LEARNING OBJECTIVES

1. Describe the building-block concepts of costing systems
2. Distinguish job costing from process costing
3. Outline the seven-step approach to job costing
4. Distinguish actual costing from normal costing
5. Track the flow of costs in a job-costing system
6. Dispose of under- or overallocated manufacturing overhead costs at the end of the fiscal year using alternative methods
7. Apply variations from normal costing

It’s fair to say that no one likes to lose money. Whether a company is a new startup venture providing marketing consulting services or an established manufacturer of custom-built motorcycles, knowledge of job cost—how much it costs to consult for a client job or to produce an individual motorcycle—is critical if profit is to be generated. But what costs need to be considered? Direct materials and labor only? Or something more? John Metz, owner and CEO of Robinson Company, realizes the importance of accurately determining job costs. His company manufactures and installs specialized machinery for the paper-making industry. John has called a meeting with Anita Patel, controller, to discuss the costs of a new job.

John: This new Western Pulp and Paper Company (WPP) job has me a bit worried. We’ve never made a machine quite like this one, and I’m wondering if our price quote of $15,000 for the job is adequate. We’re also getting ready to bid on another similar job, so knowing how our costs are looking on the WPP project would help in preparing that bid.

Anita: We’re only two months into the fiscal year, but our costing system shows that we should earn more than our usual profit margin on the WPP project.

John: When you say “profit margin,” have you taken into account overhead costs as well as direct material and direct labor costs?

Anita: Yes—after all, we can’t say we’ve made a profit unless our revenues exceed all our costs, not just the direct costs.

John: But Anita, how do you know what our overhead costs are for the WPP job this early in the year? Don’t we have to wait until year-end to determine actual overhead?

Anita: Right again, John. Our accounting system does a good job of tracking job costs, but we won’t know the final actual overhead costs until the end of December. However, we have a pretty good idea of our upcoming overhead costs, based on prior years’ experience. Bottom line, I’d recommend pursuing more of these contracts.

John: That’s great news. Thank you for your advice. I’ll move forward right away on this new bid.

John Metz, like most business owners and managers, is right to be concerned about costs. DaimlerChrysler managers, for example, need to know how much it costs to manufacture the Mercedes S-Class. PriceWaterhouseCoopers needs to know what it costs to audit Novartis AG, the Swiss pharmaceutical company. When the costs and profitability of jobs are known, managers can confidently pursue their business strategies, develop pricing plans, and meet external reporting requirements. Costing systems are only one source of information for managers. When making decisions, managers combine cost information with noncost information, such as personal observations of operations, and nonfinancial performance measures, such as quality and customer satisfaction.
Building-Block Concepts of Costing Systems

Let's review some terms discussed in Chapter 2 that we'll now use to introduce costing systems:

- **Cost object**—anything for which a measurement of costs is desired—for example, a product, such as an iMac computer, or a service, such as the cost of repairing an iMac computer.
- **Direct costs of a cost object**—costs related to a particular cost object that can be traced to that cost object in an economically feasible (cost-effective) way.
- **Indirect costs of a cost object**—costs related to a particular cost object that cannot be traced to that cost object in an economically feasible (cost-effective) way. Indirect costs are allocated to the cost object using a cost-allocation method.

Cost assignment is a general term for assigning costs, whether direct or indirect, to a cost object. Cost tracing is a specific term for assigning direct costs; cost allocation specifically refers to assigning indirect costs. The relationship among these three concepts can be graphically represented as

Throughout this chapter, the costs assigned to a cost object, for example, a product such as a Mini Cooper or a service such as an audit of MTV, include both variable and fixed costs. Managers use costs of products and services to guide long-run strategic decisions (for example, what mix of products and services to produce and sell and what prices to charge for them?) In making these decisions, managers include all costs for two reasons. First, in the long run more costs can be managed and fewer costs are regarded as fixed. Second, also in the long run, a business cannot survive unless the prices of the products and services it chooses to sell cover both variable and fixed costs.

We need to introduce and explain two more terms to discuss costing systems:

1. **Cost pool.** A cost pool is a grouping of individual cost items. Cost pools can range from broad, such as all manufacturing-plant costs, to narrow, such as the costs of operating metal-cutting machines. Cost pools are often organized in conjunction with cost-allocation bases.

2. **Cost-allocation base.** How should a company allocate costs to operate metal-cutting machines—collected in a single cost pool—among different products? One way would be to allocate the costs on the basis of the number of machine-hours used to produce the different products. The cost-allocation base (in our example, the number of machine-hours) links in a systematic way an indirect cost or group of indirect costs (in our example, operating costs of all metal-cutting machines) to a cost object (in our example, different products). Companies often use the cost driver of indirect costs (number of machine-hours) as the cost-allocation base because of the cause-and-effect link between changes in the level of the cost driver and changes in indirect costs. A cost-allocation base can be either financial (such as direct labor costs) or nonfinancial (such as the number of machine-hours). When the cost object is a job, product, or customer, the cost-allocation base is also called a cost-application base.

The concepts represented by these five terms constitute the building blocks that we will use to design the costing systems described in this chapter.
Managers and management accountants choose cost objects to help them make decisions. As we described earlier, one major cost object of an accounting system is *products and services*. Another major cost object is *responsibility centers*, which are parts, segments, or subunits of an organization whose managers are accountable for specified activities. Examples of responsibility centers are departments or groups of departments (such as operations and sales at eBay), divisions (such as Cadillac and Buick at General Motors), and geographic territories (such as North America, Europe, and Asia Pacific at Nike).

The most common responsibility center is a department. Identifying department costs helps managers control the costs for which they are responsible. It also enables senior managers to evaluate the performance of their subordinates and the performance of subunits as economic investments. In manufacturing companies, the costs of the Manufacturing Department include all costs of materials, manufacturing labor, supervision, engineering, production, and quality control.

Be aware that supervision, engineering, and quality control costs, which are considered indirect or overhead costs when costing individual jobs or products, are considered direct costs of the Manufacturing Department. The reason is these costs are difficult to trace in an economically feasible way to individual jobs or products within the Manufacturing Department, but they are easily identified with and traced to the department itself.

**Job-Costing and Process-Costing Systems**

Management accountants use two basic types of costing systems to assign costs to products or services:

1. **Job-costing system.** In this system, the cost object is a unit or multiple units of a distinct product or service called a *job*. Each job uses a different amount of resources. The product or service is often a single unit, such as a specialized machine made at Hitachi, a construction project managed by Bechtel Corporation, a repair job done at an Audi Service Center, or an advertising campaign produced by Saatchi and Saatchi. Each special machine made by Hitachi is unique and distinct. An advertising campaign for one client at Saatchi and Saatchi differs greatly from advertising campaigns for other clients. Job costing is also used to cost multiple units of a distinct product, such as the costs incurred by Raytheon Corporation to manufacture multiple units of the Patriot missile for the U.S. Department of Defense. Because the products and services are distinct, job-costing systems accumulate costs separately for each product or service.

2. **Process-costing system.** In this system, the cost object is masses of identical or similar units of a product or service. For example, Citibank provides the same service to all its customers when processing customer deposits. Intel provides the same product (say, a Pentium 4 chip) to each of its customers. Customers of Minute Maid all receive the same frozen orange juice product. In each period, process-costing systems divide the total costs of producing an identical or similar product or service by the total number of units produced to obtain a per-unit cost. This per-unit cost is the average unit cost that applies to each of the identical or similar units produced in that period.

Exhibit 4-1 presents examples of job costing and process costing in the service, merchandising, and manufacturing sectors.

These two types of costing systems are best considered as opposite ends of a continuum; in between, one type of system can blur into the other to some degree.
Many companies have costing systems that are neither pure job costing nor pure process costing but have elements of both. Costing systems, therefore, need to be tailored to the underlying operations. For example, Kellogg Corporation uses job costing to calculate the total cost to manufacture each of its different and distinct types of products—such as Corn Flakes, Crispix, and Froot Loops—but process costing to calculate the per-unit cost of producing each identical box of Corn Flakes. In this chapter, we focus on job-costing systems. Chapters 17 and 18 discuss process-costing systems.

**Actual Costing in Manufacturing**

We illustrate job costing using the Robinson example from the vignette at the beginning of the chapter. Robinson uses actual-costing to determine the cost of individual jobs. Actual costing is a costing system that traces direct costs to a cost object by using the actual direct-cost rates times the actual quantities of the direct-cost inputs. It allocates indirect costs based on the actual indirect-cost rates times the actual quantities of the cost-allocation bases.

Robinson operates at capacity to manufacture and install specialized machinery for the paper-making industry at its Green Bay, Wisconsin, plant. In its job-costing system, Robinson accumulates costs incurred on a job in different parts of the value chain—for example, manufacturing, marketing, and customer service. To start, we focus on Robinson’s manufacturing function (which also includes product installation). To make a machine, Robinson purchases some components from outside suppliers and makes others itself. Each of Robinson’s jobs also has a service element: installing a machine at a customer’s site, integrating it with the customer’s other machines and processes, and ensuring the machine meets customer expectations.

The specific job we will focus on is the manufacture (and installation) of a small pulp machine, which converts wood to pulp, for Western Pulp and Paper Company in 2006. Based on cost estimates prepared by Robinson’s management accountants, Robinson prices the job at $15,000. Robinson uses knowledge about its own costs to set a price that will make a profit and to make informed estimates of the costs of future jobs. The next section describes how the management accountant calculates direct- and indirect-cost rates and actual costs.
General Approach to Job Costing

There are seven steps to assigning costs to an individual job—whether in the manufacturing, merchandising, or service sector.

**Step 1:** Identify the Job That Is the Chosen Cost Object. The cost object in the Robinson Company example is Job WPP 298, manufacturing a pulp machine for the Western Pulp and Paper Company in 2006. Robinson’s managers and management accountants gather information to cost jobs through source documents. A source document is an original record (such as a labor time card on which an employee’s work hours are recorded) that supports journal entries in an accounting system. The main source document for Job WPP 298 is a job-cost record. A job-cost record, also called a job-cost sheet, records and accumulates all the costs assigned to a specific job, starting when work begins. Exhibit 4-2 shows the job-cost record for the pulp machine ordered by Western Pulp and Paper Company. As we work our way through the various steps in costing Job WPP 298, follow the entries on the job-cost record in Exhibit 4-2.

**Step 2:** Identify the Direct Costs of the Job. Robinson identifies two direct-manufacturing cost categories: direct materials and direct manufacturing labor.

- **Direct materials:** On the basis of the engineering specifications and drawings provided by Western Pulp, a manufacturing engineer orders materials from the storeroom. The order is placed using a basic source document called a materials-requisition record, which contains information about the cost of direct materials used on a specific job and in a specific department. Exhibit 4-3,
Panel A shows a materials-requisition record for the Robinson Company. See how the record specifies the job for which the material is requested (WPP 298), the description of the material (Part Number MB 468-A, metal brackets), the actual quantity (8), the actual unit cost ($14), and the actual total cost ($112). The $112 actual total cost also appears on the job-cost record in Exhibit 4-2. If we add the cost of all material requisitions, the total actual direct material cost is $4,606, which is shown on the job-cost record in Exhibit 4-2.

Direct manufacturing labor: The accounting for direct manufacturing labor is similar to the accounting described for direct materials. The source document for direct manufacturing labor is a labor-time record, which contains information about the amount of labor time used for a specific job in a specific department. Exhibit 4-3, Panel B, shows a typical weekly labor-time record for a particular employee (G. L. Cook). Each day Cook records the time spent on individual jobs (in this case WPP 298 and JL 256), as well as the time spent on other tasks, such as maintenance of machines or cleaning, that are not related to a specific job.

The 25 hours that Cook spent on Job WPP 298 appears on the job-cost record in Exhibit 4-2 at a cost of $450 (25 hours \times $18 per hour). Similarly, the job-cost record for Job JL 256 will carry a cost of $216 (12 hours \times $18 per hour). The three hours of time spent on maintenance and cleaning at $18 per hour equals $54. This cost is part of indirect manufacturing costs because it is not traceable to any particular job. This indirect cost is included as part of the manufacturing-overhead cost pool allocated to jobs. The total direct manufacturing labor costs of $1,579 for the pulp machine that appear on the job-cost record in Exhibit 4-2 are the sum of all the direct manufacturing labor costs charged to this job by different employees.

All costs other than direct materials and direct manufacturing labor are classified as indirect costs.

Step 3: Select the Cost-Allocation Bases to Use for Allocating Indirect Costs to the Job. Indirect manufacturing costs are costs that are necessary to do a job but that cannot be traced to a specific job. It would be impossible to complete a job without incurring indirect costs such as supervision, manufacturing engineering, utilities, and repairs. Because these costs cannot be traced to a specific job, they must be allocated to all jobs in a systematic way. Different jobs require different quantities of indirect resources. The objective is to allocate the costs of indirect resources in a systematic way to their related jobs. Companies often use multiple cost-allocation bases to allocate indirect costs (see Global Surveys of Company Practice, p. 103) because different indirect costs have different cost drivers. For example, some indirect costs such as depreciation and repairs of machines are more closely related to
GLOBAL SURVEYS OF COMPANY PRACTICE

Cost-Allocation Bases Used for Manufacturing Overhead

How do companies around the world allocate manufacturing overhead costs to products? The percentages in the following table indicate how frequently particular cost-allocation bases are used in costing systems in six countries. If the reported percentages for a country exceed 100%, that's because many companies surveyed use more than one cost-allocation base.

<table>
<thead>
<tr>
<th></th>
<th>United States</th>
<th>Australia</th>
<th>Ireland</th>
<th>Japan</th>
<th>New Zealand</th>
<th>United Kingdom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct labor</td>
<td>62%</td>
<td>73%</td>
<td>52%</td>
<td>68%</td>
<td>84%</td>
<td>78%</td>
</tr>
<tr>
<td>Machine-hours</td>
<td>12</td>
<td>17</td>
<td>22</td>
<td>27</td>
<td>53</td>
<td>60</td>
</tr>
<tr>
<td>Units of production</td>
<td>4</td>
<td>17</td>
<td>28</td>
<td>32</td>
<td>47</td>
<td>55</td>
</tr>
<tr>
<td>Direct material cost</td>
<td>5</td>
<td>14</td>
<td>7</td>
<td>36</td>
<td>44</td>
<td>40</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>—</td>
<td>22</td>
<td>—</td>
<td>10</td>
<td>15</td>
</tr>
</tbody>
</table>

As the survey data identifies, a growing global trend is the use of multiple allocation bases for manufacturing overhead. Surveys also indicate that as companies begin to identify activity drivers of manufacturing overhead costs, such as setup hours and inspection hours, more of the manufacturing overhead costs are allocated to products using measures other than direct labor and machine-hours.8

8 Clarke, “Management Accounting Practices in Large Irish Manufacturing Firms.”
8 Lamminmaki and Drury, “A Comparison of New Zealand and British Product-Costing Practices.”
8 Groot, “Activity Based Costing in U.S. and Dutch Food Companies.”

