

► Learning Objectives

1. Describe the building-block concepts of costing systems
2. Distinguish job costing from process costing
3. Describe the approaches to evaluating and implementing job-costing systems
4. Outline the seven-step approach to normal costing
5. Distinguish actual costing from normal costing
6. Track the flow of costs in a job-costing system
7. Dispose of under- or overallocated manufacturing overhead costs at the end of the fiscal year using alternative methods
8. 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, knowing how to job cost—how much it costs to produce an individual product—is critical if a profit is to be generated. As the following article shows, Nexamp, a clean-energy company, knows this all too well.

Job Costing and Nexamp's Next Generation Energy and Carbon Solutions¹

Making a profit on a project depends on pricing it correctly. At Nexamp, a leading renewable-energy systems provider in Massachusetts, a team of managers and employees is responsible for the costing and pricing of its solar, geothermal, wind, and biomass installation jobs for homeowners and businesses.

For each project, account managers carefully examine and verify job costs as part of a competitive bidding process. Using a computer model developed from previous projects, a company executive double-checks all the numbers, watching for costs that could wreak havoc with the net profit on the job. Projects of a certain size, such as a recent \$20 million government stimulus contract to install solar panels, require the approval of a company vice president or other high-ranking officer. This type of approval ensures that Nexamp does not approve jobs that could lose money.

Nexamp holds a weekly project management meeting where managers report on the status of each job approved and scheduled. Once a project is underway, on-site project managers provide weekly reports on the progress of each phase of installation. Nexamp project managers are also responsible for identifying any potential problems with each project and determining any alterations necessary to ensure high quality, on-time delivery within the original project budget.

At Nexamp, job costing includes three key elements: direct costs of a job, indirect costs of a job, and general administrative costs. Direct costs are costs traceable to a specific job such as costs of solar panels, electricity converters, mounting systems, and

¹ Sources: Conversations with Nexamp management. June 4, 2010. Noblett, Jackie. 2010. Nexamp lands \$20M stimulus contract. *Boston Business Journal*, February 5.

subcontractor payments. All materials are purchased through a formal procurement process, which helps Nexamp carefully manage and control material costs. Another key element of direct costs is direct labor. Besides the actual wages paid to employees, direct labor costs include costs of workers' compensation insurance, health insurance, vacations and holidays, sick days, and paid days off.

Indirect costs of a job are allocated to each project. These include cost of supervisory labor, company-owned equipment, construction supplies, and safety equipment. Finally, Nexamp allocates general and administrative costs, such as office rent, utilities, and general insurance to each job.

Just like at Nexamp, managers at Nissan need to know how much it costs to manufacture its new Leaf electric car, and managers at Ernst & Young need to know what it costs to audit Whole Foods, the organic grocer. Knowing the costs and profitability of jobs helps managers pursue their business strategies, develop pricing plans, and meet external reporting requirements. Of course, 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

Before we begin our discussion of costing systems, let's review Chapter 2's cost-related terms and introduce the new terms that we will need for our primary discussion.

1. *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.
2. *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—for example the cost of purchasing the main computer board or the cost of parts used to make an iMac computer.
3. *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—for example, the costs of supervisors who oversee multiple products, one of which is the iMac, or the rent paid for the repair facility that repairs many different Apple computer products besides the iMac. Indirect costs are allocated to the cost object using a cost-allocation method.

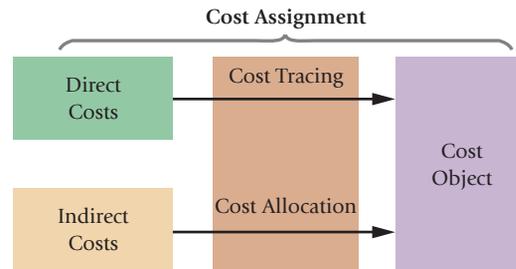
Recall that *cost assignment* is a general term for assigning costs, whether direct or indirect, to a cost object. *Cost tracing* is a specific term for assigning direct costs; *cost allocation*

Learning Objective 1

Describe the building-block concepts of costing systems

... the building blocks are cost object, direct costs, indirect costs, cost pools, and cost-allocation bases

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 costs and costs that are fixed in the short run. Managers cost 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 the long run, managers want revenues to exceed total costs.

