Inventory		Cost of Goods Sold	
	40,000 1	1 40,000		7 177,600	177,600 8	8 177,600	
	70,000 4	2 28,000					
		3 5,600					
		4 70,000					
		5 10,000					
		6 24,000	177,600 7				
		0					
Wages Payable		Machining Department Overhead Cost Control		Assembly Department Overhead Cost Control			
	28,000 2		5,600 3		24,000 6		
	10,000 5						

Journal Entries:

1	Work in process (Job 482)	40,000	
	Raw material inventory		40,000
	To record direct materials requisitioned for Job 482 in machining		
2	Work in process (Job 482)	28,000	
	Wages payable		28,000
	To record direct labor used for Job 482 in machining		
3	Work in process (Job 482)	5,600	
	Machining department overhead cost control		5,600
	To record overhead allocated to Job 482 in machining		
4	Work in process (Job 482)	70,000	
	Raw material inventory		70,000
	To record direct materials requisitioned for Job 482 in assembly		
5	Work in process (Job 482)	10,000	
	Wages payable		10,000
	To record direct labor used for Job 482 in assembly		
6	Work in process (Job 482)	24,000	
	Assembly department overhead cost control		24,000
	To record overhead allocated to Job 482 in assembly		
7	Finished goods inventory (Job 482)	177,600	
	Work in process (Job 482)		177,600
	To record completion of Job 482		
8	Cost of goods sold	177,600	
	Finished goods inventory (Job 482)		177,600
	To record the delivery of Job 482		

Q1 How are costs assigned to customized goods and services?

Q2 How is overhead allocated to individual jobs?

work in process inventory (entries 1 and 4). Some types of direct materials, such as supplies, are not traced to individual jobs when they are used; these costs are transferred into an overhead cost pool. However, this situation is not illustrated in Exhibit 5.7. As direct labor employees report their work time, the cost of their wages is debited to the jobs they work on and wages payable is credited for the wages earned (entries 2 and 5).²

Many organizations use overhead cost control accounts to monitor the costs for each overhead cost pool. As actual overhead costs are incurred, they are debited to the control account. For example, the assembly department supervisor's salary would be debited to the assembly

²The direct labor entries in Exhibit 5.7 show only the part of employee wages payable that relate to Job 482. The total amount of an individual employee's wages would be credited to wages payable, and debit entries would be made to all of the jobs the employee worked on during the pay period.

Overapplied and Underapplied Overhead

To correct for overapplied or underapplied overhead, we first compare the amount of overhead allocated to actual overhead cost. Suppose it is the end of the fiscal year at Aluminum Benders. Balances in the overhead cost control accounts for the machining department and assembly department cost pools are shown in Exhibit 5.8(a). Machining department overhead costs incurred totaled \$1,600,000, while costs allocated to jobs totaled \$1,120,000 (20,000 machine hours \times \$56). Assembly department overhead costs incurred totaled \$2,700,000, while costs allocated to jobs totaled \$2,880,000 (\$1,200,000 direct labor cost \times 240%). The combined amount of overapplied (underapplied) overhead is

Machining Department Overhead Cost Control Account			Assembly Department Overhead Cost Control Account		
Total costs incurred	1,600,000	1,120,000	Total costs incurred	2,700,000	2,880,000
Underapplied overhead	480,000				180,000
		Total costs allocated			Total costs allocated
					Overapplied overhead

Because the method of adjusting for overapplied or underapplied overhead depends on materiality, we need to decide whether the \$300,000 amount for Aluminum Benders is material. One way to evaluate materiality is to calculate the net overapplied or underapplied overhead as a percent of actual overhead costs. For Aluminum Benders, this calculation follows:

$$\$300,000 \div (\$1,600,000 + \$2,700,000) = 7\%$$

Many accountants view amounts smaller than 10% to be immaterial. If we decide that the adjustment for Aluminum Benders is immaterial, we adjust the cost of goods sold total. Because overhead was underapplied, cost of goods sold would be increased, as follows:

HELPFUL HINT

Some accountants might use cost of goods sold to determine materiality.

Cost of goods sold	300,000	
Assembly department overhead cost control	180,000	
Machining department overhead cost control		480,000

If we decide that the adjustment for Aluminum Benders is material, it must be prorated among work in process, finished goods, and cost of goods sold. Suppose the balances in these accounts before the adjustment are:

Ending work in process	\$ 100,000
Finished goods	20,000
Cost of goods sold	10,000,000
Total	<u>\$10,120,000</u>

The adjustment of \$300,000 would be prorated among these accounts based on each account's proportion of the total. The adjusting journal entry would be:

Ending work in process (\$100,000 ÷ \$10,120,000 × \$300,000)	2,964	
Finished goods (\$20,000 ÷ \$10,120,000 × \$300,000)	593	
Cost of goods sold (\$10,000,000 ÷ \$10,120,000 × \$300,000)	296,443	
Assembly department overhead cost control	180,000	
Machining department overhead cost control		480,000

The balances before and after the adjustment would be:

	Before Adjustment	Adjustment	After Adjustment
Ending work in process	\$ 100,000	\$ 2,964	\$ 102,964
Finished goods	20,000	593	20,593
Cost of goods sold	10,000,000	296,443	10,296,443
Total	<u>\$10,120,000</u>	<u>\$300,000</u>	<u>\$10,420,000</u>

Whether the adjustment is considered material or immaterial, zero balances are left in both overhead cost control accounts after the adjustment, as shown in Exhibit 5.8(b).

GUIDE YOUR LEARNING 5.3 Key Terms

Stop to confirm that you understand the new terms introduced in the last several pages:

- Overapplied overhead (p. 186)
- Underapplied overhead (p. 186)

For each of these terms, write a definition in your own words.

SERVICE SECTOR
JOB COSTING

Q1 How are costs assigned to customized goods and services?

Many different kinds of organizations provide customized services for their clientele, for example hospitals, accounting firms, law firms, architects, and print shops. A major difference between job costing for service organizations and job costing for manufacturing organizations is that service companies typically do not carry product inventory on the balance sheet. Under generally accepted accounting principles, service revenues are usually earned as the services are performed. Therefore, both revenue and product costs are recorded on the income statement as

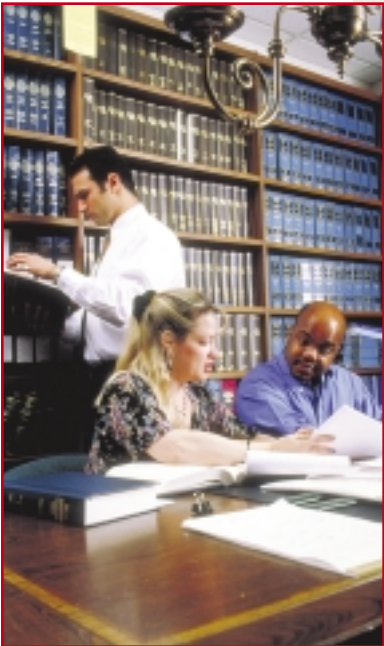
Q2 How is overhead allocated to individual jobs?

services are performed. Although job costing information is not required for inventory record-keeping, many service organizations use job costing systems to help managers measure and monitor job costs and profits. In addition, the customer's price for a service is often calculated based on a percentage above cost. Costs in these contracts often include direct costs as well as allocated overhead costs. Thus, the allocation of overhead costs can directly affect revenues.

Jobs costing systems for service organizations are similar to the ones used by manufacturers. Source documents are used to trace direct costs to a specific job, and overhead costs are allocated. For example, in hospitals, physicians order treatments directly on computers at the nurses' stations. From these treatment orders, materials are requisitioned and costs and patient charges are recorded as part of each patient's stay. Charges and costs are also accumulated for resources such as the number of meals served, X-rays received, and minutes in the operating room. When the patient is sent home, the bill is sent to the payer and the costs (direct and allocated overhead) are recorded in a subsidiary ledger identified with the patient's medical number and a hospital episode number.

When allocating overhead, service organizations often use the labor hours of their professional employees as an allocation base. For example, accountants and lawyers record professional labor hours and other direct costs to specific jobs. Overhead cost is then allocated on the basis of the professional labor hours used for each specific job.

Service organizations often use information from their job costing systems to facilitate cost management, productivity measurement, and billing. Consulting firms and other organizations that manage large projects often track job costs in conjunction with their project management systems. Following is an example of job costing in a service organization.



NIGHTHAWK LAW COMPANY
JOB COSTING IN A LAW FIRM

Nighthawk Law Company specializes in copyright protection for authors. A client approached the law firm about handling his lawsuit against a large film company that he believes stole the plot from one of his novels for a made-for-TV movie.

Estimated Job Costs and Price

The law partners estimated that the case would require 500 hours of professional labor. Nighthawk's accountant estimated the following direct costs:

Direct professional labor (500 hours)	\$ 75,000
Direct support labor	20,000
Fringe benefits for direct labor	15,000
Photocopying	1,000
Telephone calls	1,000
Total direct costs	<u>\$112,000</u>

Last year, Nighthawk's overhead totaled \$450,000. The two law partners worked about 5,000 professional labor hours. The accountant developed an estimated overhead allocation rate of \$90 per direct labor hour ($\$450,000 \div 5,000$). Therefore, the estimated overhead cost for this case is $\$90 \times 500 \text{ hours} = \$45,000$, and the total estimated cost is \$157,000 ($\$45,000 + \$112,000$). The law firm's policy is to mark up cost by 20% for the estimated price. Using this markup, the estimated profit for the case is \$31,400 ($\$157,000 \times 20\%$). Using all of this information, the partners estimate the client's service price as follows:

Direct professional labor (500 hours)	\$ 75,000
Direct support labor	20,000
Fringe benefits for direct and professional labor	15,000
Photocopying	1,000
Telephone calls	1,000
Total direct costs	112,000
Overhead ($\$90 \times 500 \text{ hours}$)	<u>45,000</u>
Total costs	157,000
Margin ($\$157,000 \times 20\%$)	<u>31,400</u>
Total estimated service price	<u>\$188,400</u>

Competitor's Job Costs and Price

A competing law firm traces only the direct professional labor hours as a direct cost and considers all other costs to be indirect (overhead). These overhead costs are allocated at an estimated rate of \$160 per professional labor hour. The accountant for this firm estimates this copyright case to cost \$75,000 + \$80,000 ($\$160 \times 500$) = \$155,000. The competitor uses the same markup rate as Nighthawk: 20% of estimated total cost, or \$31,000 ($\$155,000 \times 20\%$). The partner in the competitor firm estimates the client's service price as follows:

Direct professional labor (500 hours)	\$ 75,000
Overhead ($\$160 \times 500$ hours)	80,000
Total costs	155,000
Margin ($\$155,000 \times 20\%$)	31,000
Total estimated service price	<u>\$186,000</u>

Monitoring Job Costs

The prices estimated by the two law firms are very close in amount. However, the costs that are used to estimate the price are also used to monitor costs in the law firm. Nighthawk separately accounts for direct costs such as fringe benefits, photocopying, and telephone calls. The competitor includes these costs in overhead. Each approach has its pros and cons.