Full citations are in Appendix A at the end of the book.

Step 4: Identify the Indirect Costs Associated with Each Cost-Allocation Base.

Robinson believes that a single cost-allocation base—direct manufacturing labor-hours—can be used to allocate indirect manufacturing costs to jobs. Consequently, Robinson creates a single cost pool called manufacturing overhead costs. This pool represents all indirect costs of the Green Bay Manufacturing Department that are difficult to trace directly to individual jobs. In 2006, actual manufacturing overhead costs total $1,215,000.

As we saw in steps 3 and 4, managers first identify cost-allocation bases and then identify the costs related to each cost-allocation base, not the other way around. That’s because managers must first understand the cost driver, the reasons why costs are being incurred (for example, for setting up machines, moving materials, or designing jobs), before they can determine the costs asso-
Exhibit 4-4 presents concepts that appear throughout this book in a similar format. In the Robinson Company example, the cost object (a pulp machine for Western Pulp and Paper Company) has two direct costs (direct materials and direct manufacturing labor) and one indirect cost (manufacturing overhead) allocated on the basis of direct manufacturing labor-hours.

Chapter 4

Exhibit 4-4 presents concepts that appear throughout this book in a similar format. In the Robinson Company example, the cost object (a pulp machine for Western Pulp and Paper Company) has two direct costs (direct materials and direct manufacturing labor) and one indirect cost (manufacturing overhead) allocated on the basis of direct manufacturing labor-hours.

**Step 5:** Compute the Rate per Unit of Each Cost-Allocation Base Used to Allocate Indirect Costs to the Job. For each cost pool, the actual indirect-cost rate is calculated by dividing total indirect costs in the pool (determined in step 4) by the total quantity of the cost-allocation base (determined in step 3). Robinson calculates the allocation rate for its single manufacturing overhead cost pool as follows:

\[
\text{Actual manufacturing overhead rate} = \frac{\text{Actual manufacturing overhead costs}}{\text{Actual total quantity of cost-allocation base}}
\]

\[
= \frac{\$1,215,000}{27,000 \text{ direct manufacturing labor-hours}}
\]

\[
= \$45 \text{ per direct manufacturing labor-hour}
\]

**Step 6:** Compute the Indirect Costs Allocated to the Job. The indirect costs of a job are computed by multiplying the actual quantity of each different allocation base (one allocation base for each cost pool) associated with the job by the indirect-cost rate of each allocation base (computed in step 5). To make the pulp machine, Robinson uses 88 direct manufacturing labor-hours, the cost-allocation base for its only manufacturing overhead cost pool (out of the 27,000 total direct manufacturing labor-hours for 2006). Manufacturing overhead costs allocated to the pulp machine job equal $3,960 ($45 per direct manufacturing labor-hour x 88 hours) and appear on the WPP 298 job-cost record in Exhibit 4-2.

**Step 7:** Compute the Total Cost of the Job by Adding All Direct and Indirect Costs Assigned to the Job. Exhibit 4-2 shows that the total manufacturing costs of the Western Pulp job are $10,145.

Recall, Robinson was paid $15,000 for the job. With that revenue, the actual-costing system shows a gross margin of $4,855 ($15,000 – $10,145) and a gross-margin percentage of 32.4% ($4,855 / $15,000 = 0.324).

Robinson’s manufacturing managers and sales managers can use the gross-margin and gross-margin percentage calculations to compare the profitability of different jobs (see Concepts in Action on p. 106) to try to understand the reasons why some jobs show low profitability: Have direct materials been wasted? Was direct manufacturing labor too high? Were there ways to improve the efficiency of these jobs? Were these jobs simply underpriced? Job-cost analysis provides the information needed for judging the performance of manufacturing and sales managers and for making future improvements. (See Focus on Values and Behaviors, p. 107.)

Exhibit 4-4 is an overview of Robinson Company’s job-costing system. This exhibit represents the concepts comprising the five building blocks—cost object, direct costs of a cost object, indirect costs of a cost object, indirect-cost pool, and cost-allocation base—of job-costing systems. Costing-system overviews such as Exhibit 4-4 are important learning tools. We urge you to sketch one when you need to understand a costing system in manufacturing, merchandising, or service companies. (The symbols in Exhibit 4-4 are used consistently in the costing-system overviews presented in this book. A triangle always identifies a direct cost; a rectangle, the indirect-cost pool; and an octagon, the cost-allocation base.) Note the parallel between the overview diagram and the cost of the pulp machine job described in step 7. Exhibit 4-4 shows two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost category (manufacturing overhead) used to allocate indirect costs. The costs in step 7 also have three dollar amounts, each corresponding respectively to the two direct-cost and one indirect-cost categories.
The Role of Technology

To improve the efficiency of their operations, managers use costing information about products and jobs to control materials, labor, and overhead costs. Modern information technology provides managers with quick and accurate product-cost information, making it easier to manage and control jobs. For example, in many costing systems, source documents exist only in the form of computer records. We next describe bar coding and other forms of online information recording that reduce human intervention and improve the accuracy of the records of materials and labor time for individual jobs.

Consider, for example, direct materials charged to jobs for product-costing purposes. Managers control these costs as materials are purchased and used. Using Electronic Data Interchange (EDI) technology, companies like Robinson order materials from their suppliers by clicking a few keys on a computer keyboard. EDI, an electronic computer link between a company and its suppliers, ensures that the order is transmitted quickly and accurately with minimum paperwork and costs. A bar code scanner records the receipt of incoming materials. The computer matches the receipt with the order, prints out a check to the supplier, and records the material received. When an operator on the production floor transmits a request for materials via a computer terminal, the computer prepares a materials-requisition record, instantly recording the issue of materials in the materials and job-cost records. Each day, the computer sums the materials-requisition records charged to a particular job or manufacturing department. A performance report is then prepared comparing budgeted costs and actual costs of direct materials. Direct material usage can be reported hourly—if the benefits exceed the cost of such frequent reporting.

Similarly, information about manufacturing labor is obtained as employees log into computer terminals and key in the job numbers, their employee numbers, and start and end times of their work on different jobs. The computer automatically prints the labor-time record and, using hourly rates stored for each employee, calculates the labor costs of
CHAPTER 4

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individual jobs. Information technology also provides managers with instantaneous feedback to help control manufacturing overhead, jobs in process, jobs completed, and jobs shipped and installed at customer sites.

Time Period Used to Compute Indirect-Cost Rates

Robinson Company computes indirect-cost rates in step 5 of the job-costing system (p. 104) on an annual basis. Why does Robinson wait until the end of the fiscal year (annual accounting period) to calculate indirect-cost rates? Why doesn’t Robinson calculate indirect-cost rates each week? or each month? Using weekly rates or monthly rates, Robinson would be able to calculate actual costs of jobs much earlier and not have to wait until the end of the fiscal year. There are two reasons for using longer periods, such as a year, to calculate indirect-cost rates. One reason is related to the dollar amount in the numerator. The other reason is related to the quantity in the denominator of the calculation.

1. **The numerator reason (indirect-cost pool).** The shorter the period, the greater the influence of seasonal patterns on the amount of costs. For example, if indirect-cost rates were calculated each month, costs of heating (included in the numerator) would be charged to production only during the winter months. But an annual period incorporates the effects of all four seasons into a single, annual indirect-cost rate.

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CONCEPTS IN ACTION

**Job Costing on the Joint Strike Fighter Project**

Northrop Grumman, Inc., is a leading provider of systems and technologies for the U.S. Department of Defense. Competitive bidding processes and increased public and congressional oversight make understanding costs critical in pricing decisions as well as in winning and retaining government contracts. Each job must be estimated individually because the unique end products demand different amounts of Northrop Grumman’s resources.

In 2001, the team of Northrop Grumman, Lockheed Martin, and BAE Systems was awarded the System Design and Demonstration contract for the Joint Strike Fighter (JSF) project. This project, worth $200 billion over seven years, will create a family of supersonic, multirole fighter airplanes designed for the U.S. Air Force, Navy, and Marine Corps, as well as the United Kingdom’s Royal Air Force and Royal Navy. This project has five primary stages: (1) conceptualization, (2) design and review, (3) manufacturing, (4) assembly, and (5) testing and delivery. In the conceptualization phase, detailed plans for each aircraft model are created. Technologies for these plans are researched, developed, and approved during the design and review phase. Subsequently, thousands of components, created by the primary contractors and various subcontractors, are manufactured, assembled in multiple locations, and tested prior to delivery to the purchasing organizations. If they do not meet required specifications during testing, the fighter jets are reworked before delivery.

To ensure proper allocation and accounting of resources, JSF project managers use a job-costing system. The system first calculates the budgeted cost of direct materials and direct-labor hours for the project. It then allocates all overhead costs (supervisory salaries, rent, depreciation, materials handling, and so on) to jobs using budgeted direct material costs and direct-labor hours as allocation bases. Northrop Grumman’s job-costing system allows managers to assign costs to processes and projects. Northrop Grumman continually estimates the profitability of these projects based on the percentage of work completed and the related revenue earned. Managers use the job-costing system to actively manage costs, while program representatives from the Department of Defense and members of Congress have access to clear, concise, and transparent costing data. Therefore, Northrop Grumman’s job-costing system improves cost identification and management for all Department of Defense projects.

Source: Conversations with Stephen Bryant, Northrop Grumman, Inc., in October and November 2003.
Levels of total indirect costs are also affected by nonseasonal erratic costs. Examples of nonseasonal erratic costs include costs incurred in a particular month that benefit operations during future months, costs of repairs and maintenance of equipment, and costs of vacation and holiday pay. If monthly indirect-cost rates were calculated, jobs done in a month with high, nonseasonal, erratic costs would be loaded with these costs. Pooling all indirect costs together over the course of a full year and calculating a single annual indirect-cost rate helps to smooth some of the erratic bumps in costs associated with shorter periods.

2. The denominator reason (quantity of the allocation base). Another reason for longer periods is the need to spread monthly fixed indirect costs over fluctuating levels of monthly output. Some indirect costs may be variable each month with respect to the cost-allocation base (for example, supplies), whereas other indirect costs are fixed each month (for example, property taxes and rent).

Suppose a company deliberately schedules its production to correspond with a highly seasonal sales pattern. Assume the following mix of variable indirect costs (such as supplies, repairs, and indirect manufacturing labor) and fixed indirect costs (plant depreciation and engineering support):

<table>
<thead>
<tr>
<th>Indirect Costs</th>
<th>Variable</th>
<th>Fixed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Labor-Hours</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>High-output month</td>
<td>$40,000</td>
<td>$60,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>Low-output month</td>
<td>10,000</td>
<td>60,000</td>
<td>70,000</td>
</tr>
</tbody>
</table>

You can see that variable indirect costs change in proportion to changes in direct manufacturing labor-hours. Therefore, the variable indirect-cost rate is the same in both the high-output months and the low-output months ($40,000 ÷ 3,200 labor-hours = $12.50 per labor-hour; $10,000 ÷ 800 labor-hours = $12.50 per labor-hour). If the vari-
able indirect-cost rate is higher in high-output months (because of overtime payments or excessive machine maintenance caused by high output), variable indirect costs should be allocated at a higher rate to production in high-output months relative to production in low-output months. Consider now the fixed costs of $60,000. The fixed costs cause monthly total indirect-cost rates to vary considerably—from $31.25 per hour to $87.50 per hour. Few managers believe that identical jobs done in different months should be allocated indirect-cost charges per hour that differ so significantly ($87.50 ÷ $31.25 = 2.80, or 280%) because of fixed costs. In our example, management chooses a specific level of capacity based on a time horizon far beyond a mere month. An average, annualized rate based on the relationship of total annual indirect costs to the total annual level of output will smooth the effect of monthly variations in output levels.

The calculation of monthly indirect-cost rates is affected by the number of Monday-to-Friday workdays in a month. The number of workdays per month varies from 20 to 23 during a year. If separate rates are computed each month, jobs in February, having the fewest workdays in a month, would bear a greater share of indirect costs (such as depreciation and property taxes) than jobs in other months. Many managers believe such results to be an unrepresentative and unreasonable way to assign indirect costs to jobs. An annual period reduces the effect that the number of working days per month has on unit costs. In addition, setting annual overhead rates once a year saves management time that would be needed 12 times per year if overhead rates were set monthly.

Normal Costing

The difficulty of calculating actual indirect-cost rates on a weekly or monthly basis means managers cannot calculate the actual costs of jobs as they are completed. However, managers want a close approximation of the manufacturing costs of various jobs regularly during the year, not just at the end of the fiscal year. Managers want manufacturing costs (and other costs, such as marketing costs) for ongoing uses, including pricing jobs, monitoring and managing costs, and preparing interim financial statements. Because of the benefits of immediate access to job costs, few companies wait until the actual manufacturing overhead is finally known (at year-end) before allocating overhead costs to compute job costs. Instead, a predetermined or budgeted indirect-cost rate is calculated for each cost pool at the beginning of a fiscal year, and overhead costs are allocated to jobs as work progresses. For the numerator and denominator reasons already described, for each cost pool, the budgeted indirect-cost rate is computed as follows:

\[
\text{Budgeted indirect-cost rate} = \frac{\text{Budgeted annual indirect costs}}{\text{Budgeted annual quantity of the cost-allocation base}}
\]

Using budgeted indirect-cost rates gives rise to normal costing.

Normal costing is a costing system that traces direct costs to a cost object by using the actual direct-cost rates times the actual quantities of the direct-cost inputs and that allocates indirect costs based on the budgeted indirect-cost rates times the actual quantities of the cost-allocation bases. Both actual costing and normal costing trace direct costs to jobs in the same way. The actual quantities and actual rates of direct materials and direct manufacturing labor used on a job are known from the source documents as the work is done. The only difference between actual costing and normal costing is that actual costing uses actual indirect-cost rates, whereas normal costing uses budgeted indirect-cost rates to cost jobs. Exhibit 4-5 distinguishes between actual costing and normal costing.