We also need to introduce and explain two more terms before discussing costing systems:

4. **Cost pool.** A **cost pool** is a grouping of individual indirect 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.
5. **Cost-allocation base.** How should a company allocate costs to operate metal-cutting machines among different products? One way to allocate costs is based on the number of machine-hours used to produce different products. The **cost-allocation base** (number of machine-hours) is a systematic way to link an indirect cost or group of indirect costs (operating costs of all metal-cutting machines) to cost objects (different products). For example, if indirect costs of operating metal-cutting machines is \$500,000 based on running these machines for 10,000 hours, the cost allocation rate is $\$500,000 \div 10,000 \text{ hours} = \50 per machine-hour, where machine-hours is the cost allocation base. If a product uses 800 machine-hours, it will be allocated \$40,000, $\$50 \text{ per machine-hour} \times 800 \text{ machine-hours}$. The ideal cost-allocation base is the cost driver of the indirect costs, because there is a cause-and-effect relationship between the cost allocation base and the 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.

Decision Point

What are the building block concepts of a costing system?

Learning Objective 2

Distinguish job costing . . . job costing is used to cost a distinct product from process costing . . . process costing is used to cost masses of identical or similar units

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 generally uses different amounts 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 & Saatchi. Each special machine made by Hitachi is unique and distinct. An advertising campaign for one client at Saatchi and Saatchi is unique and distinct from advertising campaigns for other clients. Job costing is also used by companies such as Ethan Allen

to cost multiple identical units of distinct furniture products. 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. All Minute Maid consumers 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 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—and 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.

Decision Point

How do you distinguish job costing from process costing?

| | Service Sector | Merchandising Sector | Manufacturing Sector |
|-----------------------------|--|--|--|
| Job Costing Used | <ul style="list-style-type: none"> • Audit engagements done by Price Waterhouse Coopers • Consulting engagements done by McKinsey & Co. • Advertising-agency campaigns run by Ogilvy & Mather • Individual legal cases argued by Hale & Dorr • Computer-repair jobs done by CompUSA • Movies produced by Universal Studios | <ul style="list-style-type: none"> • L. L. Bean sending individual items by mail order • Special promotion of new products by Wal-Mart | <ul style="list-style-type: none"> • Assembly of individual aircrafts at Boeing • Construction of ships at Litton Industries |
| Process Costing Used | <ul style="list-style-type: none"> • Bank-check clearing at Bank of America • Postal delivery (standard items) by U.S. Postal Service | <ul style="list-style-type: none"> • Grain dealing by Arthur Daniel Midlands • Lumber dealing by Weyerhaeuser | <ul style="list-style-type: none"> • Oil refining by Shell Oil • Beverage production by PepsiCo |

Exhibit 4-1

Examples of Job Costing and Process Costing in the Service, Merchandising, and Manufacturing Sectors

Learning Objective 3

Describe the approaches to evaluating and implementing job-costing systems

... to determine costs of jobs in a timely manner

Job Costing: Evaluation and Implementation

We illustrate job costing using the example of Robinson Company, a company that manufactures and installs specialized machinery for the paper-making industry. In early 2011, Robinson receives a request to bid for the manufacturing and installation of a new paper-making machine for the Western Pulp and Paper Company (WPP). Robinson had never made a machine quite like this one, and its managers wonder what to bid for the job. Robinson's management team works through the five-step decision-making process.

- 1. Identify the problems and uncertainties.** The decision of whether and how much to bid for the WPP job depends on how management resolves two critical uncertainties: what it will cost to complete the job and the prices that its competitors are likely to bid.
- 2. Obtain information.** Robinson's managers first evaluate whether doing the WPP job is consistent with the company's strategy. Do they want to do more of these kinds of jobs? Is this an attractive segment of the market? Will Robinson be able to develop a competitive advantage over its competitors and satisfy customers? Robinson's managers conclude that the WPP job fits well with the company's strategy.
Robinson's managers study the drawings and engineering specifications provided by WPP and decide on technical details of the machine. They compare the specifications of this machine to similar machines they have made in the past, identify competitors who might bid on the job, and gather information on what these bids might be.
- 3. Make predictions about the future.** Robinson's managers estimate the cost of direct materials, direct manufacturing labor, and overhead for the WPP job. They also consider qualitative factors and risk factors and think through any biases they might have. For example, do engineers and employees working on the WPP job have the necessary skills and technical competence? Would they find the experience valuable and challenging? How accurate are the cost estimates, and what is the likelihood of cost overruns? What biases do Robinson's managers have to be careful about? Remember, Robinson has not made a machine quite like this one. Robinson's managers need to be careful not to draw inappropriate analogies and to seek the most relevant information when making their judgments.
- 4. Make decisions by choosing among alternatives.** Robinson bids \$15,000 for the WPP job. This bid is based on a manufacturing cost estimate of \$10,000 and a markup of 50% over manufacturing cost. The \$15,000 price takes into account likely bids by competitors, the technical and business risks, and qualitative factors. Robinson's managers are very confident that they have obtained the best possible information in reaching their decision.
- 5. Implement the decision, evaluate performance, and learn.** Robinson wins the bid for the WPP job. As Robinson works on the WPP job, it keeps careful track of all the costs it has incurred (which are detailed later in this chapter). Ultimately, Robinson's managers compare the predicted amounts against actual costs to evaluate how well they did on the WPP job.