Nighthawk's accounting system incurs additional costs to separately accumulate and assign fringe benefits, photocopying, and telephone calls to individual jobs. Each of these costs is accumulated in a separate cost pool. Fringe benefits are allocated to jobs based on information that is already available about professional and support labor hours or costs. To allocate photocopying costs, the firm needs a system, such as the use of client codes, to record photocopying usage for each job. Telephone costs are traced using telephone logs. The accuracy of records for photocopying and telephone costs depends on the ability and desire of professional and support staff to maintain good records.

The benefit of separately accumulating and assigning fringe benefits, photocopying, and telephone call costs is improved monitoring of costs. The overhead cost pool is considerably smaller and includes fewer different types of costs. As the proportion of costs that can be directly traced to individual jobs increases, the accuracy of the costing system increases. Therefore systems with lower proportions of overhead more accurately capture the flow of resources to individual jobs.

USES AND
LIMITATIONS
OF JOB COST
INFORMATION

Q4 What are the uses and limitations of job cost information?

Job costing systems measure the cost of products, primarily for customized goods and services. The information from a job costing system can be used for several purposes, including the following:

- Reporting inventory and cost of goods sold values on financial statements and income tax returns
- Developing cost estimates to assist in bidding on potential future jobs
- Measuring actual costs to compare to estimated costs
- Developing cost estimates for short-term or long-term decisions

Because a job costing system accumulates and reports costs for individual jobs, the tendency is to mistakenly believe that job costs are measured accurately and that the costs assigned to a job are incremental, that is, would not be incurred if the job were not undertaken. However, job costing systems are subject to uncertainties and require judgment. In addition, analysis is required to identify the job costs that are relevant to a given decision.

Allocated Overhead Costs and Decision Making

Overhead costs are allocated to jobs to match revenues and product costs. However, allocated overhead costs are not relevant information for most short-term decisions, such as special orders or the use of constrained resources. Many overhead costs are fixed; they do not change with changes in the allocation base or any other measure of activity. Nevertheless, managers may mistakenly assume that these allocated costs are variable, particularly when the job costing system uses several cost pools and allocation bases. Another problem occurs if the allocation base used to allocate variable overhead

costs is not a cost driver, which means it does not accurately reflect the use of variable cost resources.

Managers within an organization often do not understand how costs are allocated to individual jobs. They may misinterpret cost information and rely on irrelevant information. Accountants must not only produce relevant information for each decision, but also help educate managers about appropriate uses of cost information. The next illustration demonstrates the accountant's role in providing managers with relevant information for internal decision making.

CHAPTER REFERENCE

See Chapter 4 for more information on short-term decision making.



ALUMINUM BENDERS (PART 2)
JOB COSTS RELEVANT FOR DECISION MAKING

Suppose Aluminum Benders receives two new orders from two different contractors. Because of previous commitments, the company has only enough capacity during the next few weeks to accept one of the new orders. Sean estimates the direct costs for the new orders and the amount of overhead that will be allocated to each job. These figures allow him to estimate the contribution margin and operating income as follows:

	For Contractor A	For Contractor B
Estimated selling price	\$150,000	\$230,000
Less variable costs:		
Direct materials	55,000	100,000
Direct labor		
Machining	5,000	10,000
Assembly	10,000	20,000
Estimated contribution margin	80,000	100,000
Less allocated overhead:		
Machining:		
For Contractor A (85 hours × \$56)	4,760	
For Contractor B (150 hours × \$56)		8,400
Assembly (direct labor cost × 240%)	24,000	48,000
Estimated operating income	\$ 51,240	\$ 43,600

Sean initially thinks that the company should accept the job from Contractor A because that job is expected to generate higher operating income. However, he realizes that operating income includes a reduction for allocated overhead. He knows that the contribution margin for each job is relevant to the decision; he is less sure whether overhead is relevant.

Sean studies the types of costs included in the overhead cost pools, and learns that most of the overhead costs are fixed. Direct labor employees are guaranteed a 40-hour work week, so the overhead costs of fringe benefits are likely fixed. The machine-related costs are also primarily fixed, although repair costs probably increase as volumes increase. He would like to break overhead into fixed and variable portions, but does not have time right now.

Given his quick analysis of the costs for each job, Sean believes he should only present the incremental costs in his report because managers may assume that allocated overhead costs actually vary with machine hours and labor cost and choose Contractor A's job with an estimated operating income of \$51,240. Thus, Sean plans to recommend that the company accept the job from Contractor B. He expects the company to earn \$20,000 more (\$100,000 – \$80,000) in incremental contribution margin from this job than from Contractor A's job.

Qualitative Factors

Sean asks the controller for her advice. She agrees that only incremental costs should be presented. She tells Sean that he also needs to discuss some qualitative factors with the managers. For example, Contractor A is a profitable, ongoing customer who would become dissatisfied if the order were turned down. The job from Contractor B involves special machining that the company does not ordinarily perform, reducing the accountant's confidence in the job cost estimate. However, Contractor B is a new customer with whom Aluminum Benders would like to work in the future. These types of qualitative factors sometimes weigh more heavily than the estimated incremental contribution margin when managers make these types of decisions.

GUIDE YOUR LEARNING 5.4 Aluminum Benders (Part 2)		
Aluminum Benders (Part 2) illustrates a decision between alternative customer orders. For this illustration:		
Identify Problem and Information	Identify Uncertainties	Explore Uncertainty
What decision was being addressed, and what information was relevant to the decision? In your own words, explain why allocated overhead costs were irrelevant to the decision.	What were the uncertainties? Consider uncertainties about: <ul style="list-style-type: none">• Revenues for each job• Costs for each job• Qualitative factors	How might the degree of uncertainty about job costs affect this decision?

■ Uncertainties in Measuring Job Costs

Little uncertainty tends to surround the direct costs assigned to a job, because those costs are traced to each job. However, judgment is used to decide which direct costs will be traced. Occasionally direct costs are quite small, and the cost of creating a system to track them is greater than the benefit achieved. In these cases, costs that might potentially be traced are instead included with indirect costs in a pool of overhead costs. However, changes in technology sometimes allow accountants to trace costs that were previously too costly to trace. For example, most large photocopiers today include security systems that track the number of copies made to specific account codes. These systems minimize the cost of tracing photocopy costs to individual jobs. Without such a system, the cost of tracking individual copies could be overly expensive. Tracking the use of software and Internet services for networked computers or monitoring small supplies such as nails and tape during manufacturing is more difficult. These costs are treated as indirect costs and become part of overhead.

Accountants also choose the type and number of cost pools to use for overhead. For example, overhead costs were pooled at the department level in Aluminum Benders. However, overhead could have been pooled at the plant level. Alternatively, the overhead costs in each department could have been separated into fixed and variable pools. Accountants consider several factors when they choose the number and kind of cost pools to use. From a management control perspective, if costs are tracked to a department or a process, the managers of that department or process can be held responsible for controlling costs. When overhead costs from many departments are pooled, managers and employees within each department have little incentive to control costs. In addition, different departments usually perform different tasks, so their costs may be quite different. If costs are allocated on a department level and these costs more accurately reflect the flow of resources, products can be designed to spend less time in costly departments. When deciding whether to use department or plantwide cost pools, the benefit gained from gathering information about department costs and the use of department resources by other departments must be worth the cost of tracking them.

Ideally, we would prefer that the overhead allocation process reflect the flow of overhead resources to each product. Thus, an ideal overhead allocation base would be a cost driver. However, fixed overhead is not expected to vary with any allocation base, and it is not always possible to identify or to accurately measure a cost driver for variable overhead. Thus, allocated overhead generally does not accurately measure the overhead resources used by a job.

■ Uncertainties in Estimating Future Job Costs

Managers use job cost estimates to establish a bid for a job, decide whether to accept a job, or make other types of decisions. Managers then monitor operations by comparing actual job costs to the original estimate. Any time we estimate future events we face uncertainties about whether the estimates will be accurate. Thus, actual job costs will almost certainly be different from estimated job costs. Managers analyze the differences to evaluate the efficiency of operations and to improve future job cost estimates.

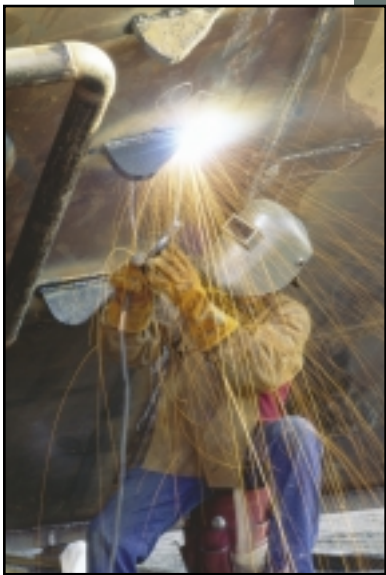
CHAPTER REFERENCE

Chapter 2 introduces several techniques for evaluating whether a potential cost driver explains the variation in a cost.

CHAPTER REFERENCE

Chapter 11 introduces variance analysis, which is used to evaluate differences between estimated and actual costs.

Under normal costing, overhead is allocated to jobs using an estimated overhead allocation rate. The estimated rate is based on estimates of the total overhead cost and the total volume of the allocation base. Actual costs and activity levels are affected by many unforeseen events. These include unanticipated cost inflation or deflation or an economic downturn that causes business activities to fall short of expectations. Actual costs also differ from expectations because of unexpected improvements or deterioration in production efficiency. Differences between estimates and actual amounts cause overhead to be overapplied or underapplied, and then adjustments are required at the end of an accounting period. However, judgment is necessary in the way that adjustments are made. The following ethical scenario illustrates a situation in which the method of adjusting costs affects an organization's revenues.