We illustrate normal costing for the Robinson Company example using the seven-step procedure. The following budgeted data for 2006 are for its manufacturing operations:

<table>
<thead>
<tr>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total manufacturing overhead costs</td>
</tr>
<tr>
<td>Total direct manufacturing labor-hours</td>
</tr>
</tbody>
</table>

Steps 1 and 2 are exactly as before: Step 1 identifies WPP 298 as the cost object; Step 2 calculates actual direct material costs of $4,606, and actual direct manufacturing labor costs of $1,579. Recall from Step 3 that Robinson uses a single cost-allocation base, direct
### EXHIBIT 4-5

<table>
<thead>
<tr>
<th></th>
<th>Actual Costing</th>
<th>Normal Costing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct Costs</strong></td>
<td>Actual direct-cost rates × actual quantities of direct-cost inputs</td>
<td>Actual direct-cost rates × actual quantities of direct-cost inputs</td>
</tr>
<tr>
<td><strong>Indirect Costs</strong></td>
<td>Actual indirect-cost rates × actual quantities of cost-allocation bases</td>
<td>Budgeted indirect-cost rates × actual quantities of cost-allocation bases</td>
</tr>
</tbody>
</table>

Manufacturing labor-hours, to allocate all manufacturing overhead costs to jobs. The budgeted quantity of direct manufacturing labor-hours for 2006 is 28,000 hours. In Step 4, Robinson groups all the indirect manufacturing costs into a single manufacturing overhead cost pool. In Step 5, the budgeted manufacturing overhead rate for 2006 is calculated as:

\[
\text{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted total quantity of cost-allocation base}}
\]

\[
= \frac{\$112,000}{28,000 \text{ direct manufacturing labor-hours}}
\]

\[
= \$40 \text{ per direct manufacturing labor-hour}
\]

In Step 6, under a normal-costing system,

\[
\text{Manufacturing overhead costs allocated to WPP 298} = \text{Budgeted manufacturing overhead rate} \times \text{Actual quantity of direct manufacturing labor-hours}
\]

\[
= \$40 \text{ per direct manufacturing labor-hour} \times 88 \text{ direct manufacturing labor-hours}
\]

\[
= \$3,520
\]

In Step 7, the cost of the job under normal costing is $9,705, calculated as

Direct manufacturing costs
- Direct materials $4,606
- Direct manufacturing labor 1,579 $6,185

Manufacturing overhead costs
- ($40 × 88 actual direct manufacturing labor-hours) 3,520

Total manufacturing costs of job $9,705

The manufacturing cost of the WPP 298 job is lower by $440 under normal costing ($9,705) than it is under actual costing ($10,145) because the budgeted indirect-cost rate is $40 per hour, whereas the actual indirect-cost rate is $45 per hour. That is, ($45 − $40) × 88 actual direct manufacturing labor-hours = $440.

As we discussed previously, manufacturing costs of a job are available much earlier under a normal-costing system. Consequently, Robinson’s manufacturing and sales managers can evaluate the profitability of different jobs, the efficiency with which the jobs are done, and the pricing of different jobs as soon as the jobs are completed, while the experience is still fresh in everyone’s mind. Another advantage of normal costing is that corrective actions can be implemented much sooner.

### A Normal Job-Costing System in Manufacturing

We now explain how a normal job-costing system operates in manufacturing. Continuing with the Robinson Company example, the following illustration considers events that occurred in February 2006.

#### General Ledger and Subsidiary Ledgers

You know by this point that a job-costing system has a separate job-cost record for each job. A summary of the job-cost record is typically found in a subsidiary ledger. The general ledger account Work-in-Process Control presents the total of these separate job-cost records pertaining to all unfinished jobs. The job-cost records and Work-in-Process Control account track job costs from when jobs are started until they are completed.
Exhibit 4-6 shows T-account relationships for Robinson Company’s general ledger. The general ledger gives a “bird’s-eye view” of the costing system. The amounts shown in Exhibit 4-6 are based on the transactions that follow. The explanation of transactions shows the subsidiary ledgers and the basic source documents that contain the underlying details—the “worm’s-eye view.” As you go through each of the following T-accounts, use Exhibit 4-6 as a road map to see how the various entries being made come together.

General ledger accounts with “Control” in the titles (for example, Materials Control and Accounts Payable Control) have underlying subsidiary ledgers that contain additional details, such as each type of material in inventory and individual suppliers that Robinson must pay. The sum of all entries in underlying subsidiary ledgers equals the total amounts in the corresponding general ledger control accounts.

Software programs process the transactions in most accounting systems. Some programs make general ledger entries simultaneously with entries in the subsidiary ledger accounts. Other software programs make general ledger entries at, say, weekly or monthly intervals, with entries in the subsidiary ledger accounts made more frequently. The Robinson Company makes entries in its subsidiary ledger when transactions occur and then makes entries in its general ledger on a monthly basis.

A general ledger should be viewed as only one of many tools that assist management in planning and control. To control operations, managers use not only the source documents used to record amounts in the subsidiary ledgers, but also nonfinancial variables such as the percentage of jobs requiring rework.

**EXHIBIT 4-6**

Explanations of Transactions

The following transaction-by-transaction analysis explains how a job-costing system serves the dual goals of product costing and department responsibility and control. These transactions track stages (a) through (d) from the purchase of materials and other manufacturing inputs, to conversion to work-in-process and finished goods, to the sale of finished goods:

1. **Transaction**: Purchases of materials (direct and indirect) on credit, $89,000.
   **Account Analysis**: The asset Materials Control is increased (debited) by $89,000, and the liability Accounts Payable Control is increased (credited) by $89,000.
   **Subsidiary Records**: The subsidiary ledger for materials at Robinson Company—called Materials Records—keeps a continuous record of quantity received, quantity issued to jobs, and inventory balances for each type of material. Panel A of Exhibit 4-7 shows the Materials Record for Metal Brackets (Part No. MB 468-A). In many companies, the source documents supporting the receipt and issue of materials are scanned into a computer. Software programs then automatically update the Materials Records and make all the necessary accounting entries in the subsidiary and general ledgers. The following journal entry accounts for all the $89,000 of February 2006 purchase transactions in the materials subsidiary ledger:

   **Journal Entry**: Materials Control 89,000
   Accounts Payable Control 89,000

   **Post to General Ledger (Exhibit 4-6)**:
   Materials Control
   Accounts Payable Control
   ① 89,000 ① 89,000

   Materials Control includes all materials purchases, whether the items are classified as direct or indirect costs of products.

2. **Transaction**: Materials sent to the manufacturing floor: direct materials, $81,000, and indirect materials, $4,000.
   **Account Analysis**: The asset Work-in-Process Control account is increased (debited) by $81,000, and the Manufacturing Overhead Control account is increased (debited) by $4,000. The asset Materials Control is decreased (credited) by $85,000. The idea is that material costs "attach" to the work in process, thereby making the work in process a more valuable asset. Responsibility is fixed by using materials-requisition records as a basis for charging departments for the materials issued to them.
   **Subsidiary Records**: As direct materials are used, they are recorded as issued in the Materials Records (see Exhibit 4-7, Panel A, for a record of the Metal Brackets issued for the Western Pulp machine job). Direct materials are also charged to individual job records, which are the subsidiary ledger accounts for the Work-in-Process Control account in the general ledger. For example, the metal brackets used in the Western Pulp machine job appear as direct material costs of $112 in the subsidiary ledger under the job-cost record for WPP 298 (Exhibit 4-8, Panel A). The cost of direct materials used across all job-cost records for February 2006 is $81,000 (Exhibit 4-8, Panel A).
As indirect materials (for example, lubricants) are used, they are charged to the Manufacturing Department overhead records, which comprise the subsidiary ledger for Manufacturing Overhead Control (Exhibit 4-7, Panel C). The Manufacturing Department overhead records accumulate actual costs in individual overhead categories by each indirect-cost-pool account in the general ledger. Recall that Robinson has only one indirect-cost pool: Manufacturing Overhead. The cost of indirect materials used is not added directly to individual job records. Instead, the cost of these indirect materials is allocated to individual job records as a part of manufacturing overhead (transaction 6, which follows). The following journal entry accounts for all the February 2006 requisitions posted in the materials subsidiary ledger for direct materials ($81,000) and indirect materials ($4,000).

**Journal Entry:**

\[
\begin{align*}
\text{Work-in-Process Control} & \quad 81,000 \\
\text{Manufacturing Overhead Control} & \quad 4,000 \\
\text{Materials Control} & \quad 85,000
\end{align*}
\]

**Post to General Ledger (Exhibit 4-6):**

\[
\begin{array}{c|c|c}
\text{Materials Control} & 89,000 & 85,000 \\
\hline
\text{Work-in-Process Control} & 81,000 \\
\hline
\text{Manufacturing Overhead Control} & 4,000 \\
\end{array}
\]

**3. Transaction:** Total manufacturing payroll incurred for February: direct, $39,000; indirect, $15,000.
### Account Analysis
The asset Work-in-Process Control is increased (debited) by the direct manufacturing labor amount of $39,000, and Manufacturing Overhead Control is increased (debited) by the $15,000 of indirect manufacturing labor. The liability Wages Payable Control is increased (credited) by $54,000. Manufacturing labor costs increase Work-in-Process Control because these costs increase the cost of the work-in-process asset. Manufacturing labor helps to transform one asset—direct materials—into another asset—work in process—and then into another asset—finished goods.

### Subsidiary Records
Labor-time records (see Exhibit 4-7, Panel B) are used to trace direct manufacturing labor to individual jobs and to accumulate the indirect manufacturing labor in Manufacturing Department overhead records (Exhibit 4-7, Panel C). The subsidiary ledger for employee labor records shows the $720 of wages owed to G. L. Cook, Employee No. 551-87-3076, for the week ending February 9. The sum of total wages owed to all employees for February 2006 is $54,000. The job-cost record for WPP 298 shows direct manufacturing labor costs of $450 for the time Cook spent on the Western Pulp machine job (Exhibit 4-8, Panel A). Total direct manufacturing labor costs recorded in all job-cost records (the subsidiary ledger for Work-in-Process Control) for February 2006 is $39,000. G. L. Cook's employee record shows $54 for maintenance, which is an indirect manufacturing labor cost. The total indirect manufacturing labor costs of $15,000 for February 2006 appear in the Manufacturing Department overhead records in the subsidiary ledger (Exhibit 4-7, Panel C). These costs, by definition, are not traced to an individual job. They are instead allocated to individual jobs as a part of the job-cost records.
of manufacturing overhead (transaction 6, which follows). The journal entry for all the February 2006 manufacturing payroll for direct manufacturing labor ($39,000) and indirect manufacturing labor ($15,000) is

**Journal Entry:**

<table>
<thead>
<tr>
<th>Work-in-Process Control</th>
<th>Manufacturing Overhead Control</th>
<th>Wages Payable Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>39,000</td>
<td>15,000</td>
<td>54,000</td>
</tr>
</tbody>
</table>

**Post to General Ledger (Exhibit 4-6):**

<table>
<thead>
<tr>
<th>Wages Payable Control</th>
<th>Work-in-Process Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 54,000</td>
<td>② 81,000</td>
</tr>
<tr>
<td>③ 39,000</td>
<td></td>
</tr>
</tbody>
</table>

**4. Transaction:** Payment of total manufacturing payroll for February, $54,000. (Because we are focusing on job-costing issues, payroll withholdings from employees, including taxes, are ignored in this example.) For convenience here, wages payable for the month are assumed to be completely paid at month’s end.

**Account Analysis:** The liability Wages Payable Control is decreased (debited) by $54,000, and the asset Cash Control is decreased (credited) by $54,000.

**Subsidiary Records:** The subsidiary records for labor, overhead, and individual jobs are unaffected by this transaction.

**Journal Entry:**

<table>
<thead>
<tr>
<th>Wages Payable Control</th>
<th>Cash Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>54,000</td>
<td>54,000</td>
</tr>
</tbody>
</table>

**Post to General Ledger (Exhibit 4-6):**

<table>
<thead>
<tr>
<th>Wages Payable Control</th>
<th>Cash Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>④ 54,000</td>
<td>④ 54,000</td>
</tr>
</tbody>
</table>

**5. Transaction:** Additional manufacturing overhead costs incurred during February, $75,000. These costs consist of engineering and supervisory salaries, $44,000; plant utilities and repairs, $11,000; plant depreciation, $18,000; and plant insurance, $2,000.

**Account Analysis:** The indirect-cost account, Manufacturing Overhead Control, is increased (debited) by $75,000. The liability, Salaries Payable Control, is increased (credited) by $44,000; the liability, Accounts Payable Control, is increased (credited) by $11,000; the asset Equipment Control is decreased (credited) by $18,000 by means of a contra (related) asset account, Accumulated Depreciation Control; and the asset Prepaid Insurance Control is decreased (credited) by $2,000.

**Subsidiary Records:** The detail of each of these costs is entered in the appropriate columns of the individual Manufacturing Department overhead records that make up the subsidiary ledger for Manufacturing Overhead Control (see Exhibit 4-7, Panel C). The source documents for these entries include invoices (for example, a utility bill) and special schedules (for example, a depreciation schedule) from the responsible accounting officer. The following journal entry accounts for all $75,000 of February 2006 overhead transactions in the Manufacturing Department overhead records:

**Journal Entry:**

<table>
<thead>
<tr>
<th>Manufacturing Overhead Control</th>
<th>Salaries Payable Control</th>
<th>Accounts Payable Control</th>
<th>Accumulated Depreciation Control</th>
<th>Prepaid Insurance Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>75,000</td>
<td>44,000</td>
<td>11,000</td>
<td>18,000</td>
<td>2,000</td>
</tr>
</tbody>
</table>

Utilities, depreciation, and insurance are debited to Manufacturing Overhead Control only if they are related to producing the products, and they are considered to be inventoriable costs (assets) until the products are sold. In contrast, utilities for a sales office, depreciation on executives’ automobiles, and insurance on those automobiles are period costs and therefore are not part of manufacturing overhead.
Actual manufacturing overhead (MOH) is debited to MOH Control as incurred; the total actual MOH is not known until the end of the accounting period. Allocated MOH is the budgeted MOH rate (known at the beginning of the period) times the actual quantity of the MOH allocation base recorded upon completion of jobs (or the end of the period) — when usage of the allocation base is known.
7. **Transaction:** Completion and transfer to finished goods of individual jobs, $188,800.

   **Account Analysis:** The asset Finished Goods Control is increased (debited) by $188,800, and the asset Work-in-Process Control is decreased (credited) by $188,800 to recognize the completion of jobs.

   **Subsidiary Records:** Exhibit 4-8, Panel A, shows that Job WPP 298 was completed at a cost of $9,705. Job WPP 298 also simultaneously appears in the finished goods records of the subsidiary ledger. Given Robinson’s use of normal costing, cost of goods completed consists of actual direct materials, actual direct manufacturing labor, and manufacturing overhead allocated to each job based on the budgeted manufacturing overhead rate times actual direct manufacturing labor-hours. The following journal entry accounts for the $188,800 total cost of all jobs completed in February 2006.

   **Journal Entry:**

<table>
<thead>
<tr>
<th>Account</th>
<th>Debit</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Goods Control</td>
<td>188,800</td>
<td></td>
</tr>
<tr>
<td>Work-in-Process Control</td>
<td></td>
<td>188,800</td>
</tr>
</tbody>
</table>

   **Post to General Ledger (Exhibit 4-6):**

<table>
<thead>
<tr>
<th>Work-in-Process Control</th>
<th>Finished Goods Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀  81,000</td>
<td>➀  188,800</td>
</tr>
<tr>
<td>➁  39,000</td>
<td></td>
</tr>
<tr>
<td>➂  80,000</td>
<td></td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td><strong>11,200</strong></td>
</tr>
</tbody>
</table>

   The debit balance of $11,200 in the Work-in-Process Control account represents the total costs of all jobs (per the job-cost records in the subsidiary ledger) that have not been completed as of the end of February 2006.