In its job-costing system, Robinson accumulates costs incurred on a job in different parts of the value chain, such as manufacturing, marketing, and customer service. We focus here 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.

One form of a job-costing system that Robinson can use is actual costing. **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. The *actual indirect-cost rate* is calculated by dividing actual total indirect costs by the actual total quantity of the cost-allocation base. As its name suggests, actual costing

systems calculate the actual costs of jobs. Yet, actual costing systems are not commonly found in practice because actual costs cannot be computed in a *timely* manner. The problem is not with computing direct-cost rates for direct materials and direct manufacturing labor. For example, Robinson records the actual prices paid for materials. As it uses these materials, the prices paid serve as actual direct-cost rates for charging material costs to jobs. As we discuss next, calculating actual indirect-cost rates on a timely basis each week or each month is, however, a problem. Robinson can only calculate actual indirect-cost rates at the end of the fiscal year and Robinson's managers are unwilling to wait that long to learn the costs of various jobs.

Time Period Used to Compute Indirect-Cost Rates

There are two reasons for using longer periods, such as a year, to calculate indirect-cost rates.

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. An annual period incorporates the effects of all four seasons into a single, annual indirect-cost rate.

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, such as 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 charged with these costs. Pooling all indirect costs together over the course of a full year and calculating a single annual indirect-cost rate helps smooth some of the erratic bumps in costs associated with shorter periods.

2. **The denominator reason (quantity of the cost-allocation base).** Another reason for longer periods is to avoid spreading monthly fixed indirect costs over fluctuating levels of monthly output and fluctuating quantities of the cost-allocation base. Consider the following example.

Reardon and Pane are tax accountants whose work follows a highly seasonal pattern with very busy months during tax season and less busy months at other times. Assume the following mix of variable indirect costs (such as supplies, food, power, and indirect support labor) that vary with the quantity of the cost-allocation base (direct professional labor-hours) and fixed indirect costs (depreciation and general administrative support) that do not vary with short-run fluctuations in the quantity of the cost-allocation base:

| | Indirect Costs | | | Direct | Allocation Rate per Direct |
|-------------------|-----------------|--------------|--------------|---------------------------------|--|
| | Variable (1) | Fixed (2) | Total (3) | Professional Labor-Hours (4) | Professional Labor-Hour (5) = (3) ÷ (4) |
| High-output month | \$40,000 | \$60,000 | \$100,000 | 3,200 | \$31.25 |
| Low-output month | 10,000 | 60,000 | 70,000 | 800 | 87.50 |

You can see that variable indirect costs change in proportion to changes in direct professional labor-hours. Therefore, the variable indirect-cost rate is the same in both the high-output months and the low-output months ($\$40,000 \div 3,200$ labor-hours = \$12.50 per labor-hour; $\$10,000 \div 800$ labor-hours = \$12.50 per labor-hour). Sometimes overtime payments can cause the variable indirect-cost rate to be higher in high-output months. In such cases, variable indirect costs will 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 ($\$87.50 \div \$31.25 = 2.80$, or 280%) because of fixed costs. Furthermore, if fees for preparing tax returns are based on costs, fees would be high in low-output months leading to lost business, when in

Decision Point

What is the main challenge in implementing job-costing systems?

fact management wants to accept more bids to utilize idle capacity. Reardon and Pane chose 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 smoothes the effect of monthly variations in output levels and is more representative of the total costs and total output that management considered when choosing the level of capacity and, hence, fixed costs. Another denominator reason for using annual overhead rates is that 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 would bear a greater share of indirect costs (such as depreciation and property taxes) than jobs in other months, because February has the fewest workdays (and consequently labor-hours) in a month. 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.

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, including those at Robinson, want a close approximation of the costs of various jobs regularly during the year, not just at the end of the fiscal year. Managers want to know manufacturing costs (and other costs, such as marketing costs) for ongoing uses, including pricing jobs, monitoring and managing costs, evaluating the success of the job, learning about what worked and what didn't, bidding on new jobs, and preparing interim financial statements. Because of the need for immediate access to job costs, few companies wait to allocate overhead costs until year-end when the actual manufacturing overhead is finally known. 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, the **budgeted indirect-cost rate** for each cost pool 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 (1) traces direct costs to a cost object by using the actual direct-cost rates times the actual quantities of the direct-cost inputs and (2) allocates indirect costs based on the *budgeted* indirect-cost rates times the actual quantities of the cost-allocation bases.

We illustrate normal costing for the Robinson Company example using the following seven steps to assign costs to an individual job. This approach is commonly used by companies in the manufacturing, merchandising, and service sectors.