FOCUS ON ETHICAL DECISION MAKING
Inappropriate Prorating of Underapplied Overhead

The U.S. government contracts with defense industry firms to develop new military technology. These contracts are sometimes based on cost. Because these organizations also sell products to nongovernment businesses, incentives exist to shift overhead costs to the government, so that commercial operations become more competitive. Because cost allocations are private information, research provides only indirect evidence that this cost shifting occurs. For example, when the Cost Accounting Standards Board developed new standards for defense contractors during 1968–1970, the stock market price of these firms dropped, indicating that market analysts believed these firms would be hurt by more rigorous standards (Pownall, 1986). The following vignette is fictional, but it illustrates potential ethical problems that arise when governments use cost-based contracts for product development.

Deep Water Ship Building Company builds large ships and submarines for both commercial and government contracts. Because one of its commercial contracts fell through last year, the company had fewer jobs than anticipated. Consequently, the company's overhead costs were underapplied at the end of the year, so an adjustment was made to increase cost of goods sold.

Deep Water's policy is to allocate production overhead as a percentage of direct labor costs for each contract. One of the contracts completed last year was for a stealth watercraft for a branch of the military. The job contract was based on cost-plus-fixed-fee for a total cost of \$245 million. The stealth project was Deep Water's only government contract last year. Commercial business completed was \$105 million, so cost of goods sold (COGS) totaled \$350 million.

Disagreement about Underapplied Overhead Adjustment

The government official in charge of the contract complained to the federal contract auditor that Deep Water's underapplied overhead should not have been closed to COGS. Instead, he argued that it should have been prorated among the contracts in progress, finished goods, and COGS. The auditor asked to see the cost accounting records and financial statements for the period. Following is an analysis of the direct costs and cost allocations (in millions):

	Contracts in Progress	Finished Goods Inventory	Cost of Goods Sold	Total Work on Jobs This Period
Direct materials used	\$250	\$50	\$100	\$400
Direct labor	92	8	50	150
Overhead allocated	<u>184</u>	<u>16</u>	<u>100</u>	<u>300</u>
Total before adjustment	526	74	250	850
Add:				
Underapplied overhead	<u>0</u>	<u>0</u>	<u>100</u>	<u>100</u>
Total after adjustment	<u><u>\$526</u></u>	<u><u>\$74</u></u>	<u><u>\$350</u></u>	<u><u>\$950</u></u>

The \$350 million in COGS included \$245 million for the government contract. When the underapplied overhead (\$100 million) was closed to COGS, the government portion of underapplied overhead was \$70 million [$\$100 \times (\$245 \div \$350)$]. Because the contract specified that the government would pay costs plus a fixed amount, the overhead adjustment effectively increased the revenue under the contract by \$70 million.

Actual direct labor costs were \$150 million, and the pre-adjustment allocated overhead was \$300 million. Therefore, the original allocation rate was 200% ($\$300 \div \150) of direct labor cost.

Total actual overhead turned out to be \$400 million (the \$300 million plus the \$100 million underapplied). If Deep Water accountants could have perfectly estimated overhead at \$400 million and direct labor cost at \$150 million, they would have used 267% ($\$400 \div \150) as the allocation rate.

The underapplied overhead amount was material (\$100 million out of \$400 million, or 25%). Therefore, the government auditor decided that it should have been prorated among the three accounts that reflected work done this period: contracts in progress, finished goods, and cost of goods sold. Had this method been used, the adjustment would have been prorated as follows:

Contracts in progress ($\$526 \text{ million} \div \850 million) \times \$100 million	\$ 61.9 million
Finished goods ($\$74 \text{ million} \div \850 million) \times \$100 million	8.7
Cost of goods sold ($\$250 \text{ million} \div \850 million) \times \$100 million	29.4
Total adjustment	<u>\$100.0 million</u>

The government share of the COGS adjustment would be $(\$245 \div \$350) \times \$29.4 \text{ million} = \20.6 million . When the auditor compared this to the original adjustment of \$70 million, she knew the government had been overcharged.

Alternative Methods for Prorating Overapplied or Underapplied Overhead

The auditor offered Deep Water three alternatives for prorating the overhead adjustment. Under governmental contracts, underapplied overhead could be prorated based on direct materials cost, direct labor cost, or total direct costs. If Deep Water uses direct materials, COGS is increased by \$25 million, of which the government portion is \$17.5 million. If direct labor cost is used, COGS is increased by \$33.3 million, of which the government portion is \$23.3 million. If total direct cost is used, COGS is increased by \$27.3 million, of which the government portion is \$19.1 million.

The government and Deep Water must now negotiate to determine the most appropriate proration method.

SOURCE: G. Pownall, "An Empirical Analysis of the Regulation of the Defense Contracting Industry: The Cost Accounting Standards Board," *Journal of Accounting Research* 24, no. 2 (1986), pp. 291–316.

Practice Ethical Decision Making

In Chapter 1, we learned a process for making ethical decisions (Exhibit 1.11). You can address the following questions for this ethical dilemma to improve your skills for making ethical decisions. Think about your answers to these questions and discuss them with others.

Ethical Decision-Making Process	Questions to Consider about This Ethical Dilemma
Identify ethical problems as they arise.	Is allocating proportionately more cost to government contracts an ethical problem for Deep Water? Why or why not?
Objectively consider the well-being of others and society when exploring alternatives.	When the government pays more than commercial customers pay for work done, does this situation pose a business problem, a social problem, or both? Explain. Discuss the preferences of various stakeholders for this problem, including: <ul style="list-style-type: none">• Deep Water managers• Deep Water shareholders• Deep Water commercial customers• Deep Water governmental customers• Deep Water competitors• U.S. taxpayers
Clarify and apply ethical values when choosing a course of action.	Identify the values you use as you answer the following questions: <ul style="list-style-type: none">• Is it fair for the government to pay more for products and services than commercial customers pay?• Is it fair for taxes to subsidize the overhead costs for a private business?
Work toward ongoing improvement of personal and organizational ethics.	How can an organization monitor whether its accounting practices are ethical?

SPOILAGE, REWORK, AND SCRAP IN JOB COSTING

Q5 How are spoilage, rework, and scrap handled in job costing?

No matter how carefully goods are manufactured, occasionally some units do not meet quality standards; they are spoiled. **Spoilage** refers to units of product that are unacceptable and are discarded, reworked, or sold at a reduced price. Examples of spoilage in job costing include:

- Units in batches of clothing that have flaws in the material or sewing
- Several valves in a batch that do not function properly when tested at the end of production
- A custom-ordered birdhouse that has an off-center round hole

Different types of spoiled products are handled in different ways. For example, if the material flaws are not too noticeable, the clothing can be sold as irregular. Perhaps the birdhouse can be sold at a discount, but the valves probably cannot be sold and must be discarded or reworked.

Spoilage is typically identified through some type of inspection process. Sometimes inspection occurs at the end of the production process immediately before units are moved to finished goods inventory. Other times, inspection occurs at one or more intermediate stages during production. Inspection can also occur at the beginning of the process. For example, denim fabric can be checked for flaws before it is introduced into the production process for manufacturing jeans. Other practices, such as conducting preventive maintenance on equipment rather than waiting for machinery problems to develop, help minimize spoilage.

To determine the cost of a partially complete spoiled unit, we add up all direct materials and labor costs used and allocate overhead according to the amount of work completed before the unit was removed from production. The way spoilage cost is handled depends on whether the spoilage is considered normal or abnormal.

■ Normal and Abnormal Spoilage

Normal spoilage consists of defective units that arise as part of regular operations. If normal spoilage arises from the requirements of a specific job, the cost of the spoiled units is charged to the job. For example, suppose one of **Bombardier's** completion center customers wants leather interior walls. If the leather is more difficult to install than other materials and part of the leather is spoiled in the installation process, then the cost of the spoilage would be charged to that job.

Normal spoilage also occurs periodically as a regular part of all jobs. For example, suppose that the safety lighting system installed along the carpeting sometimes twists and breaks as it is being installed, no matter how carefully it is handled. This loss has nothing to do with any specific order; instead, it is a normal part of operations. The cost of normal spoilage common to all jobs is charged to overhead and is allocated with other overhead costs to all jobs.

Abnormal spoilage is spoilage that is not part of everyday operations. It occurs for reasons such as the following:

- Out-of-control manufacturing processes
- Unusual machine breakdowns
- Unexpected electrical outages that result in a number of spoiled units

Some abnormal spoilage is considered avoidable; that is, if managers monitor processes and maintain machinery appropriately, little spoilage will occur. To highlight these types of problems so that they can be monitored, abnormal spoilage is recorded in a Loss from Abnormal Spoilage Account in the general ledger and is not included in the job costing inventory accounts (work in process, finished goods, and cost of goods sold).

The following illustration demonstrates normal and abnormal spoilage for Aluminum Benders.

HELPFUL HINT

The accounting entries shown here for normal spoilage are based on current U.S. GAAP. Current international accounting standards do not permit the cost of spoilage to be included in inventory, and the **FASB** is considering a similar prohibition.



ALUMINUM BENDERS (PART 3)
ASSIGNING SPOILAGE COSTS

When Job 512 was being processed in the machining department, a piece of sheet metal was off center in the bending machine and two vents were spoiled. This problem occurs periodically, is considered normal spoilage, and is recorded as an overhead cost. Because this step comes first in the procedure for making the vents, the only costs incurred were for direct materials (\$25). The following journal entry records normal spoilage as an overhead cost, assuming the sheet metal cannot be sold at a discount and its cost has been recorded in work in process inventory.

Overhead cost control (normal spoilage)	\$25	
Work in process inventory (cost of spoiled sheet metal)		\$25

If these costs had been abnormal spoilage, they would have been recorded to a loss from abnormal spoilage account instead of the overhead cost control account.

Job 489 required an especially thin sheet metal to reduce the weight of the vents. When two of the vents were being assembled, they were spoiled because the metal twisted and could not be joined properly. Because the thin metal was a specific requirement for this job, the costs for the spoiled units were recorded as a cost for Job 489. Direct materials cost \$100 and direct labor cost \$150 for the vents up to the time they were spoiled. The metal can be sold to a recycler at a discounted price of \$50. The journal entries for the use of direct materials and labor are the same as if the direct materials and labor were not spoiled, because these are additional costs for this specific job. However, the following journal entries record the value of the sheet metal at the time it is spoiled and the subsequent sale of the metal.