8. **Transaction:** Cost of Goods Sold, $180,000.

   **Account Analysis:** The account Cost of Goods Sold is increased (debited) by $180,000. The asset Finished Goods Control is decreased (credited) by $180,000.

   **Subsidiary Records:** Exhibit 4-8, Panel B, indicates that Job WPP 298 was sold and delivered to the customer in February 2006. The following journal entry accounts for the $180,000 total cost of all goods sold during February 2006.

   **Journal Entry:**

<table>
<thead>
<tr>
<th>Account</th>
<th>Debit</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Goods Sold</td>
<td>180,000</td>
<td></td>
</tr>
<tr>
<td>Finished Goods Control</td>
<td></td>
<td>180,000</td>
</tr>
</tbody>
</table>

   **Post to General Ledger (Exhibit 4-6):**

<table>
<thead>
<tr>
<th>Finished Goods Control</th>
<th>Cost of Goods Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>➇  188,800</td>
<td>➇  180,000</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td><strong>8,800</strong></td>
</tr>
</tbody>
</table>

   The debit balance of $8,800 in the Finished Goods Control account represents the costs of all jobs that have been completed but not sold as of the end of February 2006.

9. **Transaction:** Marketing and customer-service payroll and advertising costs accrued for February:

   **Account Analysis:** As described in Chapter 2, for financial accounting purposes, marketing and advertising costs of $45,000 ($35,000 + $10,000) and customer-service costs of $15,000 are period costs for February 2006 to be matched against February 2006’s revenues. Unlike manufacturing costs, these costs are not added to Work-in-Process Control because these costs are not incurred to transform materials into a finished product.
Subsidiary Records: Just as in the case of the manufacturing payroll, Robinson maintains employee labor records in the subsidiary ledger for marketing and customer-service payroll as well as records for different types of advertising costs (print, television, and radio). The following journal entry accounts for all the February 2006 transactions in the Marketing, Advertising, and Customer-Service Department records.

Journal Entries:  
Marketing and Advertising Costs 45,000  
Customer-Service Costs 15,000  
Salaries Payable Control 50,000  
Accounts Payable Control 10,000

Post to General Ledger (Exhibit 4-6):

<table>
<thead>
<tr>
<th>Marketing and Advertising Costs</th>
<th>Salaries Payable Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 45,000</td>
<td>⑤ 44,000</td>
</tr>
<tr>
<td></td>
<td>⑥ 50,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Customer-Service Costs</th>
<th>Accounts Payable Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑥ 15,000</td>
<td>① 89,000</td>
</tr>
<tr>
<td></td>
<td>⑤ 11,000</td>
</tr>
<tr>
<td></td>
<td>⑥ 10,000</td>
</tr>
</tbody>
</table>

10. Transaction: Sales revenues, all on credit, $270,000.

Account Analysis: The Revenues account is increased (credited) by $270,000. The asset Accounts Receivable Control is increased (debited) by $270,00. The $270,000 represents total amounts due from customers for sales made in February 2006.

Subsidiary Records: The February 2006 amounts due from each customer, including the $15,000 due from the sale of Job WPP 298, are recorded in the subsidiary ledger.

Journal Entry:  
Accounts Receivable Control 270,000  
Revenues 270,000

Post to General Ledger (Exhibit 4-6):

<table>
<thead>
<tr>
<th>Accounts Receivable Control</th>
<th>Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑥ 270,000</td>
<td>③ 270,000</td>
</tr>
</tbody>
</table>

At this point, pause and review the 10 entries in this illustration. Exhibit 4-6 is a handy summary of all 10 general-ledger entries presented in T-account form. Be sure to trace each journal entry, step by step, to T-accounts in the general ledger in Exhibit 4-6.

Exhibit 4-9 presents Robinson’s income statement for February 2006 using information from entries 8, 9, and 10. If desired, the cost of goods sold calculations can be further subdivided and presented in the format of Exhibit 2-7, p. 39.
Nonmanufacturing Costs and Job Costing

Chapter 2 (pp. 44–45) pointed out that companies use product costs for different purposes. The product costs reported as inventoriable costs to shareholders may differ from product costs reported to tax authorities and may also differ from product costs reported to managers for guiding pricing and product-mix decisions. We emphasize that even though, as described previously, marketing and customer-service costs are expensed when incurred for financial accounting purposes, companies often trace or allocate these costs to individual jobs for pricing, product-mix, and cost-management decisions.

To identify marketing and customer-service costs of individual jobs, Robinson can use the same approach to job costing described earlier in this chapter in the context of manufacturing. Robinson can trace the direct marketing costs and customer-service costs to jobs. Robinson can then calculate a budgeted indirect-cost rate by dividing budgeted, indirect marketing costs plus indirect customer-service costs by the budgeted quantity of the cost-allocation base, say, revenues. Robinson can use this rate to allocate these indirect costs to jobs. For example, if this rate were 15% of revenues, Robinson would allocate $2,250 to Job WPP 298 (0.15 × $15,000, the revenue from the job). By assigning both manufacturing costs and nonmanufacturing costs to jobs, Robinson can compare all costs of the different jobs against the revenues they generate.

Budgeted Indirect Costs and End-of-Accounting-Year Adjustments

Using budgeted indirect-cost rates and normal costing instead of actual costing has the advantage that indirect costs can be assigned to individual jobs on an ongoing and timely basis, rather than only at the end of the fiscal year when actual costs are known. However, budgeted rates are unlikely to equal actual rates because they are based on estimates made up to 12 months before actual costs are incurred. We now consider adjustments that need to be made when, at the end of the fiscal year, indirect costs allocated differ from actual indirect costs incurred. Recall that for the numerator and denominator reasons discussed earlier (pp. 106–107), we do not expect actual overhead costs incurred each month to equal overhead costs allocated each month.

Underallocated indirect costs occur when the allocated amount of indirect costs in an accounting period is less than the actual (incurred) amount. Overallocated indirect costs occur when the allocated amount of indirect costs in an accounting period is greater than the actual (incurred) amount.

\[
\text{Underallocated (overallocated) indirect costs} = \text{Indirect costs incurred} - \text{Indirect costs allocated}
\]

Underallocated (overallocated) indirect costs are also called underapplied (overapplied) indirect costs and underabsorbed (overabsorbed) indirect costs.

Consider the manufacturing overhead indirect-cost pool at Robinson Company. There are two indirect-cost accounts in the general ledger that have to do with manufacturing overhead:

1. Manufacturing Overhead Control, the record of the actual costs in all the individual overhead categories (such as indirect materials, indirect manufacturing labor, supervision, engineering, power, and plant depreciation)
2. Manufacturing Overhead Allocated, the record of the manufacturing overhead allocated to individual jobs on the basis of the budgeted rate multiplied by actual direct manufacturing labor-hours

Assume the following annual data for the Robinson Company:

<table>
<thead>
<tr>
<th>Manufacturing Overhead Control</th>
<th>Manufacturing Overhead Allocated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bal. Dec. 31, 2006</td>
<td>1,215,000</td>
</tr>
<tr>
<td>Bal. Dec. 31, 2006</td>
<td>1,080,000</td>
</tr>
</tbody>
</table>
The $1,080,000 credit balance in Manufacturing Overhead Allocated results from multiplying the 27,000 actual direct manufacturing labor-hours worked on all jobs in 2006 by the budgeted rate of $40 per direct manufacturing labor-hour.

The $135,000 difference (a net debit) is an underallocated amount because actual manufacturing overhead costs are greater than the allocated amount. This difference arises from two reasons related to the computation of the $40 budgeted hourly rate:

1. **Numerator reason (indirect-cost pool).** Actual manufacturing-overhead costs of $1,215,000 are greater than the budgeted amount of $1,120,000.
2. **Denominator reason (quantity of allocation base).** Actual direct manufacturing labor-hours of 27,000 are fewer than the budgeted 28,000 hours.

There are three main approaches to accounting for the $135,000 underallocated manufacturing overhead caused by Robinson underestimating manufacturing overhead costs and overestimating the quantity of the cost-allocation base: (1) adjusted allocation-rate approach, (2) proration approach, and (3) write-off to cost of goods sold approach.

### Adjusted Allocation-Rate Approach

The adjusted allocation-rate approach restates all overhead entries in the general ledger and subsidiary ledgers using actual cost rates rather than budgeted cost rates. First, the actual manufacturing overhead rate is computed at the end of the fiscal year. Then, the manufacturing overhead costs allocated to every job during the year are recomputed using the actual manufacturing overhead rate (rather than the budgeted manufacturing overhead rate). Finally, end-of-year closing entries are made. The result is that at year-end, every job-cost record and finished goods record—as well as the ending Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold accounts—accurately represent actual manufacturing overhead costs incurred.

The widespread adoption of computerized accounting systems has greatly reduced the cost of using the adjusted allocation-rate approach. Consider the Robinson example. The actual manufacturing overhead ($1,215,000) exceeds the manufacturing overhead allocated ($1,080,000) by 12.5% \([1,215,000 - 1,080,000] / 1,080,000\). The actual 2006 manufacturing overhead rate is $45 per direct manufacturing labor-hour \([1,215,000 / 27,000 \text{ hours}]\) rather than the budgeted $40 per direct manufacturing labor-hour. At year-end, Robinson could increase the manufacturing overhead allocated to each job in 2006 by 12.5% using a single software command. The command would adjust both the subsidiary ledgers and the general ledger.

Consider the Western Pulp machine job, WPP 298. Under normal costing, the manufacturing overhead allocated to the job is $3,520 (the budgeted rate of $40 per direct manufacturing labor-hour \(\times 88 \text{ hours}\)). Increasing the manufacturing overhead allocated by 12.5%, or $440 \((3,520 \times 0.125)\), means the adjusted amount of manufacturing overhead allocated to Job WPP 298 equals $3,960 \((3,520 + 440)\). Note from page 104 that under actual costing, manufacturing overhead allocated to this job is also $3,960 (the actual rate of $45 per direct manufacturing labor-hour \(\times 88 \text{ hours}\)). Making this adjustment under normal costing for each job in the subsidiary ledgers ensures that all $1,215,000 of manufacturing overhead is allocated to jobs.

The adjusted allocation-rate approach yields the benefits of both the timeliness and convenience of normal costing during the year and the accuracy of actual costing at year-end. Each individual job-cost record and the end-of-year account balances for inventories and cost of goods sold are adjusted to actual costs. After-the-fact analysis of actual profitability of individual jobs provides managers with accurate and useful insights for future decisions about job pricing, which jobs to emphasize, and ways to manage job costs.

### Proration Approach

Proration spreads underallocated overhead or overallocated overhead among ending work in process, finished goods, and cost of goods sold. Materials inventory is not included in this proration because no manufacturing overhead costs have been allocated to it. In our Robinson example, end-of-year proration is made to the ending balances in

---

The adjusted allocation-rate approach “corrects” all MOH entries in the general and subsidiary ledgers to what they would have been if accountants had perfectly forecasted actual MOH costs and the actual quantity of the cost-allocation base used. Implementation of the adjusted allocation-rate approach becomes more feasible as technology improvements decrease information-processing costs.
Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. Assume the following actual results for Robinson Company in 2006:

<table>
<thead>
<tr>
<th>Account</th>
<th>Account Balance (Before Proration)</th>
<th>Allocated Manufacturing Overhead Included in Each Account Balance (Before Proration)</th>
<th>Allocated Manufacturing Overhead (Before Proration)</th>
<th>Proration of $135,000 of Underallocated Manufacturing Overhead</th>
<th>Account Balance (After Proration)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
</tr>
<tr>
<td>2</td>
<td>Work in Process Control</td>
<td>$30,000</td>
<td>$16,200</td>
<td>1.3%</td>
<td>0.015 × $135,000 = $2,025</td>
</tr>
<tr>
<td>3</td>
<td>Finished Goods Control</td>
<td>75,000</td>
<td>31,320</td>
<td>2.9%</td>
<td>0.029 × 135,000 = 3,915</td>
</tr>
<tr>
<td>4</td>
<td>Cost of Goods Sold</td>
<td>2,375,000</td>
<td>1,032,480</td>
<td>93.6%</td>
<td>0.936 × 135,000 = 129,060</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>$2,390,000</td>
<td>$1,080,000</td>
<td>100.0%</td>
<td>$135,000</td>
</tr>
</tbody>
</table>

Recall that the actual manufacturing overhead ($1,215,000) exceeds the manufacturing overhead allocated ($1,080,000) by 12.5%. The proration amounts in column 4 can also be derived by multiplying the balances in column 2 by 0.125. For example, the $3,915 proration to Finished Goods is 0.125 × $31,320. The journal entry to record this proration is:

- Work-in-Process Control 2,025
- Finished Goods Control 3,915
- Cost of Goods Sold 129,060
- Manufacturing Overhead Allocated 1,080,000
- Manufacturing Overhead Control 1,215,000

If manufacturing overhead had been overallocated, the Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold accounts would be decreased (credited) instead of increased (debited).

This journal entry restates the 2006 ending balances for Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold to what they would have been if actual manufacturing overhead rates had been used rather than budgeted manufacturing overhead rates. This method reports the same 2006 ending balances in the general ledger as the adjusted allocation-rate approach.

Some companies use the proration approach but base it on the column 1 amounts of the preceding table—that is, the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold before proration. It gives the same results as the
previous proration only if the proportions of manufacturing overhead costs to total costs, and therefore direct costs, are the same in the Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold accounts. In general, the proportion of direct costs to manufacturing overhead costs in the various accounts are not the same. That’s because manufacturing overhead is usually allocated using a cost-allocation base such as direct manufacturing labor-hours rather than direct costs. The following table shows that prorations based on ending account balances will not be the same as the more-accurate prorations calculated earlier based on the amount of manufacturing overhead allocated to the accounts.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Account Balance (Before Proration)</td>
<td>Account Balance as a Percent of Total</td>
<td>Proration of $135,000 of Underallocated Manufacturing Overhead</td>
<td>Account Balance (After Proration)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>(1)</td>
<td>(2) = (1) / $2,500,000</td>
<td>(3) = (2) x $135,000</td>
<td>(4) = (1) + (3)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Work in Process Control</td>
<td>$30,000</td>
<td>2.0%</td>
<td>0.02 x $135,000 = $2,700</td>
<td>$52,700</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Finished Goods Control</td>
<td>75,000</td>
<td>3.0%</td>
<td>0.03 x $135,000 = 4,050</td>
<td>79,050</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cost of Goods Sold</td>
<td>2,375,000</td>
<td>95.0%</td>
<td>0.95 x $135,000 = 128,250</td>
<td>2,503,250</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Total</td>
<td>$2,500,000</td>
<td>100.0%</td>
<td>$135,000</td>
<td>$2,635,000</td>
<td></td>
</tr>
</tbody>
</table>

However, proration based on ending balances is frequently justified as being an expedient way of approximating the more-accurate results from using indirect costs allocated.