General Approach to Job Costing

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 paper-making machine for Western Pulp and Paper (WPP) in 2011. 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 paper-making machine ordered by WPP. Follow the various steps in costing Job WPP 298 on the job-cost record in Exhibit 4-2.

Learning Objective 4

Outline the seven-step approach to normal costing

... the seven-step approach is used to compute direct and indirect costs of a job

Exhibit 4-2

Source Documents at Robinson Company: Job-Cost Record

|  | | | | | | |
|--|---|------------------------|------------------------|------------------------|------------------------|-----------------|
| | A | B | C | D | E | |
| 1 | JOB-COST RECORD | | | | | |
| 2 | JOB NO: | WPP 298 | | CUSTOMER: | Western Pulp and Paper | |
| 3 | Date Started: | Feb. 7, 2011 | | Date Completed | Feb. 28, 2011 | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | DIRECT MATERIALS | | | | | |
| 7 | <u>Date</u> | <u>Materials</u> | | <u>Quantity</u> | <u>Unit</u> | <u>Total</u> |
| 8 | <u>Received</u> | <u>Requisition No.</u> | <u>Part No.</u> | <u>Used</u> | <u>Cost</u> | <u>Costs</u> |
| 9 | Feb. 7, 2011 | 2011: 198 | MB 468-A | 8 | \$14 | \$ 112 |
| 10 | Feb. 7, 2011 | 2011: 199 | TB 267-F | 12 | 63 | 756 |
| 11 | | | | | | • |
| 12 | | | | | | • |
| 13 | Total | | | | | <u>\$ 4,606</u> |
| 14 | | | | | | |
| 15 | DIRECT MANUFACTURING LABOR | | | | | |
| 16 | <u>Period</u> | <u>Labor Time</u> | <u>Employee</u> | <u>Hours</u> | <u>Hourly</u> | <u>Total</u> |
| 17 | <u>Covered</u> | <u>Record No.</u> | <u>No.</u> | <u>Used</u> | <u>Rate</u> | <u>Costs</u> |
| 18 | Feb. 7-13, 2011 | LT 232 | 551-87-3076 | 25 | \$18 | \$ 450 |
| 19 | Feb. 7-13, 2011 | LT 247 | 287-31-4671 | 5 | 19 | 95 |
| 20 | | | | | | • |
| 21 | | | | | | • |
| 22 | Total | | | | | <u>\$ 1,579</u> |
| 23 | | | | | | |
| 24 | MANUFACTURING OVERHEAD* | | | | | |
| 25 | | <u>Cost Pool</u> | | <u>Allocation Base</u> | <u>Allocation-</u> | <u>Total</u> |
| 26 | <u>Date</u> | <u>Category</u> | <u>Allocation Base</u> | <u>Quantity Used</u> | <u>Base Rate</u> | <u>Costs</u> |
| 27 | Dec. 31, 2011 | Manufacturing | Direct Manufacturing | 88 hours | \$40 | <u>\$ 3,520</u> |
| 28 | | | Labor-Hours | | | |
| 29 | | | | | | |
| 30 | Total | | | | | <u>\$ 3,520</u> |
| 31 | TOTAL MANUFACTURING COST OF JOB | | | | | |
| 32 | | | | | | <u>\$ 9,705</u> |
| 33 | | | | | | |
| 34 | *The Robinson Company uses a single manufacturing-overhead cost pool. The use of multiple overhead cost pools | | | | | |
| 35 | would mean multiple entries in the "Manufacturing Overhead" section of the job-cost record. | | | | | |
| 36 | | | | | | |

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 WPP, 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 in the Direct Materials panel of 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 sheet**, 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 sheet 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 paper-making machine that appears in the Direct Manufacturing Labor panel of the job-cost record in Exhibit 4-2 is 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 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 machine-hours. Other indirect costs such as supervision and production support are more closely related to direct manufacturing labor-hours. Robinson, however, chooses direct manufacturing labor-hours as the sole allocation base for linking all indirect manufacturing costs to jobs. That's because, in its labor-intensive environment, Robinson believes that the number of direct manufacturing labor-hours drives the manufacturing overhead resources (such as salaries paid to supervisors, engineers, production support staff, and quality management staff) required by individual jobs. (We will see in Chapter 5 that, in many manufacturing

Exhibit 4-3

Source Documents at Robinson Company: Materials Requisition Record and Labor-Time Sheet