Raw material inventory (metal to be sold to recycler)	\$50	
Work in process inventory (Job 489)		\$50
Cash	\$50	
Raw material inventory		\$50

■ Rework

Rework consists of spoiled units that are repaired and sold as if they were originally produced correctly. For example, electronic equipment that is special ordered, such as computers or batches of cell phones, are reworked when defects are discovered during the manufacturing process or through inspection at the end of the process. If the cost of rework is tracked, it is recorded in the same manner as spoilage; normal rework is charged to overhead or to a specific job, and abnormal rework is recorded as a line item loss. Rework costs are often not tracked, however.

Units are sometimes reworked and then sold at a regular price through regular marketing channels. Other times reworked units remain flawed and must be sold at a reduced price. Costs and benefits are analyzed to decide whether to rework a spoiled unit. Suppose a clothing manufacturer discovers several jeans with back pockets sewn on upside down. If the pockets are carefully removed and then sewn on correctly, it may be difficult to tell that there was ever a problem. However, additional cost is added for the labor time to fix the pockets. Furthermore, the pockets might rip more easily because the material has been weakened. The managers need to evaluate whether the costs of reworking the pockets outweigh the benefits.

■ Scrap

Scrap consists of the bits of direct material left over from normal manufacturing processes. Sometimes it has value and can be sold, and sometimes it is discarded. New technology affects whether something is considered scrap. For example, for many years lumber mills burned sawdust, for which they had no alternative uses, in teepee-shaped silos that glowed red at night. As trees became a scarce resource, sawdust became more valuable. With improved glues and new manufacturing processes, products such as specialty logs for fireplaces and chipboard were developed. A process was developed to turn sawdust into pulp for

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CHAPTER REFERENCE

Accounting for joint products and by-products is covered in Chapter 9.

paper mills. Sawdust is no longer scrap, but has become an important by-product of milling lumber.

Some manufacturers track scrap to measure whether resources are being used efficiently. Scrap is also tracked if it has value and could be stolen. Often it is recorded in physical terms. For example, gold scraps from jewelry manufacture are weighed, the weight is recorded, and the scraps are stored in a safe.

From an accounting standpoint, we need to plan for and sometimes guard scrap by setting up control systems. We also need to determine the effect of the value of scrap on inventory costing and the income statement. If scrap can be sold, the revenue is recorded either at the time it is produced or at the time it is sold. When the value of scrap is immaterial, it is simply recorded as part of other revenues in the income statement.

In job costing, scrap sometimes arises as part of specific jobs. If we can trace it to individual jobs, revenue from the scrap is credited to the specific job in work in process. Scrap revenue reduces the cost of the job with which it is associated. If scrap is common to all jobs, or if it is not worth tracing to individual jobs, the scrap revenue offsets overhead cost for the period. This entry reduces overhead cost for all jobs produced.

If scrap is held for a period of time before it is reused as direct material or sold, we need to estimate its net realizable value so that the value of the scrap can be used to offset overhead costs in the same period in which the overhead costs and associated revenues are recognized. When the price of scrap is volatile, such as gold in the previous example, estimating its value is more difficult.

Some organizations develop creative ways to use scrap to benefit employees and others. For example, print shops sometimes bind scrap paper into scratch pads and give them to employees, customers, or public schools. Employees working for a defense contractor near the Mexican border remove the nails and staples from lumber the company receives as packing crates for parts. The company then transports the lumber across the border for use by impoverished families living in homes made from cardboard. Such uses of scrap improve employee satisfaction, enhance the firm's reputation, and provide social value.

GUIDE YOUR LEARNING 5.5 Key Terms

Stop to confirm that you understand the new terms introduced in the last several pages:

Spoilage (p. 194)	Rework (p. 195)
Normal spoilage (p. 194)	Scrap (p. 195)
Abnormal spoilage (p. 194)	

For each of these terms, write a definition in your own words. Also list at least one example that is different from the ones given in this textbook.

PRODUCTION QUALITY AND BEHAVIOR IMPLICATIONS

Q6 What are the quality and behavioral implications of spoilage?

In the preceding section, we learned about methods used to account for the direct costs of spoilage, rework, and scrap. Although the direct costs can be significant, managers need to consider several other issues related to the quality of their production processes.

■ Spoilage Opportunity Costs

The opportunity costs of spoilage and rework can be large. Opportunity costs include the following:

- Forgone profit
- Loss of reputation and market share

An organization forgoes the normal profit from resources that are used to produce spoiled units. Forgone profit is a bigger problem when capacity limits are involved, because the organization forgoes the profit on resources employed as well as the contribution margin from good units that might have been produced. In addition, some proportion of spoiled units is

likely to mistakenly pass inspection. As the number of spoiled units increases, a larger number of spoiled units will inevitably be sold to customers. The sale of these defective units leads to loss of market share because consumers switch brands. The company eventually loses its reputation for quality products, leading to further erosion of market share, including customers who never had direct quality problems. These opportunity costs, which are often much greater than the cost of the spoiled units, are not tracked by the accounting system.

■ Investing in Quality

Some organizations position themselves as high-quality producers and work toward continuous improvement in quality. For example, **Bombardier's** Learjets have a reputation for high quality. In addition, customers may demand higher quality or may be willing to pay a premium price for quality. To improve quality, many organizations adopt a variety of business practices such as total quality management, Six Sigma[®], lean manufacturing, and kaizen costing. Quality efforts can dramatically reduce spoilage, rework, and related opportunity costs.

However, measuring the costs and benefits of such improvements is difficult. Quality costs are often measured imprecisely. Employees often work on quality issues in addition to their other responsibilities, so time spent on quality is not tracked, but estimated. Measuring loss of market share due to quality problems is also difficult. Therefore, exactly identifying the costs and benefits of quality improvement measures is an uncertain process. Although managers may not be able to prove that their quality efforts are cost-effective, other qualitative benefits result from investments in quality.

CURRENT PRACTICE

Organizations may voluntarily agree to comply with **ISO 9000** standards, which are designed to improve quality management and facilitate business-to-business transactions.³

CHAPTER REFERENCE

To learn more about kaizen costing, see Chapter 13.

CURRENT PRACTICE

Quality as a Public Issue

The effects of quality go beyond the costs for individual organizations. Quality is often a public issue:

- In 1982, several bottles of Tylenol were contaminated with cyanide by a customer in Illinois retail stores. Although the manufacturer, **Johnson & Johnson**, did not cause the problem, the CEO, James Burke, pulled all Tylenol capsules off retail shelves at a cost of \$100 million. Burke was responding to Johnson & Johnson's mission to a higher duty to "mothers and all others who use our products." For this and other similar actions, in 2003 Burke was awarded sixth place in *Fortune* 10 greatest CEOs of all time.
- The 2000 U.S. presidential election finished in a national controversy over the way that election ballots were counted in Florida. Antiquated and error-prone equipment caused a disproportionate number of ballots to be spoiled in poorer counties. Spoiled ballots are disqualified; they are not counted in the election results.

SOURCES: Jim Collins, "The 10 Greatest CEOs of All Time," *Fortune*, July 21, 2003, p. 62; and "Rights Commission's Report on Florida Election," executive summary by U.S. Commission on Civil Rights, June 5, 2001, available at www.washingtonpost.com.

■ Effect of Accounting on Manager Behavior

Accounting practices influence manager behavior, especially when managers are compensated based on accounting earnings. Only some types of spoilage and rework costs are reflected in the accounting records. These accounting procedures may not provide incentives that encourage managers to control spoilage, for example:

- Spoilage opportunity costs are not measured or recorded in the accounting records, which discourages management attention.
- Normal spoilage may seem insignificant because it is often a relatively small part of the total overhead cost pool.
- Judgment is used to determine normal spoilage, which influences the portion of spoilage costs included in the overhead cost pool versus the portion reported as a separate operating loss.

³Available at International Organization for Standardization (ISO) Web site: www.iso.org.

- Rework costs are not usually tracked, giving managers an incentive to inappropriately rework units to avoid recognizing abnormal spoilage.

To control for the potentially adverse effects of these accounting practices, some organizations institute systems to monitor defects and establish defect rates as part of management compensation criteria. Still other organizations prohibit rework to emphasize initial quality and to avoid the potential waste of additional resources.

■ External Monitoring

INTERNATIONAL

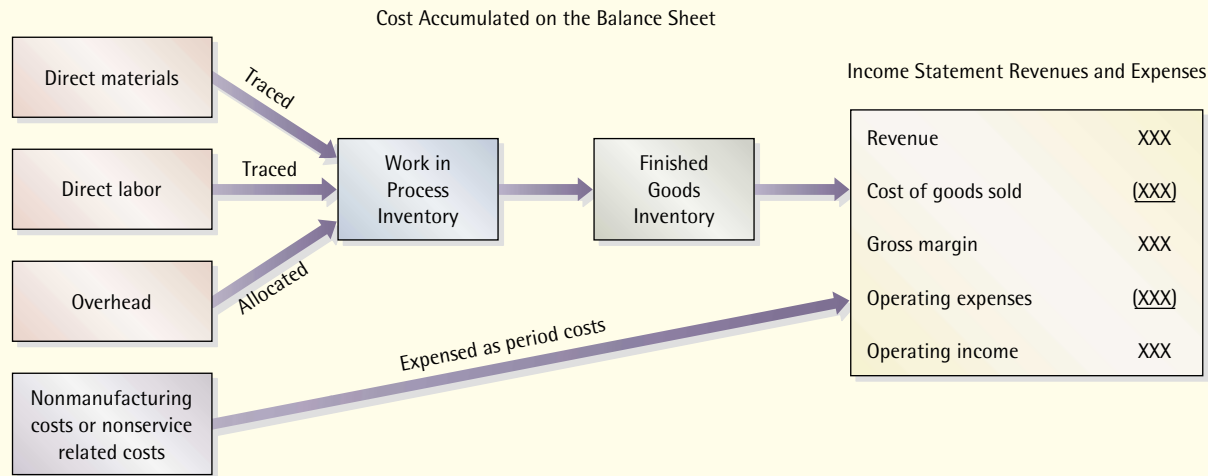
Some organizations strategically adopt a zero defect policy, with normal spoilage expected to be zero. Japanese companies frequently implement zero defect policies, which pressures competing U.S. firms to adopt similar policies.