**Write-Off to Cost of Goods Sold Approach**

Under this approach, the total under- or overallocated manufacturing overhead is included in this year’s Cost of Goods Sold. For Robinson, the journal entry would be:

\[
\begin{align*}
\text{Cost of Goods Sold} & \quad 135,000 \\
\text{Manufacturing Overhead Allocated} & \quad 1,080,000 \\
\text{Manufacturing Overhead Control} & \quad 1,215,000
\end{align*}
\]

Robinson’s two Manufacturing Overhead accounts are closed with the difference between them included in cost of goods sold. The Cost of Goods Sold account after the write-off equals $2,510,000, the balance before the write-off of $2,375,000 plus the underallocated manufacturing overhead amount of $135,000.

**Choice Among Approaches**

Which of these three approaches is the best one to use? In making this decision, managers should be guided by the causes for underallocation or overallocation and how the information will be used. Many management accountants, industrial engineers, and managers argue that to the extent that the under- or overallocated overhead cost measures inefficiency during the period, it should be written off to Cost of Goods Sold instead of being prorated. This line of reasoning argues for applying a combination of the write-off and proration methods. For example, the portion of the underallocated overhead cost that is due to inefficiency (say, because of excessive spending) and that could have been avoided should be written off to Cost of Goods Sold, whereas the portion that is unavoidable should be prorated. Unlike full proration, this approach avoids carrying the costs of inefficiency as part of inventory assets.

Proration should be based on the manufacturing overhead allocated component in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. This proration method results in the most accurate inventory and Cost of Goods Sold numbers being reported in the financial statements. Prorating to each individual job (as in the adjusted allocation-rate approach) is useful if the goal is to develop the most accurate record of individual job costs for profitability analysis purposes.

The write-off to Cost of Goods Sold is the simplest approach for dealing with under- or overallocated overhead. If the amount of under- or overallocated overhead is small—in comparison with total operating income or some other measure of materiality—the write-off to Cost of Goods Sold approach yields a good approximation to more-accurate, but more-complex, approaches. Companies are also becoming increasingly conscious of inventory control, and quantities of inventories are lower than they were in earlier years.
As a result, cost of goods sold tends to be higher in relation to the dollar amount of work-in-process and finished goods inventories. Also, the inventory balances of job-costing companies are usually small because goods are often made in response to customer orders. Consequently, as is true in our Robinson example, writing off, instead of prorating, under- or overallocated overhead is unlikely to cause significant distortions in financial statements. For all these reasons, the cost-benefit test favors the simplest approach—write-off to Cost of Goods Sold—because the more-complex attempts at accuracy represented by the other two approaches do not appear to provide sufficient additional useful information.

Note that regardless of which of the three approaches is used, the underallocated overhead is not carried in the overhead accounts beyond the end of the fiscal year. Why? Because the ending balances in Manufacturing Overhead Control and Manufacturing Overhead Allocated are closed to Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold, and therefore become zero at the end of each year.

### Multiple Overhead Cost Pools

The Robinson Company illustration assumed that a single manufacturing overhead cost pool with direct manufacturing labor-hours as the cost-allocation base was appropriate for allocating all manufacturing overhead costs to jobs. Robinson could have used multiple cost-allocation bases, say, direct manufacturing labor-hours and machine-hours, to allocate manufacturing overhead costs to jobs. But Robinson would use multiple cost-allocation bases only if its managers believed that the benefits of the information generated by adding one or more pools (more-accurate costing and pricing of jobs and better ability to manage costs) exceeded the additional costs of that costing system. (We discuss these issues in Chapter 5.)

To implement a normal-costing system with two overhead cost pools, Robinson would determine, say, the budgeted total direct manufacturing labor-hours and the budgeted total machine-hours for 2006, and identify the associated total budgeted overhead costs for each cost pool. It would then calculate two budgeted overhead rates, one based on direct manufacturing labor-hours and the other on machine-hours. Manufacturing overhead costs would be allocated to jobs using these two budgeted overhead rates and the actual direct manufacturing labor-hours and actual machine-hours used by various jobs. The general ledger would contain Manufacturing Overhead Control and Manufacturing Overhead Allocated amounts for each cost pool. End-of-year adjustments for under- or overallocated overhead costs would then be made separately for each cost pool.

### Variations from Normal Costing: A Service-Sector Example

Job costing is also very useful in service industries such as accounting and consulting firms, advertising agencies, auto repair shops, and hospitals. In an accounting firm, each audit is a job. The costs of each audit are accumulated in a job-cost record, much like the document used by Robinson Company, based on the seven-step approach described earlier. On the basis of labor-time records, direct labor costs of the professional staff—audit partners, audit managers, and audit staff—are traced to individual jobs. Other direct costs such as travel, out-of-town meals and lodging, phone, fax, and copying are also traced to jobs. The costs of secretarial support, office staff, rent, and depreciation of furniture and equipment are indirect costs because these costs cannot be traced to jobs in an economically feasible way. Indirect costs are allocated to jobs, for example, using a cost-allocation base such as professional labor-hours.

In some service organizations, a variation from normal costing is helpful because actual direct-labor costs—the largest component of total costs—can be difficult to trace to jobs as they are completed. For example, in our audit illustration, the actual direct-labor costs may include bonuses that become known only at the end of the year (a numerator
To review important terms and concepts in Chapters 3 and 4, work the crossword puzzle (Student Guide, p. 45). The solution is on p. 48.

Assuming only one indirect-cost pool and total direct-labor costs as the cost-allocation base,

\[
\text{Budgeted indirect-cost rate} = \frac{\text{Budgeted total costs in indirect-cost pool}}{\text{Budgeted total quantity of cost-allocation base (direct-labor costs)}}
\]

\[
= \frac{$12,960,000}{14,400,000} = 0.90, \text{or 90\% of direct-labor costs}
\]

Suppose an audit of Tracy Transport, a client of Lindsay, completed in March 2006, uses 800 direct labor-hours. Lindsay calculates the direct-labor costs of the Tracy Transport audit by multiplying the budgeted direct-labor cost rate, $50 per direct-labor-hour, by 800, the actual quantity of direct labor-hours. It allocates indirect costs to the Tracy Transport audit by multiplying the budgeted indirect-cost rate (90%) by the direct-labor costs assigned to the Tracy Transport job ($40,000). Assuming no other direct costs for travel and the like, the cost of the Tracy Transport audit is:

\[
\begin{align*}
\text{Direct-labor costs, $50 \times 800} & = $40,000 \\
\text{Indirect costs allocated, 90\% \times $40,000} & = 36,000 \\
\text{Total} & = $76,000
\end{align*}
\]

At the end of the fiscal year, the direct costs traced to jobs using budgeted rates will generally not equal the actual direct costs because the actual rate and the budgeted rate are developed at different times using different information. End-of-year adjustments for under- or overallocated direct costs would need to be made in the same way that adjustments are made for under- or overallocated indirect costs.

The Lindsay and Associates example illustrates that all costing systems do not exactly match either the actual-costing system or the normal-costing system described earlier in the chapter. As another example, engineering consulting firms often have some actual direct costs (cost of making blueprints or fees paid to outside experts), other direct costs (professional labor costs) traced to jobs using a budgeted rate, and indirect costs (engineering and office-support costs) allocated to jobs using a budgeted rate. Therefore, users of costing systems should be aware of the different systems that they may encounter.

**PROBLEM FOR SELF-STUDY**

You are asked to bring the following incomplete accounts of Endeavor Printing, Inc., up to date through January 31, 2007. Consider the data that appear in the T-accounts as well as the following information in items (a) through (i).
Endeavor’s normal-costing system has two direct-cost categories (direct material costs and direct manufacturing labor costs) and one indirect-cost pool (manufacturing overhead costs, which are allocated using direct manufacturing labor costs).

### Materials Control T-account

- **12-31-2006 Bal.:** 15,000

### Wages Payable Control T-account

- **1-31-2007 Bal.:** 3,000

### Work-in-Process Control T-account

**1-31-2007 Bal.:** 57,000

### Manufacturing Overhead Control T-account

- **1-31-2007 Bal.:** 57,000

### Finished Goods Control T-account

- **12-31-2006 Bal.:** 20,000

### Cost of Goods Sold T-account

- **1-31-2007 Bal.:**

---

**Additional Information:**

- **a.** Manufacturing overhead is allocated using a budgeted rate that is set every December. Management forecasts next year’s manufacturing overhead costs and next year’s direct manufacturing labor costs. The budget for 2007 is $600,000 for manufacturing overhead costs and $400,000 for direct manufacturing labor costs.

- **b.** The only job unfinished on January 31, 2007, is No. 419, on which direct manufacturing labor costs are $2,000 (125 direct manufacturing labor-hours) and direct material costs are $8,000.

- **c.** Total direct materials issued to production during January are $90,000.

- **d.** Cost of goods completed during January is $180,000.

- **e.** Materials inventory as of January 31, 2007, is $20,000.

- **f.** Finished goods inventory as of January 31, 2007, is $15,000.

- **g.** All plant workers earn the same wage rate. Direct manufacturing labor-hours used for January total 2,500 hours. Other labor costs and supervision costs total $10,000.

- **h.** The gross plant payroll paid in January equals $52,000. Ignore withholdings.

- **i.** All “actual” manufacturing overhead incurred during January has already been posted.

- **j.** All materials are direct materials.

---

**Required**

Calculate:

1. Materials purchased during January
2. Cost of Goods Sold during January
3. Direct manufacturing labor costs incurred during January
4. Manufacturing Overhead Allocated during January
5. Balance, Wages Payable Control, December 31, 2006
8. Manufacturing Overhead Underallocated or Overallocated for January 2007

**Solution**

Amounts from the T-accounts are labeled "(T)"

1. From Materials Control T-account, Materials purchased: $90,000 (c) + $20,000 (e) − $15,000 (T) = $95,000
2. From Finished Goods Control T-account, Cost of Goods Sold: $20,000 (T) + $180,000 (d) − $15,000 (f) = $185,000
3. Direct manufacturing wage rate: $2,000 (b) ÷ 125 direct manufacturing labor-hours (b) = $16 per direct manufacturing labor-hour
   - Direct manufacturing labor costs: 2,500 direct manufacturing labor-hours × $16 per hour = $40,000
4. Manufacturing overhead rate: $600,000 (a) + $400,000 (a) = 150%
   - Manufacturing Overhead Allocated: 150% of $40,000 = 1.50 × $40,000 (see 3) = $60,000
5. From Wages Payable Control T-account, Wages Payable Control, December 31, 2006: $52,000 (h) + $3,000 (T) − $40,000 (see 3) − $10,000 (g) = $5,000
6. Work-in-Process Control, January 31, 2007: $8,000 (b) + $2,000 (b) + 150% of $2,000 (b) = $13,000 (This answer is used in item 7.)
7. From Work-in-Process Control T-account, Work-in-Process Control, December 31, 2006: $180,000 (d) + $13,000 (see 6) − $90,000 (c) − $40,000 (see 3) − $60,000 (see 4) = $3,000.

8. Manufacturing overhead overallocated: $60,000 (see 4) − $57,000 (T) = $3,000.

Entries in T-accounts are lettered in accordance with the preceding additional information and are numbered in accordance with the requirements above.

**Materials Control**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bal. (given)</td>
<td>15,000</td>
<td>20,000</td>
</tr>
<tr>
<td>(1)</td>
<td>95,000*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>90,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Work-in-Process Control**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bal.</td>
<td>3,000</td>
<td>13,000</td>
</tr>
<tr>
<td>(7)</td>
<td>3,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>180,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>90,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>40,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Finished Goods Control**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bal. (given)</td>
<td>20,000</td>
<td>15,000</td>
</tr>
<tr>
<td>(2)</td>
<td>185,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Wages Payable Control**

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
<th>December 31, 2006</th>
<th>January 31, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>(h)</td>
<td>52,000</td>
<td>(given) 5,000</td>
<td>(given) 3,000</td>
</tr>
<tr>
<td>(g)</td>
<td>40,000</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>(g)</td>
<td>10,000</td>
<td>(4)</td>
<td></td>
</tr>
</tbody>
</table>

**Manufacturing Overhead Control**

| Total January charges (given) | 57,000 |

**Manufacturing Overhead Allocated**

| (g) (a) (4) | 60,000 |

| (f) (2) | 185,000 |

*Can be computed only after all other postings in the account have been found.

---

**Decision Points**

The following question-and-answer format summarizes the chapter’s learning objectives. Each decision presents a key question related to a learning objective. The guidelines are the answer to that question.

**Decision**

1. What are the building-block concepts of a costing system?

**Guidelines**

The building-block concepts of a costing system are cost object, direct costs of a cost object, indirect costs of a cost object, cost pool, and cost-allocation base. Costing-system overview diagrams represent these concepts in a systematic way. Costing systems aim to report cost numbers that reflect the way chosen cost objects (such as products or services) use the resources of an organization.
2. How do you distinguish job costing from process costing?

Job-costing systems assign costs to distinct units of a product or service. Process-costing systems assign costs to masses of identical or similar units and compute unit costs on an average basis. These two costing systems represent opposite ends of a continuum. The costing systems of many companies combine some elements of both job costing and process costing.

3. How do you implement a job-costing system?

A general approach to job costing requires identifying (a) the job, (b) the direct-cost categories, (c) the cost-allocation bases, (d) the indirect-cost categories, (e) the cost-allocation rates, (f) the allocated indirect costs of a job, and (g) the total direct and indirect costs of a job.

4. How do you distinguish actual costing from normal costing?

Actual costing and normal costing differ in the type of indirect-cost rates used:

<table>
<thead>
<tr>
<th>Actual Costing</th>
<th>Normal Costing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct-cost rates</td>
<td>Actual rates</td>
</tr>
<tr>
<td>Indirect-cost rates</td>
<td>Actual rates</td>
</tr>
</tbody>
</table>

Both systems use actual quantities of inputs for tracing direct costs and actual quantities of the allocation bases for allocating indirect costs.

5. What are the stages for recording transactions in a manufacturing job-costing system?

The transactions in a job-costing system in manufacturing track: (a) acquisition of materials and other manufacturing inputs; (b) their conversion into work in process; (c) their conversion into finished goods; and (d) the sale of finished goods. Each of the (a) to (d) stages in the manufacture/sale cycle are represented by journal entries in the costing system.

6. How should you dispose of under- or overallocated manufacturing overhead costs at the end of the fiscal year?

The two theoretically correct approaches to disposing of under- or overallocated manufacturing overhead costs at the end of the fiscal year are to adjust the allocation rate and to prorate on the basis of the total amount of the allocated manufacturing overhead cost in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. Many companies, however, simply write off amounts of under- or overallocated manufacturing overhead to Cost of Goods Sold on the basis of practicality.