PANEL A:

| MATERIALS-REQUISITION RECORD | | | | |
|----------------------------------|-------------|-----------|--------------|-------|
| Materials-Requisition Record No. | | 2011: 198 | | |
| Job No. | WPP 298 | Date: | FEB. 7, 2011 | |
| Part | Part | Unit | Total | |
| No. | Description | Quantity | Cost | Cost |
| | Metal | | | |
| MB 468-A | Brackets | 8 | \$14 | \$112 |
| Issued By: B. Clyde | | Date: | Feb. 7, 2011 | |
| Received By: L. Daley | | Date: | Feb. 7, 2011 | |

PANEL B:

| LABOR-TIME SHEET | | | | | | | | |
|-------------------------------|---|---------------------|---|--------------------------|-------------------------|---|----|-------|
| Labor-Time Record No: | | LT 232 | | | | | | |
| Employee Name: | | G. L. Cook | | Employee No: 551-87-3076 | | | | |
| Employee Classification Code: | | Grade 3 Machinist | | | | | | |
| Hourly Rate: | | \$18 | | | | | | |
| Week Start: | | Feb. 7, 2011 | | | Week End: Feb. 13, 2011 | | | |
| Job. No. | M | T | W | Th | F | S | Su | Total |
| WPP 298 | 4 | 8 | 3 | 6 | 4 | 0 | 0 | 25 |
| JL 256 | 3 | 0 | 4 | 2 | 3 | 0 | 0 | 12 |
| Maintenance | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 3 |
| Total | 8 | 8 | 8 | 8 | 8 | 0 | 0 | 40 |
| Supervisor: R. Stuart | | Date: Feb. 13, 2011 | | | | | | |

environments, we need to broaden the set of cost drivers.) In 2011, Robinson budgets 28,000 direct manufacturing labor-hours.

Step 4: Identify the Indirect Costs Associated with Each Cost-Allocation Base. Because Robinson believes that a single cost-allocation base—direct manufacturing labor-hours—can be used to allocate indirect manufacturing costs to jobs, Robinson creates a single cost pool called manufacturing overhead costs. This pool represents all indirect costs of the Manufacturing Department that are difficult to trace directly to individual jobs. In 2011, budgeted manufacturing overhead costs total \$1,120,000.

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. They choose this order because managers must first understand the cost driver, the reasons why costs are being incurred (for example, setting up machines, moving materials, or designing jobs), before they can determine the costs associated with each cost driver. Otherwise, there is nothing to guide the creation of cost pools. Of course, Steps 3 and 4 are often done almost simultaneously.

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 budgeted indirect-cost rate is calculated by dividing budgeted total indirect costs in the pool (determined in Step 4) by the budgeted 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:

$$\begin{aligned} \text{Budgeted manufacturing overhead rate} &= \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted total quantity of cost-allocation base}} \\ &= \frac{\$1,120,000}{28,000 \text{ direct manufacturing labor-hours}} \\ &= \$40 \text{ per direct manufacturing labor-hour} \end{aligned}$$

Step 6: Compute the Indirect Costs Allocated to the Job. The indirect costs of a job are calculated by multiplying the *actual* quantity of each different allocation base (one allocation base for each cost pool) associated with the job by the *budgeted* indirect cost rate of each allocation base (computed in Step 5). Recall that Robinson’s managers selected direct manufacturing labor-hours as the only cost-allocation base. Robinson uses 88 direct manufacturing labor-hours on the WPP 298 job. Manufacturing overhead costs allocated to WPP 298 equal \$3,520 (\$40 per direct manufacturing labor-hour × 88 hours) and appear in the Manufacturing Overhead panel of 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 WPP job are \$9,705.

| | | |
|---|--------------|----------------|
| Direct manufacturing costs | | |
| Direct materials | \$4,606 | |
| Direct manufacturing labor | <u>1,579</u> | \$ 6,185 |
| Manufacturing overhead costs | | |
| (\$40 per direct manufacturing labor-hour × 88 hours) | | <u>3,520</u> |
| Total manufacturing costs of job WPP 298 | | <u>\$9,705</u> |

Recall that Robinson bid a price of \$15,000 for the job. At that revenue, the normal-costing system shows a gross margin of \$5,295 (\$15,000 – \$9,705) and a gross-margin percentage of 35.3% (\$5,295 ÷ \$15,000 = 0.353).

Robinson’s manufacturing managers and sales managers can use the gross margin and gross-margin percentage calculations to compare the profitability of different jobs 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 Concepts in Action on p. 108).

Concepts in Action

Job Costing on Cowboys Stadium



Over the years, fans of the National Football League have identified the Dallas Cowboys as “America’s Team.” Since 2009, however, the team known for winning five Super Bowls has become just as recognized for its futuristic new home, Cowboys Stadium in Arlington, Texas.