External stakeholders such as shareholders typically do not have access to explicit information about an organization’s spoilage rates or costs. Although abnormal spoilage is recorded in a separate loss account in the general ledger, it is typically combined with other financial statement items. Thus, spoilage rarely appears as a line item on published financial statements. Exceptions tend to be large catastrophes, such as damage caused by an earthquake, that are publicly known before financial statements are issued. Therefore, external stakeholders must use indirect ways to analyze the quality of an organization’s production processes. An organization with a high spoilage rate might have a lower than average gross profit margin, higher than average warranty liabilities, or a poor reputation for product quality.

SUMMARY

Q1 How Are Costs Assigned to Customized Goods and Services?

Cost Flows in Manufacturing Job Costing



Accounting System

- Source documents (e.g., employee time reports and material requisitions)
- Job cost record
- Job cost software

Q2 How Is Overhead Allocated to Individual Jobs?

Procedures for Allocating Overhead Costs to Jobs:

1. Identify the relevant cost object.
2. Identify one or more overhead cost pools and allocation bases.
3. For each overhead cost pool, calculate an overhead allocation rate.
4. For each overhead cost pool, allocate costs to the cost object.

Types of Overhead Cost Pools

- Company-wide
- Plant-wide
- Separate departments
- Separate activities or processes
- Separate fixed and variable

Q3 What Is the Difference Between Actual Costing and Normal Costing?

Actual Costing

Actual quantity of allocation base for job \times Actual allocation rate

Normal Costing

Actual quantity of allocation base for job \times Estimated allocation rate

Adjustment for Overapplied or Underapplied Overhead

Overapplied (underapplied) overhead = Allocated overhead – Actual overhead

If material: Prorate among work in process, finished goods, and cost of goods sold

If not material: Apply to cost of goods sold

Q4 What Are the Uses and Limitations of Job Cost Information?

Uses of Job Cost Information

- Assign costs to work in process, finished goods, and cost of goods sold for financial statement and income tax returns
- Provide information to help managers:
 - Monitor operating costs
 - Develop job bids
 - Make short-term or long-term decisions

Allocation of Overhead Costs

- Required for financial and tax accounting of manufactured goods
- Optional otherwise
- Fixed overhead allocation generally not relevant for short-term decisions

Uncertainties

- Which estimated job costs are relevant for decision making
- Whether and how to trace direct costs
- Choice of overhead cost pools
- Choice of allocation bases
- Estimated overhead allocation rate (under normal costing)
- Method for adjusting overapplied or underapplied overhead (under normal costing)

Q5 How Are Spoilage, Rework, and Scrap Handled in Job Costing?

Type of Spoilage, Rework, or Scrap	Accounting Treatment
Normal spoilage arising from the requirements of a specific job	Charge to the individual job
Normal spoilage occurring periodically as a regular part of all jobs	Charge to overhead
Abnormal spoilage	Charge to separate loss account
Opportunity costs of spoilage	Not measured
Rework for defects arising from the requirements of a specific job	Charge to individual job
Rework for defects occurring periodically during normal production	Charge to overhead
Rework for abnormal defects	Charge to separate loss account
Sale of scrap	Record at time of production or at time sold If not material: Record as other income
Scrap traced to individual jobs	Credit to individual job
Scrap common to all jobs or difficult to trace to jobs	Credit to overhead

Q6 What Are the Quality and Behavioral Implications of Spoilage?

Spoilage Opportunity Costs

- Forgone profit
- Loss of reputation and market share

Investing in Quality

Effect of Accounting on Manager Behavior

External Monitoring

KEY TO SYMBOLS

- e** This question requires students to extend knowledge beyond the applications shown in the textbook.

1 This question requires Step 1 skills (**Identifying**) in Steps for Better Thinking (Exhibit 1.10).

2 This question requires Step 2 skills (**Exploring**) in Steps for Better Thinking (Exhibit 1.10).
- 3** This question requires Step 3 skills (**Prioritizing**) in Steps for Better Thinking (Exhibit 1.10).

4 This question requires Step 4 skills (**Envisioning**) in Steps for Better Thinking (Exhibit 1.10).

Self-Study Problems

Self-Study Problem 1 Normal Costing with Two Overhead Cost Pools

Q1, Q2, Q3, Q4

William Felix & Sons uses an estimated overhead rate for allocating production overhead to job orders. The rate is on a machine hour basis for the machining department and on a direct labor cost basis for the finishing department. The company estimated the following for 2005:

	Machining	Finishing
Production overhead cost	\$10,000,000	\$8,000,000
Machine hours	200,000	33,000
Direct labor hours	30,000	160,000
Direct labor cost	\$900,000	\$4,000,000

During the month of January, the cost record for job order No. 806 shows the following:

	Machining	Finishing
Direct materials requisitioned	\$14,000	\$3,000
Direct labor cost	\$600	\$1,250
Direct labor hours	30	50
Machine hours	130	10

Total costs and machine hours were as follows for 2005:

	Machining	Finishing
Production overhead incurred	\$10,200,000	\$7,900,000
Direct labor cost	\$950,000	\$3,900,000
Machine hours	220,000	32,000

REQUIRED:

- A. What is the estimated overhead rate that should be used in the machining department? In the finishing department?

B. What is the total overhead allocated to Job 806?
- e** C. Assuming that Job 806 manufactured 200 units of product, what is the unit cost of Job 806?

D. What is the total amount of over- or underapplied overhead in each department at the end of 2005?
- 2** E. Provide reasons why Felix uses two different overhead application bases. Also discuss why Felix might use machine hours and labor costs to allocate overhead costs.

Solution to Self-Study Problem 1

A. Overhead rates should be calculated using estimated costs and allocation bases:

Machining: $\$10,000,000 \div 200,000 = \50 per machine hour
Finishing: $\$8,000,000 \div \$4,000,000 = 200\%$ of direct labor cost

B. Using the overhead rates from part (A), the total overhead allocated to Job 806 should be as follows:

Machining department: $\$50 \times 130$ machine hours	\$6,500
Finishing department: $200\% \times \$1,250$ direct labor cost	2,500
Total overhead allocated to Job 806	<u>\$9,000</u>

C. To calculate per-unit costs, first calculate the total cost for the batch and then divide by the number of units:

	Machining	Finishing
Direct materials	\$14,000	\$3,000
Direct labor	600	1,250
Overhead allocated	6,500	2,500
Total	<u>\$21,100</u>	<u>\$6,750</u>
Total costs: \$21,100 + \$6,750 = \$27,850		
Cost per unit: \$27,850 ÷ 200 units = \$139.25 per unit		
D. Machining department overhead allocated (220,000 × \$50)		\$11,000,000
Actual overhead in machining		<u>10,200,000</u>
Overapplied overhead		<u>\$ 800,000</u>
Finishing department overhead allocated (\$3,900,000 × 200%)		\$ 7,800,000
Actual overhead in finishing		<u>7,900,000</u>
Underapplied overhead		<u>\$ 100,000</u>

E. Felix must believe that the overhead costs in each department are related to different allocation bases. Machining is likely to have more overhead expense for buying, maintaining, and using machines. Therefore, machine hours are likely to reflect the activities involved in running machines. In the finishing department, more labor-related costs are incurred. Therefore, it is logical to use labor dollars as an allocation base. Although accountants attempt to pick allocation bases that are related to the activities in a cost center, the allocations are still arbitrary. Changes in volumes do not result in proportionate changes in costs. A portion of the costs are often fixed and unaffected by changes in the level of the allocation bases. In other words, allocation bases are not necessarily cost drivers. Instead, they are simply measures of activity used to allocate costs logically.

Self-Study Problem 2 Normal and Abnormal Spoilage

Q5, Q6

Flockhart Company produces custom-made garden sheds using recycled materials. Currently two jobs are in process, number 689 and 690. During production of Job 689, lightning hit the factory and caused an electricity surge followed by an outage. Lightning strikes are relatively unusual in the region where the factory is located. At the time of the strike, wood was being sawed to fit Job 689. The rip-saw malfunctioned and ruined a large piece of lumber that originally cost \$175. During production of Job 690, two pieces of lumber had sawing errors and were scrapped. These pieces of lumber originally cost \$80 and \$75; they could be sold as scrap for \$20 and \$30. Sawing errors occur for many different jobs on a regular basis.

- Consider the spoilage for Job 689. Should it be categorized as normal or abnormal spoilage? Explain.
- Consider the spoilage for Job 690. Should it be categorized as normal or abnormal spoilage? Explain.
- Prepare journal entries for the spoilage on both jobs. Assume that the scrap lumber has not yet been sold.
- Describe the actual and opportunity costs of spoilage.

Solution to Self-Study Problem 2

REQUIRED:

- The spoilage for Job 689 is abnormal spoilage because it occurred from an unusual force of nature. Abnormal spoilage is not part of normal operations and occurs because systems are out of control or an unusual event occurs, such as loss of electricity from an unusual storm. Abnormal spoilage is recorded as a loss for the period.
- The spoilage for Job 690 is normal spoilage because it arises as a part of ongoing operations. If it occurs because of the requirements of a specific job, it is recorded as a cost for that job. If it occurs as part of operations, it is recorded as an overhead cost.
- Journal entry for abnormal spoilage (assuming the requisition of raw material was not recorded as a job cost):

Loss from abnormal spoilage	\$175	
Work in process inventory (Job 689—spoiled lumber at cost)		\$175
Journal entry for normal spoilage:		
Overhead cost control	\$105	
Raw material inventory (scrap lumber)	\$50	
Work in process inventory (Job 690—spoiled lumber at cost)		\$155

- The actual costs of spoilage include the dollar amounts for direct materials, direct labor, and overhead that have been incurred up to the point that the spoiled units are removed from production. The opportunity costs of spoilage include warranty and return costs, and potential loss of reputation and market share. It is difficult to estimate these costs, but they can be considerable.