7. What variations from normal costing can be used?

In some variations from normal costing, organizations use budgeted rates to assign direct costs, as well as indirect costs, to jobs.

**TERMS TO LEARN**

This chapter and the Glossary at the end of this book contain definitions of:

- actual costing (p. 100)
- adjusted allocation-rate approach (p. 119)
- budgeted indirect-cost rate (p. 108)
- cost-allocation base (p. 98)
- cost pool (p. 98)
- direct-cost rate (p. 104)
- job (p. 99)
- job-cost record (p. 101)
- job-cost sheet (p. 101)
- job-costing system (p. 99)
- labor-time record (p. 102)
- manufacturing overhead allocated (p. 115)
- manufacturing overhead applied (p. 115)
- materials-requisition record (p. 101)
- normal costing (p. 108)
- overabsorbed indirect costs (p. 118)
- overallocated indirect costs (p. 118)
- overapplied indirect costs (p. 118)
- process-costing system (p. 99)
- proration (p. 119)
- source document (p. 101)
- underabsorbed indirect costs (p. 118)
- underallocated indirect costs (p. 118)
- underapplied indirect costs (p. 118)

Prentice Hall Grade Assist (PHGA)

Your professor may ask you to complete selected exercises and problems in Prentice Hall Grade Assist (PHGA). PHGA is an online tool that can help you master the chapter’s topics. It provides you with multiple variations of exercises and problems designated by the PHGA icon. You can rework these exercises and problems—each time with new data—as many times as you need. You also receive immediate feedback and grading.

**ASSIGNMENT MATERIAL**

Questions

4-1 Define cost pool, cost tracing, cost allocation, and cost-allocation base.

4-2 How does a job-costing system differ from a process-costing system?

4-3 Why might an advertising agency use job costing for an advertising campaign by Pepsi, whereas a bank might use process costing to determine the cost of checking account deposits?

4-4 Describe the seven steps in job costing.
What are the two major cost objects that managers focus on in companies using job costing?

Describe three major source documents used in job-costing systems.

What is the main concern about source documents used to prepare job-cost records?

Give two reasons why most organizations use an annual period rather than a weekly or monthly period to compute budgeted indirect-cost rates.

Distinguish between actual costing and normal costing.

Describe two ways in which a house construction company may use job-cost information.

Comment on the following statement: “In a normal-costing system, the amounts in the Manufacturing Overhead Control account will always equal the amounts in the Manufacturing Overhead Allocated account.”

Describe three different debit entries to the Work-in-Process Control T-account under normal costing.

Describe three alternative ways to dispose of under- or overallocated overhead costs.

When might a company use budgeted costs rather than actual costs to compute direct-labor rates?

Describe briefly why modern technology such as Electronic Data Interchange (EDI) is helpful to managers.

### Exercises

#### 4-16 Job costing, process costing.

In each of the following situations, determine whether job costing or process costing would be more appropriate.

- a. A CPA firm
- b. An oil refinery
- c. A custom furniture manufacturer
- d. A tire manufacturer
- e. A textbook publisher
- f. A pharmaceutical company
- g. An advertising agency
- h. An apparel manufacturing plant
- i. A flour mill
- j. A paint manufacturer
- k. A medical care facility
- l. A landscaping company
- m. A cola-drink-concentrate producer
- n. A movie studio
- o. A law firm
- p. A commercial aircraft manufacturer
- q. A management consulting firm
- r. A breakfast-cereal company
- s. A catering service
- t. A paper mill
- u. An auto repair shop

#### 4-17 Actual costing, normal costing, accounting for manufacturing overhead.

Destin Products uses a job-costing system with two direct-cost categories (direct materials and direct manufacturing labor) and one manufacturing overhead cost pool. Destin allocates manufacturing overhead costs using direct manufacturing labor costs. Destin provides the following information:

<table>
<thead>
<tr>
<th></th>
<th>Budget for 2007</th>
<th>Actual Results for 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material costs</td>
<td>$1,500,000</td>
<td>$1,450,000</td>
</tr>
<tr>
<td>Direct manufacturing labor costs</td>
<td>$1,000,000</td>
<td>$980,000</td>
</tr>
<tr>
<td>Manufacturing overhead costs</td>
<td>$1,750,000</td>
<td>$1,862,000</td>
</tr>
</tbody>
</table>


2. During March, the job-cost record for Job 626 contained the following information:
   - Direct materials used: $40,000
   - Direct manufacturing labor costs: $30,000

   Compute the cost of Job 626 using (a) actual costing and (b) normal costing.

3. At the end of 2007, compute the under- or overallocated manufacturing overhead under normal costing. Why is there no under- or overallocated overhead under actual costing?

#### 4-18 Job costing, normal and actual costing.

Anderson Construction assembles residential houses. It uses a job-costing system with two direct-cost categories (direct materials and direct labor) and one indirect-cost pool (assembly support). Direct labor-hours is the allocation base for assembly support costs. In December 2006, Anderson budgets 2007 assembly-support costs to be $8,000,000 and 2007 direct labor-hours to be 160,000.

At the end of 2007, Anderson is comparing the costs of several jobs that were started and completed in 2007.

<table>
<thead>
<tr>
<th></th>
<th>Laguna Model</th>
<th>Mission Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$106,450</td>
<td>$127,604</td>
</tr>
<tr>
<td>Direct labor</td>
<td>$36,276</td>
<td>$41,410</td>
</tr>
<tr>
<td>Direct labor-hours</td>
<td>900</td>
<td>1,010</td>
</tr>
</tbody>
</table>


Direct materials and direct labor are paid for on a contract basis. The costs of each are known when direct 
materials are used or when direct labor-hours are worked. The 2007 actual assembly-support costs were 
$6,888,000, and the actual direct labor-hours were 164,000.

**Required**

1. Compute the (a) budgeted indirect-cost rate and (b) actual indirect-cost rate. Why do they differ?
2. What are the job costs of the Laguna Model and the Mission Model using (a) normal costing and 
(b) actual costing?
3. Why might Anderson Construction prefer normal costing over actual costing?

**4-19 Budgeted manufacturing overhead rate, allocated manufacturing overhead.** Waheed Company 
uses normal costing. It allocates manufacturing overhead costs using a budgeted rate per machine-hour. 
The following data are available for 2006:

<table>
<thead>
<tr>
<th>Description</th>
<th>Budgeted</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted manufacturing overhead costs</td>
<td>$2,850,000</td>
<td>$2,910,000</td>
</tr>
<tr>
<td>Budgeted machine-hours</td>
<td>190,000</td>
<td></td>
</tr>
<tr>
<td>Actual manufacturing overhead costs</td>
<td>$2,910,000</td>
<td></td>
</tr>
<tr>
<td>Actual machine-hours</td>
<td>195,000</td>
<td></td>
</tr>
</tbody>
</table>

**Required**

1. Calculate the budgeted manufacturing overhead rate.
2. Calculate the manufacturing overhead allocated during 2006.
3. Calculate the amount of under- or overallocated manufacturing overhead.

**4-20 Job costing, accounting for manufacturing overhead, budgeted rates.** The Lynn Company uses a 
job-costing system at its Minneapolis plant. The plant has a Machining Department and an Assembly 
Department. Its job-costing system has two direct-cost categories (direct materials and direct manufactur-
ing labor) and two manufacturing overhead cost pools (the Machining Department overhead, allocated to 
jobs based on actual machine-hours, and the Assembly Department overhead, allocated to jobs based on 
actual direct manufacturing labor costs). The 2007 budget for the plant is:

<table>
<thead>
<tr>
<th>Department</th>
<th>Manufacturing Overhead</th>
<th>Direct Manufacturing Labor Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining Department</td>
<td>$1,800,000</td>
<td>$1,400,000</td>
</tr>
<tr>
<td>Assembly Department</td>
<td>$3,600,000</td>
<td>$2,000,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department</th>
<th>Machine-hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining Department</td>
<td>50,000</td>
</tr>
<tr>
<td>Assembly Department</td>
<td>200,000</td>
</tr>
</tbody>
</table>

**Required**

1. Present an overview diagram of Lynn’s job-costing system. Compute the budgeted manufacturing over-
head rate for each department.
2. During February, the job-cost record for Job 494 contained the following:

<table>
<thead>
<tr>
<th>Department</th>
<th>Direct Materials</th>
<th>Direct Manufacturing Labor Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining Department</td>
<td>$45,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>Assembly Department</td>
<td>$70,000</td>
<td>$15,000</td>
</tr>
<tr>
<td>Machining Department</td>
<td>1,000</td>
<td>1,500</td>
</tr>
<tr>
<td>Assembly Department</td>
<td>2,000</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Compute the total manufacturing overhead costs allocated to Job 494.
3. At the end of 2007, the actual manufacturing overhead costs were $2,100,000 in Machining and 
$3,700,000 in Assembly. Assume that 55,000 actual machine-hours were used in Machining and that 
actual direct manufacturing labor costs in Assembly were $2,200,000. Compute the over- or underallo-
cated manufacturing overhead for each department.

**4-21 Job costing, consulting firm.** Taylor & Associates, a consulting firm, has the following condensed 
budget for 2007:

<table>
<thead>
<tr>
<th>Category</th>
<th>Budgeted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Total costs:</td>
<td></td>
</tr>
<tr>
<td>Direct costs:</td>
<td></td>
</tr>
<tr>
<td>Professional labor</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Indirect costs:</td>
<td></td>
</tr>
<tr>
<td>Consulting support</td>
<td>13,000,000</td>
</tr>
<tr>
<td>Operating income</td>
<td>$2,000,000</td>
</tr>
</tbody>
</table>

Taylor has a single direct-cost category (professional labor) and a single indirect-cost pool (client support). 
Indirect costs are allocated to jobs on the basis of professional labor costs.

**Required**

1. Prepare an overview diagram of the job-costing system. Compute the 2007 budgeted indirect-cost rate 
for Taylor & Associates.
2. The markup rate for pricing jobs is intended to produce operating income equal to 10% of revenues. Compute the markup rate as a percentage of professional labor costs.

3. Taylor is bidding on a consulting job for Red Rooster, a fast-food chain specializing in poultry meats. The budgeted breakdown of professional labor on the job is as follows:

<table>
<thead>
<tr>
<th>Professional Labor Category</th>
<th>Budgeted Rate per Hour</th>
<th>Budgeted Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director</td>
<td>$200</td>
<td>3</td>
</tr>
<tr>
<td>Partner</td>
<td>100</td>
<td>16</td>
</tr>
<tr>
<td>Associate</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Assistant</td>
<td>30</td>
<td>160</td>
</tr>
</tbody>
</table>

Compute the budgeted cost of the Red Rooster job. How much will Taylor bid for the job if it is to earn its target operating income of 10% of revenues?

4-22 Service industry, time period used to compute indirect cost rates. Printers, Inc., produces annual reports and marketing materials for large companies. There are three categories of costs in its normal job-costing system: direct materials, direct labor, and overhead (both variable and fixed), allocated on the basis of direct labor costs. Jill Liu, the controller, is concerned that an increasing number of clients are waiting until the last minute to send in their final orders, causing congestion and an increase in the variable manufacturing overhead rate because of higher overtime and facility and machine maintenance. This spike is during the “crazy” months of January, February, and March, when many companies are rushing to get out their annual reports and marketing materials. Liu obtains the following budgeted data for 2006:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials</td>
<td>$900,000</td>
<td>$620,000</td>
<td>$595,000</td>
<td>$605,000</td>
<td>$2,720,000</td>
<td></td>
</tr>
<tr>
<td>Direct labor costs</td>
<td>$400,000</td>
<td>$280,000</td>
<td>$290,000</td>
<td>$270,000</td>
<td>$1,200,000</td>
<td></td>
</tr>
<tr>
<td>Variable overhead costs as a percentage of direct labor costs</td>
<td>90%</td>
<td>60%</td>
<td>60%</td>
<td>60%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed overhead costs</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$300,000</td>
<td>$1,200,000</td>
<td></td>
</tr>
</tbody>
</table>

If you want to use Excel to solve this exercise, go to the Excel Lab at www.prenhall.com/horngren/cost12e and download the template for Exercise 4-22.

1. Consider Job 332, an order for 100,000 sales catalogs for the local mall. Actual direct material costs for this job are $10,000 and actual labor costs are $6,000. Calculate the cost of Job 332 (a) if it is completed in January–March 2006 and if the budgeted overhead rate for that quarter is used to allocate overhead costs, (b) if it is done in July–September 2006 and if the budgeted overhead rate for that quarter is used to allocate overhead costs, and (c) if the average budgeted overhead rate for the year 2006 is used to allocate overhead costs.

2. To cost each job, Printers, Inc., currently uses the budgeted variable overhead rate for the quarter in which the job is completed and a budgeted fixed overhead rate based on budgeted annual fixed overhead costs and budgeted annual direct labor costs. Calculate the cost of Job 332 using this method if it is done in (a) January–March 2006 and (b) July–September 2006.


4-23 Accounting for manufacturing overhead. Consider the following selected cost data for the Pittsburgh Forging Company for 2008.

- Budgeted manufacturing overhead: $7,000,000
- Budgeted machine-hours: 200,000
- Actual manufacturing overhead: $6,800,000
- Actual machine-hours: 195,000

The company uses normal costing. Its job-costing system has a single manufacturing overhead cost pool. Costs are allocated to jobs using a budgeted machine-hour rate. Any amount of under- or overallocation is written off to Cost of Goods Sold.

1. Compute the budgeted manufacturing overhead rate.

2. Prepare the journal entries to record the allocation of manufacturing overhead.

3. Compute the amount of under- or overallocation of manufacturing overhead. Is the amount material? Prepare a journal entry to dispose of this amount.
4-24  Job costing, journal entries. The University of Chicago Press is wholly owned by the university. It performs the bulk of its work for other university departments, which pay as though the press were an outside business enterprise. The press also publishes and maintains a stock of books for general sale. The Press uses normal costing to cost each job. Its job-costing system has two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost pool (manufacturing overhead, allocated on the basis of direct manufacturing labor costs).