When the Cowboys take the field, understanding each week’s game plan is critical for success. But for Manhattan Construction, the company that managed the development of the \$1.2 billion Cowboys Stadium project, understanding costs is just as critical for making successful pricing decisions, winning contracts, and ensuring that each project is profitable. Each job is estimated individually because the unique end-products, whether a new stadium or an office building,

demand different quantities of Manhattan Construction’s resources.

In 2006, the Dallas Cowboys selected Manhattan Construction to lead the construction of its 73,000 seat, 3 million-square-foot stadium. To be completed in three years, the stadium design featured two monumental arches spanning about a quarter-mile in length over the dome, a retractable roof, the largest retractable glass doors in the world (in each end zone), canted glass exterior walls, 325 private suites, and a 600-ton JumboTron hovering 90 feet above the field.

With only 7% of football fans ever setting foot in a professional stadium, “Our main competition is the home media center,” Cowboys owner Jerry Jones said in unveiling the stadium design in 2006. “We wanted to offer a real experience that you can’t have at home, but to see it with the technology that you do have at home.”

Generally speaking, the Cowboys Stadium project had five stages: (1) conceptualization, (2) design and planning, (3) preconstruction, (4) construction, and (5) finalization and delivery. During this 40-month process, Manhattan Construction hired architects and subcontractors, created blueprints, purchased and cleared land, developed the stadium—ranging from excavation to materials testing to construction—built out and finished interiors, and completed last-minute changes before the stadium’s grand opening in mid-2009.

While most construction projects have distinct stages, compressed timeframes and scope changes required diligent management by Manhattan Construction. Before the first game was played, Manhattan Construction successfully navigated nearly 3,000 change requests and a constantly evolving budget.

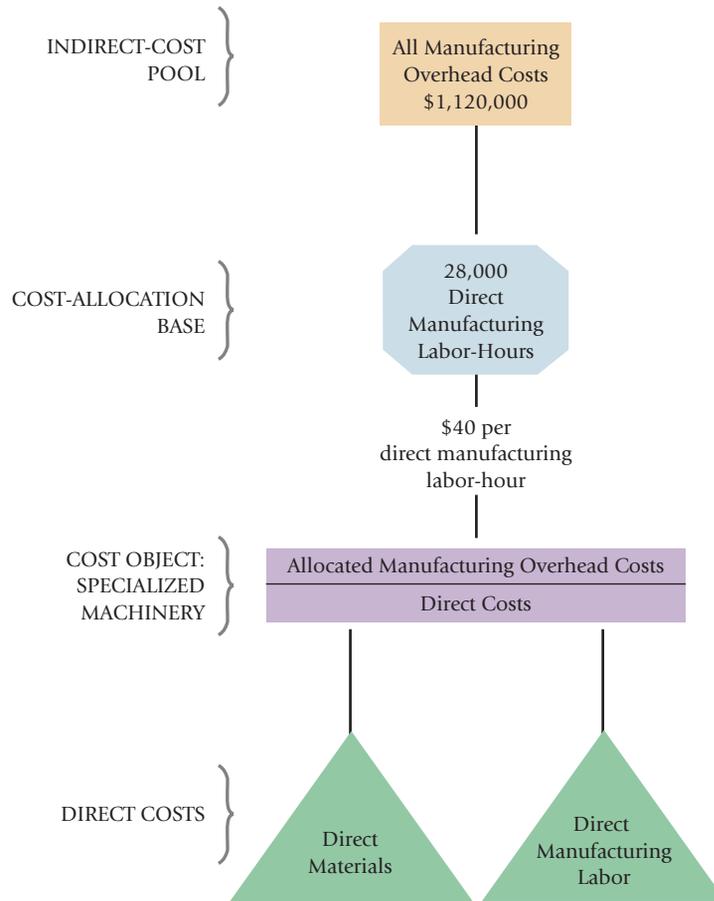
To ensure proper allocation and accounting of resources, Manhattan Construction project managers used a job-costing system. The system first calculated the budgeted cost of more than 500 line items of direct materials and labor costs. It then allocated estimated overhead costs (supervisor salaries, rent, materials handling, and so on) to the job using direct material costs and direct labor-hours as allocation bases. Manhattan Construction’s job-costing system allowed managers to track project variances on a weekly basis. Manhattan Construction continually estimated the profitability of the Cowboys Stadium project based on the percentage of work completed, insight gleaned from previous stadium projects, and revenue earned. Managers used the job-costing system to actively manage costs, while the Dallas Cowboys had access to clear, concise, and transparent costing data.

Just like quarterback Tony Romo navigating opposing defenses, Manhattan Construction was able to leverage its job-costing system to ensure the successful construction of a stadium as iconic as the blue star on the Cowboys’ helmets.