REVIEW Use the exercises in the following boxes in the chapter to review key terms and key techniques, analyze chapter illustrations, improve your learning of new concepts, and practice ethical decision making:

- Guide Your Learning 5.1: Key Terms (p. 183)
- Guide Your Learning 5.2: Aluminum Benders (Part 1) (p. 184)
- Guide Your Learning 5.3: Key Terms (p. 187)
- Guide Your Learning 5.4: Aluminum Benders (Part 2) (p. 191)
- Guide Your Learning 5.5: Key Terms (p. 196)
- Focus on Ethical Decision Making: Inappropriate Prorating of Underapplied Overhead (p. 192)

QUESTIONS

- 5.1 List three examples of job cost records you recently received for services provided to you. (Hint: Itemized bills made out to you are usually job cost records.)
- 5.2 Will underapplied and overapplied overhead arise under both actual and normal costing? Explain your answer.
- 5.3 Within the area where you live, work, or attend school, name three businesses that would likely use job costing and three that would likely use process costing.
- 5.4 How does the point of inspection (and therefore completion) affect the cost of spoilage?
- 5.5 Part of a contract between a union and a company guarantees that all manufacturing employees earn 5 hours of overtime each week. In the company's job costing system, should overtime be treated as a direct or indirect cost?
- 5.6 Compare actual and normal cost systems. Discuss the ways in which they are similar and the ways they differ.
- 5.7 Exquisite Furniture designs and manufactures custom furniture from exotic materials. Explain why spoilage is sometimes recorded as a cost for a specific job and other times as overhead for this company.
- 5.8 Explain how manufacturing overhead cost pools and cost allocation are related.
- 5.9 Describe the procedures used in job costing.
- 5.10 List the most common allocation bases used in job costing and explain under what circumstances each base would be most appropriate.
- 5.11 List several different sources of information used in job costing, and explain why this information is required.

EXERCISES

5.12 Custom versus mass production The following chart lists several different products.
Q1

Custom	Mass	Product
		Jewelry
		Rolls Royce automobiles
		Honda automobiles
		Tax services in an accounting firm
		Haircuts
		Personal shopping services
		Breakfast cereal production

REQUIRED: Check the appropriate boxes to identify whether the products can be custom produced or mass produced. Some products, such as house construction, can be either mass manufactured or custom built. In such cases, both boxes would be checked.

5.13 Job costing in the service sector Consider the following budgeted data for a client case of Bob Crachit's accounting firm. The client wants a fixed price quotation.
Q1, Q2, Q4

Direct professional labor	\$20,000
Direct support labor	10,000
Fringe benefits for direct labor	13,000
Photocopying	2,000
Telephone calls	2,000
Computer lines	6,000

Overhead is allocated at the rate of 100% of direct labor cost.

EXERCISES 203

- REQUIRED:**
- Prepare a schedule of the budgeted total costs for the client. Show subtotals for total direct labor costs and total costs as a basis for markup.
 - Assume that the partner's policy is to quote a fixed fee at 10% above the total costs. What fee would be quoted?
 - Explain why the listed estimates for costs might not be similar to the actual costs for the job. What factors could affect the accuracy of these estimates? List as many factors as you can.

5.14 **Job costing for a hospital** Mercy Hospital uses a job costing system for all patients who have surgery. The hospital uses a budgeted overhead rate for allocating overhead to patient stays. In March, the operating room had a budgeted allocation base of 1,000 operating hours. The budgeted operating room overhead costs were \$66,000.

Q1, Q2

Patient Dwight Schuller was in the operating room 4 hours during March. Other costs related to Schuller's 4-hour surgery include:

Patient medicine	\$ 250
Cost of nurses	3,500
Cost of supplies	800

Physician cost is not included because physicians bill patients separately from the hospital billing system.

- REQUIRED:**
- Explain why the hospital uses a job costing system instead of a process costing system.
 - Determine the budgeted (i.e., estimated) overhead rate for the operating room.
 - Determine the total costs of Schuller's four-hour surgery.

5.15 **Job costing, over- and underapplied overhead, journal entries** Shane's Shovels produces small, custom earth-moving equipment for landscaping companies. Manufacturing overhead is allocated to work in process using an estimated overhead rate. During April, transactions for Shane's Shovels included the following:

Q1, Q2, Q3

Direct materials issued to production	\$180,000
Indirect materials issued to production	30,000
Other manufacturing overhead incurred	250,000
Overhead allocated	225,000
Direct labor costs	75,000

Beginning and ending work in process were both zero.

- REQUIRED:**
- What was the cost of jobs completed in April?
 - Was manufacturing overhead underapplied or overapplied? By how much?
 - Write out the journal entries for these transactions, including the adjustment.

5.16 **Normal and abnormal spoilage** Franklin Fabrication produces custom-made security doors and gates. Currently two jobs are in process, 359 and 360. During production of Job 359, the supervisor was on vacation and the employees made several errors in cutting the metal pieces for the two doors in the order. The spoiled metal pieces cost \$20 each and had zero scrap value. In addition, an order of five gates that had been manufactured for Job 360 required a fine wire mesh that sometimes tore as it was being mounted. Because a similar wire could be used that was much easier to install, the customer had been warned that costs could run over the bid if any difficulty was encountered in installing the wire. One of the gates was spoiled during the process of installing the wire. The cost of the materials and direct labor for the gate was \$150. The gate and metal were hauled to the dump and discarded.

Q5

- REQUIRED:**
- Should the spoilage for Job 359 be categorized as normal or abnormal spoilage? Explain.
 - Should the spoilage for Job 360 be categorized as normal or abnormal spoilage? Explain.
 - Prepare spoilage journal entries for both jobs.

5.17 **Direct costs and overhead** Job 87M had direct material costs of \$400 and a total cost of \$2,100. Overhead is allocated at the rate of 75% of prime cost (direct material and direct labor).

Q1, Q2

- REQUIRED:**
- How much direct labor was used?
 - How much overhead was allocated?

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- 5.18 Analysis of WIP T-account** Jeeter Company uses a job costing system. Overhead is allocated based on 120% of direct labor cost. Last month's transactions in the work in process account are shown here:

Work in Process			
Beginning balance	48,000		
Direct materials	160,000	To finished goods	442,000
Direct labor	120,000		
Factory overhead	150,000		

Only one job, 850, was still in process at the end of the month. Job 850 was charged with \$9,000 in overhead for the month.

REQUIRED:

- What is the ending balance in the WIP account?
- How much direct labor cost was used for Job 850?
- What is the amount of direct materials used for Job 850?

- 5.19 Journal entries** Langley Ltd. uses a job costing system. At the beginning of the month of June, two orders were in process as follows:

	Order 88	Order 105
Direct materials	\$1000	\$900
Direct labor	1,200	200
Overhead allocated	1,800	300

There was no inventory in finished goods on June 1. During the month of June, orders numbered 106 through 120, inclusive, were put into process.

Direct materials requirements amounted to \$13,000, direct labor costs for the month were \$20,000, and actual manufacturing overhead recorded during the month amounted to \$28,000.

The only order in process at the end of June was order 120, and the costs incurred for this order were \$1,150 of direct materials and \$1,000 of direct labor. In addition, order 118, which was 100% complete, was still on hand as of June 30. Total costs for this order were \$3,300. The firm's overhead allocation rate in June was the same as that used in May and is based on labor cost.

REQUIRED:

- Prepare journal entries, with supporting calculations, to record the cost of goods manufactured, the cost of goods sold, and the closing of the overapplied or underapplied overhead to cost of goods sold.
- Describe the two different approaches to closing overapplied or underapplied overhead at the end of the period. How do you choose an appropriate method?

- 5.20 Cost of goods sold schedule** The Rebecca Corporation is a manufacturer of machines made to customer specifications. All production costs are accumulated by means of a job order costing system. The following information is available at the beginning of the month of October 20XX.



Raw materials inventory, October 1	\$16,200
Work in process, October 1	5,100

A review of the job order cost sheets revealed the composition of the work in process inventory on October 1 as follows:

Direct materials (assuming no indirect materials this month)	\$1,320
Direct labor (300 hours)	3,000
Factory overhead allocated	780
	<u>\$5,100</u>

Activity during the month of October was as follows:

Raw materials costing \$20,000 were purchased.

Direct labor for job orders totaled 3,300 hours at \$10 per hour.

Factory overhead was allocated to production at the rate of \$2.60 per direct labor hour.

EXERCISES 205

On October 31, inventories consisted of the following:

Raw materials inventory	\$17,000
Work in process:	
Direct labor (500 hours)	5,000
Factory overhead allocated	1,300

- REQUIRED:** e Prepare in good form a detailed schedule showing the cost of goods manufactured for the month of October.

5.21 Q1, Q2, Q3 Job costing journal entries Vern's Van Service customizes light trucks according to customers' orders. This month the company worked on five jobs, numbered 207 through 211. Materials requisitions for the month were as follows:

Ticket	Carpet	Paint	Electronics	Other	Total
207	\$40	\$350	\$580	—	\$ 970
208	75	200	375	—	650
209	200	400	200	—	800
210	30	150	770	—	950
211	60	—	50	—	110
Indirect	—	—	—	\$750	750
Total costs					<u>\$4,230</u>

An analysis of the payroll records revealed the following distribution for labor costs:

	Job						
	207	208	209	210	211	Other	Total
Direct labor	\$1,400	\$1,200	\$800	\$1,700	\$400	—	\$5,500
Indirect labor	—	—	—	—	—	\$2,200	<u>2,200</u>
Total costs							<u>\$7,700</u>

Other overhead costs (consisting of rent, depreciation, taxes, insurance, utilities, etc.) amounted to \$3,600. At the beginning of the period, management anticipated that overhead cost would be \$6,400 and total direct labor would amount to \$5,000. Overhead is allocated on the basis of direct labor dollars.

Jobs 207 through 210 were finished during the month; Job 211 is still in process. Jobs 207 through 209 were picked up and paid for by customers. Job 210 is still on the lot waiting to be picked up.

- REQUIRED:** e **A.** Prepare the journal entries to reflect the incurrence of materials, labor, and overhead costs, the allocation of overhead, and the transfer of units to finished goods and cost of goods sold.
B. Close overapplied or underapplied overhead to cost of goods sold.

5.22 Q2, Q3, Q5 Allocating overhead, over- and underapplied overhead, spoilage The Futons for You Company sells batches of custom-made futons to customers and uses predetermined rates for fixed overhead, based on machine hours. The following data are available for last year:

Budgeted and actual fixed factory overhead cost	\$160,000
Budgeted machine hours	100,000
Actual machine hours used	110,000

	Machine Hours Used
Job 20	11,000
Job 21	16,000
Job 22	14,000
Job 23	9,000

- REQUIRED:** **A.** Compute the estimated overhead allocation rate to be used for the year.
B. Determine the overhead to be allocated to Job 21.
C. Determine total overapplied or underapplied overhead at the end of the year.