The following data (in thousands) pertain to 2007:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials and supplies purchased on credit</td>
<td>$800</td>
</tr>
<tr>
<td>Direct materials used</td>
<td>$710</td>
</tr>
<tr>
<td>Indirect materials issued to various production departments</td>
<td>$100</td>
</tr>
<tr>
<td>Direct manufacturing labor</td>
<td>$1,300</td>
</tr>
<tr>
<td>Indirect manufacturing labor incurred by various production departments</td>
<td>$900</td>
</tr>
<tr>
<td>Depreciation on building and manufacturing equipment</td>
<td>$400</td>
</tr>
<tr>
<td>Miscellaneous manufacturing overhead incurred by various production departments (ordinarily would be detailed as repairs, photocopying, utilities, etc.)</td>
<td>$550</td>
</tr>
<tr>
<td>Manufacturing overhead allocated at 160% of direct manufacturing labor costs</td>
<td>?</td>
</tr>
<tr>
<td>Cost of goods manufactured</td>
<td>$4,120</td>
</tr>
<tr>
<td>Revenues</td>
<td>$8,000</td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>$4,020</td>
</tr>
<tr>
<td>Inventories, December 31, 2006 (not 2007)</td>
<td></td>
</tr>
<tr>
<td>Materials Control</td>
<td>$100</td>
</tr>
<tr>
<td>Work-in-Process Control</td>
<td>$60</td>
</tr>
<tr>
<td>Finished Goods Control</td>
<td>$500</td>
</tr>
</tbody>
</table>

*The term manufacturing overhead is not used uniformly. Other terms that are often encountered in printing companies include **job overhead** and **shop overhead**.

**Required**

1. Prepare an overview diagram of the job-costing system at the University of Chicago Press.
2. Prepare journal entries to summarize the 2007 transactions. As your final entry, dispose of the year-end under- or overallocated manufacturing overhead as a write-off to Cost of Goods Sold. Number your entries. Explanations for each entry may be omitted.

4-25  Job costing, journal entries, and source documents (continuation of 4-24). For each journal entry in your answer to Exercise 4-24, (a) indicate the source document that would most likely authorize the entry, and (b) give a description of the entry in the subsidiary ledgers, if any entry needs to be made there.

4-26  Job costing, journal entries. Donnell Transport assembles prestige manufactured homes. Its job-costing system has two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost pool (manufacturing overhead allocated at a budgeted $30 per machine-hour in 2007). The following data (in millions) pertain to operations for 2007:

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Control, beginning balance, January 1, 2007</td>
<td>$12</td>
</tr>
<tr>
<td>Work-in-Process Control, beginning balance, January 1, 2007</td>
<td>2</td>
</tr>
<tr>
<td>Finished Goods Control, beginning balance, January 1, 2007</td>
<td>6</td>
</tr>
<tr>
<td>Materials and supplies purchased on credit</td>
<td>$150</td>
</tr>
<tr>
<td>Direct materials used</td>
<td>$145</td>
</tr>
<tr>
<td>Indirect materials (supplies) issued to various production departments</td>
<td>$10</td>
</tr>
<tr>
<td>Direct manufacturing labor</td>
<td>$90</td>
</tr>
<tr>
<td>Indirect manufacturing labor incurred by various production departments</td>
<td>$30</td>
</tr>
<tr>
<td>Depreciation on plant and manufacturing equipment</td>
<td>$19</td>
</tr>
<tr>
<td>Miscellaneous manufacturing overhead incurred (ordinarily would be detailed as repairs, utilities, etc., with a corresponding credit to various liability accounts)</td>
<td>9</td>
</tr>
<tr>
<td>Manufacturing overhead allocated, 2,100,000 actual machine-hours</td>
<td>?</td>
</tr>
<tr>
<td>Cost of goods manufactured</td>
<td>$294</td>
</tr>
<tr>
<td>Revenues</td>
<td>400</td>
</tr>
<tr>
<td>Cost of goods sold</td>
<td>292</td>
</tr>
</tbody>
</table>

**Required**

1. Prepare an overview diagram of Donnell Transport’s job-costing system.
2. Prepare journal entries. Number your entries. Post to T-accounts. What is the ending balance of Work-in-Process Control?
3. Show the journal entry for disposing of under- or overallocated manufacturing overhead directly as a year-end write-off to Cost of Goods Sold. Post the entry to T-accounts.
4-27 \textbf{Job costing, unit cost, ending work in process.} Raymond Company produces pipes for concert-quality organs. Each job is unique. In April 2007, it completed all outstanding orders, and then, in May 2007, it worked on only two jobs, M1 and M2:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Raymond Company, May 2007</td>
<td>Job M1</td>
</tr>
<tr>
<td>2</td>
<td>Direct materials</td>
<td>$75,000</td>
</tr>
<tr>
<td>3</td>
<td>Direct manufacturing labor</td>
<td>275,000</td>
</tr>
</tbody>
</table>

Direct manufacturing labor is paid at the rate of $25 per hour. Manufacturing overhead costs are allocated at a budgeted rate of $20 per direct manufacturing labor-hour. Only Job M1 was completed in May.

If you want to use Excel to solve this exercise, go to the Excel Lab at \url{www.prenhall.com/horngren/cost12e} and download the template for Exercise 4-27.

1. Compute the total cost for Job M1.
2. 1,500 pipes were produced for Job M1. Calculate the cost per pipe.
3. Prepare the journal entry transferring Job M1 to finished goods.
4. What is the ending balance in the Work-in-Process Control account?

4-28 \textbf{Job costing; actual, normal, and variation from normal costing.} Chirac & Partners, a Quebec-based public accounting partnership, specializes in audit services. Its job-costing system has a single direct-cost category (professional labor) and a single indirect-cost pool (audit support, which contains all costs of the Audit Support Department). Audit support costs are allocated to individual jobs using actual professional labor-hours. Chirac & Partners employs 10 professionals to perform audit services.

Budgeted and actual amounts for 2007 are as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chirac &amp; Partners</td>
</tr>
<tr>
<td>2</td>
<td>Budget for 2007</td>
</tr>
<tr>
<td>3</td>
<td>Professional labor compensation</td>
</tr>
<tr>
<td>4</td>
<td>Audit support department costs</td>
</tr>
<tr>
<td>5</td>
<td>Professional labor-hours billed to clients</td>
</tr>
<tr>
<td>6</td>
<td>Actual results for 2007</td>
</tr>
<tr>
<td>7</td>
<td>Audit support department costs</td>
</tr>
<tr>
<td>8</td>
<td>Professional labor-cost rate</td>
</tr>
</tbody>
</table>

If you want to use Excel to solve this exercise, go to the Excel Lab at \url{www.prenhall.com/horngren/cost12e} and download the template for Exercise 4-28.

1. Compute the direct-cost rate and the indirect-cost rate per professional labor-hour for 2007 under (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.
2. Chirac’s 2007 audit of Pierre & Co. was budgeted to take 110 hours of professional labor time. The actual professional labor time spent on the audit was 120 hours. Compute the cost of the Pierre & Co. audit using (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs. Explain any differences in the job cost.

4-29 \textbf{Research project costs, variation in overhead rates.} Prentiss University is well-known for its groundbreaking academic research. Its professors regularly bid on and are awarded research projects funded by government and private agencies. Research teams use university resources such as laboratories, computers, office space, and libraries. For 2006, Prentiss’ Dean of Research has collected the following budgeted costs of research projects in four academic departments:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cost Category</td>
<td></td>
<td>Department</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>(000s)</td>
<td></td>
<td>Liberal Arts</td>
<td>Natural Sciences</td>
<td>Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Direct costs (travel, materials)</td>
<td>$1,200</td>
<td>$5,000</td>
<td>$3,500</td>
<td>$2,100</td>
</tr>
<tr>
<td>4</td>
<td>Professors’ salaries</td>
<td>$1,000</td>
<td>$1,600</td>
<td>$1,500</td>
<td>$2,000</td>
</tr>
<tr>
<td>5</td>
<td>Graduate students’ stipends</td>
<td>700</td>
<td>1,500</td>
<td>2,500</td>
<td>500</td>
</tr>
<tr>
<td>6</td>
<td>Overhead costs such as office space, library, computers, and facilities</td>
<td>850</td>
<td>8,030</td>
<td>9,600</td>
<td>5,250</td>
</tr>
</tbody>
</table>

When a professor applies for a grant, Prentiss University requires him or her to submit a cost budget using the following cost categories: direct costs (say, for travel and project-specific materials), direct labor costs
(for professors’ and graduate students’ time), and overhead costs (for use of university resources). Overhead costs are required to be calculated at an overhead rate of 210% of budgeted direct-labor costs of the project.

If you want to use Excel to solve this exercise, go to the Excel Lab at www.prenhall.com/horngren/cost12e and download the template for Exercise 4-29.

**Required**

1. Calculate a single common overhead rate across all departments based on budgeted total overhead costs and budgeted total direct labor costs.
2. Calculate the budgeted cost for research projects submitted to funding agencies by each academic department in 2006 using the method required by Prentiss University.
3. Calculate the budgeted cost of research projects in each academic department in 2006.
4. Professors in the Liberal Arts Department at Prentiss are beginning to lose many research projects to other small liberal arts colleges on the basis of cost. Why do you think this is happening?
5. If Liberal Arts professors are allowed to charge their own overhead rate of 50% of direct labor costs, what common overhead rate would Natural Sciences, Engineering, and Business have to apply based on budgeted overhead costs and budgeted direct labor costs of these departments?
6. What problems, if any, do you see arising from taking the approach proposed in requirement 5?

**Problems**

4-30  **Job costing, accounting for manufacturing overhead, budgeted rates.** The Solomon Company uses a job-costing system at its Dover, Delaware, plant. The plant has a Machining Department and a Finishing Department. Solomon uses normal costing with two direct-cost categories (direct materials and direct manufacturing labor) and two manufacturing overhead cost pools (the Machining Department, with machine-hours as the allocation base, and the Finishing Department, with direct manufacturing labor costs as the allocation base). The 2006 budget for the plant is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Machining Department</th>
<th>Finishing Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing overhead</td>
<td>$10,000,000</td>
<td>$8,000,000</td>
</tr>
<tr>
<td>Direct manufacturing labor costs</td>
<td>$900,000</td>
<td>$4,000,000</td>
</tr>
<tr>
<td>Direct manufacturing labor-hours</td>
<td>30,000</td>
<td>160,000</td>
</tr>
<tr>
<td>Machine-hours</td>
<td>200,000</td>
<td>33,000</td>
</tr>
</tbody>
</table>

**Required**

1. Prepare an overview diagram of Solomon’s job-costing system.
2. What is the budgeted overhead rate in the Machining Department? In the Finishing Department?
3. During the month of January, the job-cost record for Job 431 shows the following:

<table>
<thead>
<tr>
<th></th>
<th>Machining Department</th>
<th>Finishing Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct materials used</td>
<td>$14,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>Direct manufacturing labor costs</td>
<td>$600</td>
<td>$1,250</td>
</tr>
<tr>
<td>Direct manufacturing labor-hours</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Machine-hours</td>
<td>130</td>
<td>10</td>
</tr>
</tbody>
</table>

Compute the total manufacturing overhead allocated to Job 431.

4. Assuming that Job 431 consisted of 200 units of product, what is the cost per unit?
5. Amounts at the end of 2006 are as follows:

<table>
<thead>
<tr>
<th></th>
<th>Machining Department</th>
<th>Finishing Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing overhead incurred</td>
<td>$11,200,000</td>
<td>$7,900,000</td>
</tr>
<tr>
<td>Direct manufacturing labor costs</td>
<td>$950,000</td>
<td>$4,100,000</td>
</tr>
<tr>
<td>Machine-hours</td>
<td>220,000</td>
<td>32,000</td>
</tr>
</tbody>
</table>

Compute the under- or overallocated manufacturing overhead for each department and for the Dover plant as a whole.

6. Why might Solomon use two different manufacturing overhead cost pools in its job-costing system?

4-31  **Service industry, job costing, law firm.** Keating & Associates is a law firm specializing in labor relations and employee-related work. It employs 25 professionals (5 partners and 20 associates) who work directly with its clients. The average budgeted total compensation per professional for 2005 is $104,000. Each professional is budgeted to have 1,600 billable hours to clients in 2005. All professionals work for clients to their maximum 1,600 billable hours available. All professional labor costs are included in a single direct-cost category and are traced to jobs on a per-hour basis.

All costs of Keating & Associates other than professional labor costs are included in a single indirect-cost pool (legal support) and are allocated to jobs using professional labor-hours as the allocation base. The budgeted level of indirect costs in 2005 is $2,200,000.

**Required**

1. Prepare an overview diagram of Keating’s job-costing system.
2. Compute the 2005 budgeted direct-cost rate per hour of professional labor.
3. Compute the 2005 budgeted indirect-cost rate per hour of professional labor.
4. Keating & Associates is considering bidding on two jobs:
a. Litigation work for Richardson, Inc., which requires 100 budgeted hours of professional labor
b. Labor contract work for Punch, Inc., which requires 150 budgeted hours of professional labor
Prepare a cost estimate for each job.

4-32 Service industry, job costing, two direct- and two indirect-cost categories, law firm (continuation of 4-31). Keating has just completed a review of its job-costing system. This review included a detailed analysis of how past jobs used the firm’s resources and interviews with personnel about what factors drive the level of indirect costs. Management concluded that a system with two direct-cost categories (professional partner labor and professional associate labor) and two indirect-cost categories (general support and secretarial support) would yield more-accurate job costs. Budgeted information for 2005 related to the two direct-cost categories is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Professional Partner Labor</th>
<th>Professional Associate Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of professionals</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>Hours of billable time per professional</td>
<td>1,600 per year</td>
<td>1,600 per year</td>
</tr>
<tr>
<td>Total compensation (average per professional)</td>
<td>$200,000</td>
<td>$80,000</td>
</tr>
</tbody>
</table>

Budgeted information for 2005 relating to the two indirect-cost categories is

<table>
<thead>
<tr>
<th></th>
<th>General Support</th>
<th>Secretarial Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total costs</td>
<td>$1,800,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>Cost-allocation base</td>
<td>Professional labor-hours</td>
<td>Partner labor-hours</td>
</tr>
</tbody>
</table>

1. Compute the 2005 budgeted direct-cost rates for (a) professional partners and (b) professional associates. Required
2. Compute the 2005 budgeted indirect-cost rates for (a) general support and (b) secretarial support.
3. Compute the budgeted costs for the Richardson and Punch jobs, given the following information:

<table>
<thead>
<tr>
<th></th>
<th>Richardson, Inc.</th>
<th>Punch, Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional partners</td>
<td>60 hours</td>
<td>30 hours</td>
</tr>
<tr>
<td>Professional associates</td>
<td>40 hours</td>
<td>120 hours</td>
</tr>
</tbody>
</table>

4. Comment on the results in requirement 3. Why are the job costs different from those computed in Problem 4-31?

4-33 Proration of overhead. (Z. Iqbal, adapted) The Zaf Radiator Company uses a normal-costing system with a single manufacturing overhead cost pool and machine-hours as the cost-allocation base. The following data are for 2007:

- Budgeted manufacturing overhead: $4,800,000
- Overhead allocation base: Machine-hours
- Budgeted machine-hours: 80,000
- Manufacturing overhead incurred: $4,900,000
- Actual machine-hours: 75,000

Machine-hours data and the ending balances (before proration of under- or overallocated overhead) are as follows:

<table>
<thead>
<tr>
<th>Actual Machine-Hours</th>
<th>2007 End-of-Year Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Goods Sold</td>
<td>60,000</td>
</tr>
<tr>
<td>Finished Goods Control</td>
<td>11,000</td>
</tr>
<tr>
<td>Work in Process Control</td>
<td>4,000</td>
</tr>
</tbody>
</table>

1. Compute the budgeted manufacturing overhead rate for 2007. Required
2. Compute the under- or overallocated manufacturing overhead of Zaf Radiator in 2007. Dispose of this amount using:
   a. Write-off to Cost of Goods Sold
   c. Proration based on the allocated overhead amount (before proration) in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold

4-34 Normal costing, overhead allocation, working backward. (M. Rajan, adapted) Gibson Manufacturing uses normal costing for its job-costing system, which has two direct-cost categories (direct materials and
1. Use information in the first two bullet points to calculate (a) direct manufacturing labor costs in 2007 and (b) cost of direct materials used in 2007.