Sources: Dillon, David. 2009. New Cowboys Stadium has grand design, but discipline isn’t compromised *The Dallas Morning News*, June 3. http://www.dallasnews.com/sharedcontent/dws/ent/stories/DN-stadiumarchitecture_03gd.ART.State.Edition2.5125e7c.html; Knudson, Brooke. 2008. Profile: Dallas Cowboys Stadium. *Construction Today*, December 22. <http://www.construction-today.com/cms1/content/view/1175/139/1/0/>; Lacayo, Richard. 2009. Inside the new Dallas Cowboys stadium. *Time*, September 21. <http://www.time.com/time/nation/article/0,8599,1924535,00.html>; Penny, Mark, Project Manager, Manhattan Construction Co. 2010. Interview. January 12.

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 (overhead) costs of a cost object, indirect-cost pool, and cost-allocation base—of job-costing systems that were first introduced at the beginning of this chapter. 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

Exhibit 4-4
 Job-Costing Overview
 for Determining
 Manufacturing Costs of
 Jobs at Robinson
 Company



cost, a rectangle represents the indirect-cost pool, and an octagon describes the cost-allocation base.) Note the parallel between the overview diagram and the cost of the WPP 298 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.

Decision Point

How do you implement a normal-costing system?

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. Bar coding and other forms of online information recording reduce human intervention and improve the accuracy of materials and labor time records 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

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

Actual Costing

How would the cost of Job WPP 298 change if Robinson had used actual costing rather than normal costing? Both actual costing and normal costing trace direct costs to jobs in the same way because source documents identify the actual quantities and actual rates of direct materials and direct manufacturing labor for a job as the work is being done. The only difference between costing a job with normal costing and actual costing is that normal costing uses *budgeted* indirect-cost rates, whereas actual costing uses *actual* indirect-cost rates calculated annually at the end of the year. Exhibit 4-5 distinguishes actual costing from normal costing.

The following actual data for 2011 are for Robinson's manufacturing operations:

| | Actual |
|--|---------------|
| Total manufacturing overhead costs | \$1,215,000 |
| Total direct manufacturing labor-hours | 27,000 |

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 manufacturing labor-hours, to allocate all manufacturing overhead costs to jobs. The actual quantity of direct manufacturing labor-hours for 2011 is 27,000 hours. In Step 4, Robinson groups all actual indirect manufacturing costs of \$1,215,000 into a single manufacturing overhead cost pool. In Step 5, the **actual indirect-cost rate** is calculated by dividing actual total indirect costs in the pool (determined in Step 4) by the actual total quantity of the cost-allocation base (determined in Step 3). Robinson calculates the actual manufacturing overhead rate in 2011 for its single manufacturing overhead cost pool as follows:

$$\begin{aligned} \text{Actual manufacturing overhead rate} &= \frac{\text{Actual annual manufacturing overhead costs}}{\text{Actual annual quantity of the cost-allocation base}} \\ &= \frac{\$1,215,000}{27,000 \text{ direct manufacturing labor-hours}} \\ &= \$45 \text{ per direct manufacturing labor-hour} \end{aligned}$$

In Step 6, under an actual-costing system,

$$\begin{aligned} \text{Manufacturing overhead costs allocated to WPP 298} &= \text{Actual manufacturing overhead rate} \times \text{Actual quantity of direct manufacturing labor-hours} \\ &= \$45 \text{ per direct manuf. labor-hour} \times 88 \text{ direct manufacturing labor-hours} \\ &= \$3,960 \end{aligned}$$

Learning Objective 5

Distinguish actual costing

... actual costing uses actual indirect-cost rates

from normal costing

... normal costing uses budgeted indirect-cost rates

Exhibit 4-5

Actual Costing and Normal Costing Methods

| | Actual Costing | Normal Costing |
|-----------------------|--|--|
| Direct Costs | <i>Actual direct-cost rates</i> × actual quantities of direct-cost inputs | <i>Actual direct-cost rates</i> × actual quantities of direct-cost inputs |
| Indirect Costs | <i>Actual indirect-cost rates</i> × actual quantities of cost-allocation bases | <i>Budgeted indirect-cost rates</i> × actual quantities of cost-allocation bases |

In Step 7, the cost of the job under actual costing is \$10,145, calculated as follows:

| | | |
|---|--------------|-----------------|
| Direct manufacturing costs | | |
| Direct materials | \$4,606 | |
| Direct manufacturing labor | <u>1,579</u> | \$ 6,185 |
| Manufacturing overhead costs | | |
| (\$45 per direct manufacturing labor-hour × 88 actual direct manufacturing labor-hours) | | <u>3,960</u> |
| Total manufacturing costs of job | | <u>\$10,145</u> |

The manufacturing cost of the WPP 298 job is higher by \$440 under actual costing (\$10,145) than it is under normal costing (\$9,705) because the actual indirect-cost rate is \$45 per hour, whereas the budgeted indirect-cost rate is \$40 per hour. That is, $(\$45 - \$40) \times 88$ 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. At the end of the year, though, costs allocated using normal costing will not, in general, equal actual costs incurred. If material, adjustments will need to be made so that the cost of jobs and the costs in various inventory accounts are based on actual rather than normal costing. We describe these adjustments later in the chapter.