(continued)

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- D. Should cost of goods sold be increased or decreased at the end of the year? Why?
- E. If the amount of overapplied or underapplied overhead is material, how is it assigned?
- F. Suppose Job 21 required a special fabric cover for the futon pads. This type of fabric dulls the blades of the cutting machine, and a number of fabric covers were unusable. Should this spoilage be recorded for Job 21 or for all jobs processed this period? Explain your answer.

5.23 **Journal entries for job costing** At the beginning of the accounting period, the accountant for ABC Industries estimated that total overhead would be \$80,000. Overhead is allocated to jobs on the basis of direct labor cost. Direct labor was budgeted to cost \$200,000 this period. During the period only three jobs were worked on. The following summarizes the direct materials and labor costs for each:

	Job 1231	Job 1232	Job 1233
Direct materials	\$45,000	\$70,000	\$30,000
Direct labor	70,000	90,000	50,000

Job 1231 was finished and sold; job 1232 was finished but is waiting to be sold; and job 1233 is still in process. Actual overhead for the period was \$82,000.

REQUIRED: Prepare the following journal entries.

- A. Cost recorded during production
- B. Cost of jobs completed
- C. Cost of goods sold
- D. Allocation of overapplied or underapplied overhead prorated to the ending balances in work in process, finished goods, and cost of goods sold

5.24 **Spoilage journal entries** Jones Company manufactures custom doors. When Job 186 (a batch of 14 custom doors) was being processed in the machining department, one of the wood panels on a door split. This problem occurs periodically and is considered normal spoilage. Direct materials and labor for the door, to the point of spoilage, were \$35. In addition, a storm caused a surge in electricity, and a routing machine punctured the wood for Job 238. This incident occurred at the beginning of production, so spoilage amounted to only the cost of wood, at \$200.

- REQUIRED:**
- A. Prepare the journal entries for normal and abnormal spoilage.
 - B. Now suppose that the wood from abnormal spoilage can be sold for \$25. Record the journal entries for the disposal value.
 - 2 C. Jones Company is considering hiring someone to inspect all wood after it arrives at the plant, but prior to production. Discuss the pros and cons of hiring an inspector.

PROBLEMS



5.25

Collecting overhead cost information A family member asked you to review the accounting system used for Hanna's, a custom stained glass manufacturing business. The owner currently uses a software package to keep track of her checking account, but she does not produce financial statements. The owner seeks your help in setting up a costing system so that financial statements can be produced on a monthly basis.

REQUIRED:

- A. What kind of costing system is needed for this setting?
- 1 B. You plan to categorize the checkbook data for entry into the financial statement records. List the categories you might use for these entries. [List only broad categories here; see parts (C), (D), and (E) for more details.]
- 1 C. List several costs that might be included in a fixed overhead category.
- 1 D. List several costs that might be included in a variable overhead category.
- 1 E. List several costs that might be included in direct materials.
- 3 F. Write a memo to the owner discussing the alternative choices for the costing system. Include an explanation of the type of information that would need to be captured to support the costing system.

5.26 Cost of rework, control of scrap, accounting for scrap Dapper Dan Draperies manufactures and installs custom-ordered draperies.

Q5, Q6

REQUIRED:

- A. For all drapes, occasionally the sewing equipment malfunctions and the drape must be reworked. Explain how to account for the cost of rework when it is needed.
- B. Explain how to account for the cost of rework when customers choose a fabric that is known to require rework.
- 1 C. Explain why scrap will always arise in this business.
- 1 D. Dapper Dan can sell scraps to quilting groups or just throw them away. List several factors that could affect this decision.
- E. If Dapper Dan decides to sell scraps, explain the accounting choices for recording the sales value.

5.27 Accounting for scrap You are helping a friend, Jonah, set up a new accounting system for a small start-up construction company. He specializes in custom, energy efficient homes that are built on a cost-plus basis. Cost-plus means that his customers pay a fixed percentage above the sum of direct and overhead costs.

Q5, Q6

ETHICS

As he goes through the accounts, Jonah asks why you set up a separate account for scrap. He does not believe that scrap should be recorded anywhere in his accounting system because it is worth little, and theft is no problem. He makes weekly trips to a recycling plant where he receives a small sum for the scrap. Most of the time Jonah is working on only one house and the scrap is only for that house. However, once in a while he is working on several houses, and the scrap for all of the houses is recycled at once.

REQUIRED:

- A. Explain the two ways that scrap can be recorded in a job costing system.
- e B. Choose the appropriate method for Jonah and explain your choice.
- 2 C. Suppose you are a prospective homeowner. Explain to Jonah why you believe the revenue from scrap associated with your home should be recorded as a reduction in your costs rather than his overall costs.
- 3 D. Write a brief (and diplomatic) paragraph to convince Jonah that he needs to account for the revenues from scrap.

5.28 Job costing, overhead rates The Eastern Seaboard Company uses an estimated rate for allocating factory overhead to job orders based on machine hours for the machining department and on a direct labor cost basis for the finishing department. The company budgeted the following for last year:

Q1, Q2, Q3, Q4



	Machining	Finishing
Factory overhead	\$5,000,000	\$3,000,000
Machine hours	250,000	14,000
Direct labor hours	15,000	16,000
Direct labor cost	\$ 225,000	\$2,400,000

During the month of December, the cost record for Job 602 shows the following:

	Machining	Finishing
Direct materials requisitioned	\$7,000	\$2,000
Direct labor cost	\$ 300	\$6,750
Direct labor hours	20	300
Machine hours	35	5

REQUIRED:

- A. What is the estimated overhead allocation rate that should be used in the machining department? In the finishing department?
- B. What is the total overhead allocated to Job 602?
- e C. Assuming that Job 602 consisted of 200 units of product, what is the unit cost for this job?
- 2 D. What factors affect the volume of production in a period? Can we know all of the factors before the period begins? Why or why not?
- 1 E. Explain why Seaboard would use two different overhead allocation bases.

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5.29
Q1, Q2, Q3, Q4



Job costing, service sector Hawk and Eagle Co., a law firm, had the following costs last year:

Direct professional labor	\$15,000,000
Overhead	21,000,000
Total costs	<u>\$36,000,000</u>

The following costs were included in overhead:

Fringe benefits for direct professional labor	\$ 5,000,000
Paralegal costs	2,700,000
Telephone call time with clients (estimated but not tabulated)	600,000
Computer time	1,800,000
Photocopying	900,000
Total overhead	<u>\$11,000,000</u>

The firm recently improved its ability to document and trace costs to individual cases. Revised bookkeeping procedures now allow the firm to trace fringe benefit costs for direct professional labor, paralegal costs, telephone charges, computer time, and photocopying costs to each case individually. The managing partner needs to decide whether more costs than just direct professional labor should be traced directly to jobs to allow the firm to better justify billings to clients.

During the last year, more costs were traced to client engagements. Two of the case records showed the following:

	Client Cases	
	875	876
Direct professional labor	\$20,000	\$20,000
Fringe benefits for direct labor	3,000	3,000
Secretarial costs	2,000	6,000
Telephone call time with clients	1,000	2,000
Computer time	2,000	4,000
Photocopying	1,000	2,000
Total costs	<u>\$29,000</u>	<u>\$37,000</u>

Three methods are being considered for allocating overhead this year:

Method 1: Allocate overhead based on direct professional labor cost. Calculate the allocation rate using last year's direct professional labor costs of \$15 million and overhead costs of \$21 million.

Method 2: Allocate overhead based on direct professional labor cost. Calculate the allocation rate using last year's direct professional labor costs of \$15 million and overhead costs of \$10 million (\$21 million less \$11 million in direct costs that are traced this year).

Method 3: Allocate the \$10 million overhead based on total direct costs. Calculate the allocation rate using last year's direct costs (professional labor of \$15 million plus other direct costs of \$11 million).

REQUIRED:

- A. Compute the overhead allocation rate for method 1.
- B. Compute the overhead allocation rate for method 2.
- C. Compute the overhead allocation rate for method 3.
- D. Using each of the three rates computed in parts (A), (B), and (C), compute the total costs of cases 875 and 876.
- e E. Explain why the total costs allocated to cases 875 and 876 are not the same under the three methods.
- e F. Explain why method 1 would be inappropriate.
- 2 G. Would method 2 or method 3 be better? Explain.
- 1 H. Explain how job costing in a service business is different from job costing in a manufacturing business.

5.30
Q1, Q2, Q4

Plantwide versus production cost pools Flexible Manufacturers, Inc., produces small batches of customized products. The accounting system is set up to allocate plant overhead to each job using the following production cost pools and overhead allocation rates:

Labor-paced assembly	\$25 per direct labor hour
Machine-paced assembly	\$18 per machine hour
Quality testing	\$2 per unit

Actual resources used for Job 75:

Direct labor hours	3 hours
Machine hours	1.25 hours
Number of units	36 units

The plant accountant wants to simplify the cost accounting system and use a plantwide rate. If the preceding costs are grouped into a single cost pool and allocated based on labor hours, the rate would be \$35 per direct labor hour.

REQUIRED:

- A. What cost should be allocated to Job 75 using the plantwide overhead rate?
- B. What cost should be allocated to Job 75 using the production cost pool overhead rates?
- e C. Why do the allocated amounts in parts (A) and (B) differ?
- 3 D. Which method would you recommend? Explain your choice.

5.31
Q1, Q2, Q4

Allocating variable and fixed overhead in the service sector Prime Personal Trainers is a personal training service in Belgium for people who want to work out at home. Prime offers two different types of services: Setup and Continuous Improvement. Setup services consist of several home visits by a personal trainer who specializes in determining the proper equipment for each client and helping the client set up a home gym. Continuous Improvement services provide daily, weekly, or biweekly home visits by trainers.

Prime's accountant wants to create a job costing system for Setup services. She decides to use direct labor cost as the allocation base for variable overhead costs, and direct labor hours for fixed overhead cost. To estimate normal capacity, she calculates the average direct labor cost over the last several years. She estimates overhead by updating last year's overhead cost with expected increases in rent, supervisor's salaries, and so on. Following are her estimates (given in euros) for the current period.

Direct labor hours (based on 250 normal hours per month)	3,000
Direct labor cost	75,000
Indirect labor cost	25,000
Variable overhead (primarily fringe benefits)	150,000
Fixed overhead (office related costs)	120,000

Inventories consist of exercise equipment and supplies that are used by Prime for new clients. The following information summarizes operations during the month of October. A number of new jobs were begun in October, but only two jobs were completed: Job 20 and Job 22.