2. Calculate the ending work-in-process inventory on December 31, 2007.

**4-35 Proration of overhead, two indirect-cost pools.** Glavine Corporation uses two manufacturing overhead cost pools: one for the overhead costs incurred in the Machining Department and another for overhead costs incurred in the Assembly Department. Glavine uses a normal-costing system. It allocates overhead costs to jobs from the Machining Department using a budgeted machine-hour overhead rate, and from the Assembly Department using a budgeted direct manufacturing labor-hour rate.

The following data are for 2006:

<table>
<thead>
<tr>
<th>Machining Department</th>
<th>Assembly Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Budgeted manufacturing overhead rate</td>
<td>$60 per machine-hour</td>
</tr>
<tr>
<td>Actual manufacturing overhead costs</td>
<td>$6,200,000</td>
</tr>
</tbody>
</table>

Machine-hours and direct manufacturing labor-hours data and ending balances are as follows:

<table>
<thead>
<tr>
<th>Actual Machine-Hours</th>
<th>Actual Direct Manufacturing Labor-Hours</th>
<th>Balance Before Proration, December 31, 2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Goods Sold</td>
<td>67,500</td>
<td>$16,000,000</td>
</tr>
<tr>
<td>Finished Goods Control</td>
<td>4,500</td>
<td>750,000</td>
</tr>
<tr>
<td>Work-in-Process Control</td>
<td>18,000</td>
<td>3,250,000</td>
</tr>
</tbody>
</table>

**Required**

1. Compute the under- or overallocated overhead in each department in 2006. Dispose of the under- or overallocated amount in each department using:
   a. Write-off to Cost of Goods Sold.

2. Explain which proration method you prefer in requirement 1.

**4-36 General ledger relationships, under- and overallocation.** (S. Sridhar, adapted) Needham Company uses normal costing in its job-costing system. Partially completed T-accounts and additional information for Needham for 2006 are as follows:

<table>
<thead>
<tr>
<th>Direct Materials Control</th>
<th>Work-in-Process Control</th>
<th>Finished Goods Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1-2006</td>
<td>1-1-2006</td>
<td>1-1-2006</td>
</tr>
<tr>
<td>30,000</td>
<td>20,000</td>
<td>10,000</td>
</tr>
<tr>
<td>400,000</td>
<td>Dir. manuf. labor 360,000</td>
<td>940,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturing Overhead Control</th>
<th>Manufacturing Overhead Allocated</th>
<th>Cost of Goods Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>540,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Additional Information:**

a. Direct manufacturing labor wage rate was $15 per hour.

b. Manufacturing overhead was allocated at $20 per direct manufacturing labor-hour.

c. During the year, sales revenues were $1,090,000, and marketing and distribution costs were $140,000.

**Required**

1. What was the amount of direct materials issued to production during 2006?

2. What was the amount of manufacturing overhead allocated to jobs during 2006?

3. What was the total cost of jobs completed during 2006?

4. What was the balance of work-in-process inventory on December 31, 2006?

5. What was the cost of goods sold before proration of under- or overallocated overhead?

6. What was the under- or overallocated manufacturing overhead in 2006?

7. Dispose of the under- or overallocated manufacturing overhead using
   a. Write-off to Cost of Goods Sold
8. Using each of the approaches in requirement 7, calculate Needham's operating income for 2006.

4-37 Overview of general ledger relationships. The Blakely Company is a small machine shop that uses normal costing in its job-costing system. The total debits and credits in certain accounts one day before year-end are as follows:

<table>
<thead>
<tr>
<th>Account</th>
<th>Total Debits</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials Control</td>
<td>$100,000</td>
<td>$ 70,000</td>
</tr>
<tr>
<td>Work-in-Process Control</td>
<td>320,000</td>
<td>305,000</td>
</tr>
<tr>
<td>Manufacturing Department Overhead Control</td>
<td>85,000</td>
<td>—</td>
</tr>
<tr>
<td>Finished Goods Control</td>
<td>325,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Cost of Goods Sold</td>
<td>300,000</td>
<td>—</td>
</tr>
<tr>
<td>Manufacturing Overhead Allocated</td>
<td>—</td>
<td>90,000</td>
</tr>
</tbody>
</table>

All materials purchased are direct materials. Note that “total debits” in the inventory accounts would include beginning inventory balances on January 1, 2005, if any.

The total debits and total credits above do not include the following:

a. The manufacturing labor costs for the December 31 working day: direct manufacturing labor, $5,000, and indirect manufacturing labor, $1,000.
b. Miscellaneous manufacturing overhead incurred on December 31: $1,000.

Additional Information:

a. Manufacturing overhead has been allocated as a percentage of direct manufacturing labor costs through December 30.
b. Direct materials purchased during 2005 were $85,000.
c. No direct materials were returned to suppliers.
d. Direct manufacturing labor costs during 2005 totaled $150,000, not including the December 31 working day described previously.

2. Prepare all adjusting and closing journal entries for the preceding accounts. Assume that all under- or overallocated manufacturing overhead is closed directly to Cost of Goods Sold.

4-38 General ledger relationships, under- and overallocation, service industry. Brody and Co., an engineering consulting firm, uses a variation from normal costing in its job-costing system. It charges jobs for fees paid to outside experts and costs of making blueprints at actual costs, professional direct-labor costs at a budgeted direct-labor rate, and engineering support overhead costs at a budgeted overhead rate.

Brody maintains a "Jobs-in-Process Control" account in its general ledger that accumulates all costs of ongoing jobs. As a job is completed, Brody immediately bills the client and transfers the cost of the completed job to a "Cost of Jobs Billed" account.

The following data pertain to 2007:

1. Direct costs of fees and blueprints (all cash) $ 150,000
2. Actual direct professional labor costs (all cash) $1,500,000
3. Direct professional labor costs charged to jobs at a budgeted direct-labor rate of $50 per actual direct professional labor-hour $1,450,000
4. Actual engineering support overhead costs (all cash) $1,140,000
5. Engineering support overhead allocated at 80% of direct professional labor costs charged to jobs (80% × $1,450,000) $1,160,000
6. Cost of jobs billed $2,500,000
7. Revenues from jobs billed $3,500,000

2. As your final entry, dispose of the year-end under- or overallocated account balances as direct write-offs to Cost of Jobs Billed.

4-39 Allocation and proration of manufacturing overhead. (SMA, heavily adapted) Nicole Limited is a company that produces machinery to customer order. Its job-costing system (using normal costing) has two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost pool (manufacturing overhead, allocated using a budgeted rate based on direct manufacturing labor costs). The budget for 2007 was:

<table>
<thead>
<tr>
<th>Manufacturing Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct manufacturing labor</td>
</tr>
<tr>
<td>Manufacturing overhead</td>
</tr>
<tr>
<td>$420,000</td>
</tr>
<tr>
<td>$252,000</td>
</tr>
</tbody>
</table>
At the end of 2007, two jobs were incomplete: No. 1768B (total direct manufacturing labor costs were $11,000) and No. 1819C (total direct manufacturing labor costs were $39,000). Machine time totaled 287 hours for No. 1768B and 647 hours for No. 1819C. Direct materials issued to No. 1768B amounted to $22,000. Direct materials for No. 1819C were $42,000.

Total charges to the Manufacturing Overhead Control account for the year were $186,840. Direct manufacturing labor costs of all jobs were $400,000, representing 20,000 direct manufacturing labor-hours. There were no beginning inventories. In addition to ending Work-in-Process Control, ending Finished Goods Control showed a balance of $156,000 (including direct manufacturing labor costs of $40,000).

Revenues for 2007 totaled $2,700,680, cost of goods sold was $1,600,000, and marketing costs were $857,870. Nicole prices on a cost-plus basis. It currently uses a guideline of cost-plus 40% of cost.

1. Prepare a detailed schedule showing the ending balances in the inventories accounts and Cost of Goods Sold (before considering any under- or overallocated manufacturing overhead). Show also the manufacturing overhead allocated included in these ending balances.
2. Calculate the under- or overallocated manufacturing overhead for 2007.
3. Prorate the amount computed in requirement 2 on the basis of
4. Assume that Nicole decides to write off to Cost of Goods Sold any under- or overallocated manufacturing overhead. Will operating income be higher or lower than the operating income that would have resulted from the proration in requirements 3a and 3b?
5. Calculate the cost of job No. 1819C if Nicole Limited had used the adjusted allocation-rate approach to dispose of under- or overallocated manufacturing overhead in 2007.

4-40 Job costing, contracting, ethics. Jack Halpern is the owner and CEO of Aerospace Comfort, a firm specializing in the manufacture of seats for airplanes. He has just received a copy of a letter written to the General Audit Section of the U.S. Navy. He believes it is from an ex-employee of Aerospace.

Dear Sir,

Aerospace Comfort manufactured 100 X7 seats for the Navy in 2007. You may be interested to know the following:

1. Direct material costs billed for the 100 X7 seats were $25,000.
2. Direct manufacturing labor costs billed for 100 X7 seats were $6,000. These costs include 16 hours of setup labor at $25 per hour, an amount included in the manufacturing overhead cost pool as well. The $6,000 also includes 12 hours of design time at $50 an hour. Design time was explicitly identified as a cost the Navy would not reimburse.
3. Manufacturing overhead costs billed for 100 X7 seats were $9,000 (150% of direct manufacturing labor costs). This amount includes the 16 hours of setup labor at $25 per hour that is incorrectly included as part of direct manufacturing labor costs.

You may also want to know that over 40% of the direct materials is purchased from Frontier Technology, a company that is 51% owned by Jack Halpern’s brother. For obvious reasons, this letter will not be signed.

cc: The Wall Street Journal
Jack Halpern, CEO of Aerospace Comfort

Aerospace Comfort’s contract states that the Navy reimburses Aerospace at 130% of total manufacturing costs. Assume that the facts in the letter are correct as you answer the following questions.

1. What is the cost amount per X7 seat that Aerospace Comfort billed the Navy? Assume that the actual direct material costs were $25,000.
2. What is the amount per X7 seat that Aerospace Comfort should have billed the Navy? Assume that the actual direct material costs were $25,000.
3. What should the Navy do to tighten its procurement procedures to reduce the likelihood of such situations recurring in the future?

Collaborative Learning Problem

4-41 Service industry, job costing, accounting for overhead costs, budgeted rates. Jefferson Company, a commercial painting contractor, uses a normal-costing system to cost each job. Its job-costing system has two direct-cost categories (direct materials and direct labor) and one indirect-cost pool called overhead costs. To each job, Jefferson allocates overhead at a budgeted rate of 80% of direct labor costs. Jefferson provides the following additional information for February 2007:

1. As of February 1, 2007, Job A21 was the only job in process, having incurred direct material costs of $30,000 and direct labor costs of $50,000.
2. Jobs A22, A23, and A24 were started during February.
3. Direct materials used during February were $150,000.
4. Direct labor costs for February were $120,000.
5. Actual overhead costs for February were $102,000.
6. On February 28, 2007, only job A24 was still in process, having incurred direct material costs of $20,000 and direct labor costs of $40,000.

Jefferson maintains a Jobs-in-Process Control account in its general ledger. As each job is completed, its cost is transferred to the Cost of Jobs Billed account. Each month, Jefferson closes any under- or overallocated overhead to Cost of Jobs Billed.

1. Give one example of a direct cost and one example of an overhead cost for a job undertaken by Jefferson Company.
2. Calculate the overhead allocated to Job A21 as of February 1, 2007.
4. Calculate the under- or overallocated overhead for February 2007.

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**CHAPTER 4 Video Case**

**WHEELED COACH: Job Costing**

What do you need in an emergency? If it’s a medical emergency, Wheeled Coach has it covered. Based in Winter Park, Florida, Wheeled Coach (a subsidiary of Collins Industries) is the nation’s largest manufacturer of custom-built ambulances that handle everything from routine hospital transports to full-scale trauma and disaster services. You might think that ambulances are pretty much all the same, but in fact, each Wheeled Coach ambulance is built from the ground up using 12 major platforms to meet the specific and unique requirements of every buyer. The custom nature of Wheeled Coach’s business means that there are thousands of different configurations that plant personnel must be able to assemble efficiently. Because the vehicles are all distinct, Wheeled Coach uses a job-costing system to accumulate costs separately for each ambulance manufactured.

No vehicle begins production until all required materials are in inventory. Materials include Ford truck chassis, aluminum for framing, wood products for cabinets, and wiring for electrical systems. Wheeled Coach has close to 20,000 items, called stockkeeping units (SKUs), in its inventory, some of which arrive just-in-time for production. The goal of the company’s six assembly lines is to roll a finished vehicle off the line each day. Close to 350 employees work four 10-hour days per week to achieve this goal. The main assembly lines are fed daily from subsidiary job shops near the main production floor. Some of the job shops include (1) carpentry for interior benches and cabinets, (2) upholstery for seating, (3) metal fabrication for the ambulance’s shell, (4) paint shop for truck chassis prep, painting, and exterior detailing, (5) electrical for interior wiring, and (6) Plexiglas for interior cabinet window fabrication. All work is done to meet individual job specifications, so no finished goods inventory is made to stock. A detailed “bill of materials” is used to request and issue direct materials to the job shops and the main assembly floor.

To keep assembly moving each day, Wheeled Coach must balance its assembly-line work areas, called cells, so that just enough workers are assigned to work in the cell. Too many workers, and labor stands idle; too few workers, and the work tasks don’t get finished by shift’s end, backing up the line and triggering overtime. All work completed in each station moves into the next cell at day’s end so that the workers are not kept waiting the following day.

**QUESTIONS**

1. Assume the following facts for Wheeled Coach: total direct labor for top-of-the-line ambulance Job 06-MX24D is 1,750 hours at a cost of $22,750. Direct materials for the job total $25,200. For 2006, Wheeled Coach recorded 700,000 actual direct manufacturing labor-hours, and actual indirect manufacturing costs totaled $21 million. Direct manufacturing labor-hours are used for allocating manufacturing overhead. Apply the seven steps in job costing to Wheeled Coach’s operations.
2. Describe what types of source documents you would expect Wheeled Coach to use in their job-costing system.