Account balances on October 1:

Equipment and supplies (raw materials)	5,000
Client contracts in process (Job 20)	3,500
Client contracts in process (Job 22)	1,500

Purchases of equipment and supplies:

Equipment	54,000
Supplies	500
Total	<u>54,500</u>

Equipment and supplies requisitioned for clients:

Job 20	1,000
Job 21	500
Job 22	4,000
Job 23	5,000
Other jobs	40,000
Indirect supplies	500
Total	<u>51,000</u>

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Direct labor hours and cost:

	Hours	Cost
Job 20	10	250
Job 21	18	450
Job 22	15	375
Job 23	6	150
Other clients	180	4,500
Total	229	5,725

Labor costs:

Direct labor wages	5,725
Indirect labor wages (160 hours)	1,920
Manager's salary	6,250
Total	13,895

Office costs:

Rent	1,000
Utilities	100
Insurance and taxes	900
Miscellaneous	1,000
Total	3,000

REQUIRED:

- A. What are the estimated allocation rates for fixed and variable overhead for the current period?
- B. What is the total overhead cost allocated to Job 20 in October?
- C. What is the total cost of Job 20?
- D. Calculate the amounts of fixed and variable overhead allocated to jobs in October.
- 2 E. Why would the accountant choose to use two cost pools instead of one? Will this method make a difference in client bills when the job includes more equipment and less labor than other jobs?

5.32
Q1, Q2, Q4


Effects of robotic equipment on overhead rates “Our costs are out of control, our accounting system is screwed up, or both!” screamed the sales manager. “We are simply noncompetitive on a great many of the jobs we bid on. Just last week we lost a customer when a competitor underbid us by 25%! And I bid the job at cost because the customer has been with us for years but has been complaining about our prices.”

This problem, raised at the weekly management meeting, has been getting worse over the years. The Johnson Tool Company produces parts for specific customer orders. When the firm first became successful, it employed nearly 500 skilled machinists. Over the years the firm has become increasingly automated and now uses a number of different robotic machines. The firm currently employs only 75 production workers, but output has quadrupled.

The problems raised by the sales manager can be seen in the portions of two bid sheets brought to the meeting (as reproduced). The bids are from the cutting department, but the relative size of these three types of manufacturing costs is similar for other departments.

The cutting department charges overhead to products based on direct labor hours. For the current period, the department expects to use 4,000 direct labor hours. Departmental overhead, consisting mostly of depreciation on the robotic equipment, is expected to be \$1,480,000.

An employee can typically set up any job on the appropriate equipment in about 15 minutes. Once machines are operating, an employee oversees five to eight machines simultaneously. All that is required is to load or unload materials and monitor calibrations. The department’s robotic machines will log a total of 25,000 hours of run time in the current period.

For bid 74683 the firm was substantially underbid by a competitor. The firm did get the job for bid 74687, but the larger jobs are harder to find. Small jobs arise frequently, but the firm is rarely successful in obtaining them.

CUTTING DEPARTMENT

Bid # <u>74683</u>	Machine Run Time <u>3</u> Hours
Materials	
Steel sheeting	\$280.25
Direct labor	
Equipment setup (0.25 hours @ \$12.50)	3.13
Equipment tending (1 hour @ \$12.50)	12.50
Overhead (1.25 hours @ \$370)	<u>462.50</u>
Total costs	<u>\$758.38</u>

CUTTING DEPARTMENT

Bid # <u>74687</u>	Machine Run Time <u>11</u> Hours
Materials	
Steel sheeting	\$2,440.50
Direct labor	
Equipment setup (0.25 hours @ \$12.50)	3.13
Equipment tending (1.25 hours @ \$12.50)	15.63
Overhead (1.5 hours @ \$370)	<u>555.00</u>
Total costs	<u>\$3,014.26</u>

- REQUIRED:**
- 2 A. Critique the cost allocation method used within the current cost accounting system.
 - B. Suggest a better approach for allocating overhead. Allocate costs using your approach and compare the costs of both jobs under the two systems.
 - 2 C. Discuss the pros and cons of using job costs to determine the price for a job order.

☆ 5.33
Q5, Q6



Classification of rework costs, uncertainties, critique of rework and scrap policy Fran Markus is in the cost accounting group at Boats Galore, a large manufacturing company that produces customized boats and yachts. The company sometimes experiences quality problems with its fiberglass raw material, causing flawed areas in boat hulls. The problem is often fixed by reworking the flawed areas. Other times the hull is scrapped because it is too flawed, and a new hull is fabricated. The spoilage policy at Boats Galore is to charge the cost of rework and spoilage to overhead unless it arises because a hull design is particularly complicated. In those cases, the cost is assigned to the job.

Two boats currently under construction require triple the amount of materials and labor time to enhance boat security. The customer wants each hull to be able to withstand the explosion of a small bomb. It is the company's first order with this hull construction. Because of the new design and fiberglass process, the customer has agreed to a cost-plus contract and will pay cost plus a fixed percentage of cost. This contract assures that Boats Galore does not incur a loss from developing the enhanced security hull. This week, the third layer on one of the boat hulls had a flaw in the fiberglass. The area was reworked, after which it met the security requirements.

Fran receives weekly data on labor and materials for each boat under construction. For regular production, workers estimate the time and materials used to rework flawed fiberglass areas, and Fran adds those costs to overhead instead of recording them as a cost of the particular job. Now she needs to decide how to record the cost of rework for the enhanced security hulls. The production people are not sure whether the flaw was due to poor quality fiberglass or to the triple hull design. If Fran adds the cost to the job order, the customer will pay for the labor and supplies as part of the cost-plus price. If she adds the cost to overhead, the cost will be spread across all jobs and only part of it will be allocated to the job having the enhanced security hulls.

**REQUIRED:
ANALYZE
INFORMATION**

The following questions will help you analyze the information for this problem. Do not turn in your answers to these questions unless your professor asks you to do so.

- 2 A. Critique the company's accounting policy for rework and scrap.
- 1 B. Describe uncertainties about the accounting treatment for the rework costs on the enhanced security hull job.
- 2 C. Discuss the pros and cons of alternative accounting treatments for the rework costs on this job.

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REQUIRED: WRITTEN ASSIGNMENT

Suppose you are an accounting intern at Boats Galore. Fran asks you to recommend an accounting treatment for the rework costs on the enhanced security hull job. Turn in your answers to the following.

- 3 D. Write a memo to Fran with your recommendation. As you write the memo, consider what information Fran will need from you to help her make a final decision.
- 3 E. Write one or two paragraphs explaining how you decided what information to include in your memo.

BUILD YOUR PROFESSIONAL COMPETENCIES

5.34 **Focus on Professional Competency: Project Management** *Job costing system, uncertainties, management of job costs* Review the following definition and elements for the Project Management competency.⁴

DEFINITION: *Accounting professionals must successfully manage a diversity of projects throughout their career. Individuals entering the accounting profession should demonstrate the ability to effectively control the course of a multi-dimensional, multi-step undertaking. This includes managing project assets, including human, financial, property, and technical resources.*

ELEMENTS FOR THIS COMPETENCY INCLUDE

Level 1	Level 2	Level 3	Level 4
1. Lists information relevant to managing a project 2. Identifies uncertainties related to time and resource requirements for a project 3. Identifies project goals	4. Develops alternative estimates of time and resource requirements for a project 5. Utilizes methods to measure project progress 6. Organizes the various aspects of a project in order to allocate resources for optimum results	7. Prioritizes and delegates as needed 8. Recognizes situations where prompt and determined actions are needed and responds accordingly 9. Sees projects through to completion or orderly transition	10. Effectively manages human resources that are committed to the project 11. Effectively facilitates and controls the project process and takes corrective action as needed

REQUIRED: Chapter 5 does not directly address how to manage projects. However, the chapter provides methods for measuring costs associated with one type of project—a customized product or service. As you address the following questions, focus on how job costing information can assist in the management of projects.

- 1 A. Focus on competency element 1, which addresses the need to identify relevant information. List the types of information that are measured using a job costing system. For each type, explain how the job costing information could potentially be relevant to managing a customized job.
- 1 B. Focus on competency element 2, which relates to uncertainties. Identify uncertainties about (1) the expected costs for a job, and (2) how to measure costs in a job costing system.
- C. Focus on competency elements 4, 5, 6, 8, and 11, which relate to measuring and monitoring the progress of projects. Answer the following questions:
 - 2 1. Suppose a customized order is partially complete. The total estimated cost of the job is \$100,000. So far, the job cost record indicates that direct costs and allocated overhead amount to \$50,000. Does this accounting mean that the job is 50% complete? Why or why not?
 - 2 2. Assume the same facts as in question 1. However, suppose the job is only 30% complete. Would you say that costs for the job are in control? Why or why not?

⁴The definition and elements are reprinted with permission from AICPA; copyright © 1978–2000 & 2003 by American Institute of Certified Public Accountants. The AICPA's Core Competency Framework can be accessed at ecap.aservices.org.

- ② 3. Discuss things that managers might do if they learn that the costs for a job are significantly higher than expected.
- ② 4. Discuss things that managers might do if they learn that the costs for a job are significantly lower than expected.

5.35
Q1, Q2, Q3, Q4



Integrating Across the Curriculum: Financial Accounting and Auditing *Research financial accounting rules, evaluate overhead allocation policy* Refer to the information in Problem 5.30. Suppose you work for a CPA firm and are part of the team auditing the financial statements of Flexible Manufacturers. You have been assigned the responsibility for auditing the allocation of overhead costs.

REQUIRED:

- A. Assume the company uses separate overhead allocation rates for labor-paced assembly, machine-paced assembly, and quality testing.
 - ② 1. Research financial accounting rules and determine whether the company's method for allocating overhead cost to inventory complies with U.S. generally accepted accounting principles (GAAP).
 - 2. Use T-accounts to document your understanding of the company's overhead cost allocation method. (*Hint:* Prepare a schedule similar to Exhibit 5.7.)
- B. Suppose you learn that the company plans to change its method of accounting for overhead to use a single plantwide overhead allocation rate. Research financial accounting rules and determine the following:
 - ① 1. Whether a plantwide overhead allocation rate complies with GAAP.
 - ① 2. The conditions under GAAP that must be met for the company to change its accounting method from using separate department overhead allocation rates to a single plantwide allocation rate.
- ② C. Suppose the company's policy is to include all overapplied or underapplied overhead as part of cost of goods sold on the income statement. As an auditor, would you consider this policy to be acceptable? Why or why not?