Decision Point

How do you distinguish actual costing from normal costing?

A Normal Job-Costing System in Manufacturing

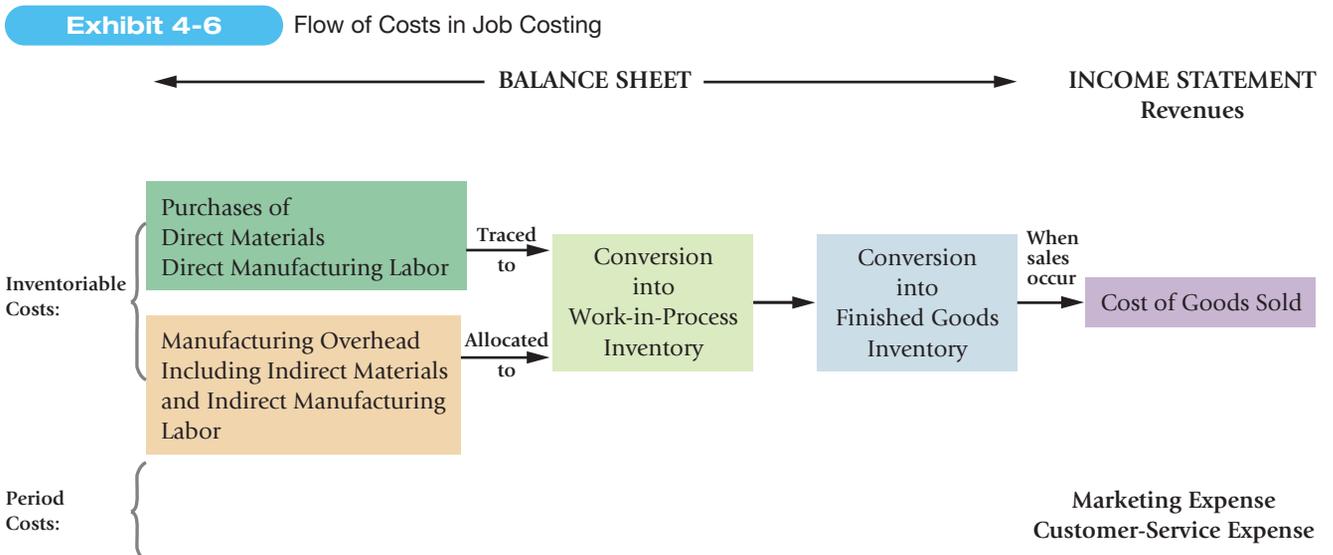
We now explain how a normal job-costing system operates in manufacturing. Continuing with the Robinson Company example, the following illustration considers events that occurred in February 2011. Before getting into details, study Exhibit 4-6, which provides a broad framework for understanding the flow of costs in job costing.

The upper part of Exhibit 4-6 shows the flow of inventoriable costs from the purchase of materials and other manufacturing inputs, to their conversion into work-in-process and finished goods, to the sale of finished goods.

Direct materials used and direct manufacturing labor can be easily traced to jobs. They become part of work-in-process inventory on the balance sheet because direct manufacturing labor transforms direct materials into another asset, work-in-process inventory. Robinson also incurs manufacturing overhead costs (including indirect materials and indirect manufacturing labor) to convert direct materials into work-in-process inventory. The overhead (indirect) costs, however, cannot be easily traced to individual jobs.

Learning Objective 6

Track the flow of costs in a job-costing system . . . from purchase of materials to sale of finished goods



Manufacturing overhead costs, therefore, are first accumulated in a manufacturing overhead account and later allocated to individual jobs. As manufacturing overhead costs are allocated, they become part of work-in-process inventory.

As individual jobs are completed, work-in-process inventory becomes another balance sheet asset, finished goods inventory. Only when finished goods are sold is an expense, cost of goods sold, recognized in the income statement and matched against revenues earned.

The lower part of Exhibit 4-6 shows the period costs—marketing and customer-service costs. These costs do not create any assets on the balance sheet because they are not incurred to transform materials into a finished product. Instead, they are expensed in the income statement, as they are incurred, to best match revenues.

We next describe the entries made in the general ledger.

General Ledger

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 start until they are complete.

Exhibit 4-7 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 4-7 Manufacturing Job-Costing System Using Normal Costing: Diagram of General Ledger Relationships for February 2011

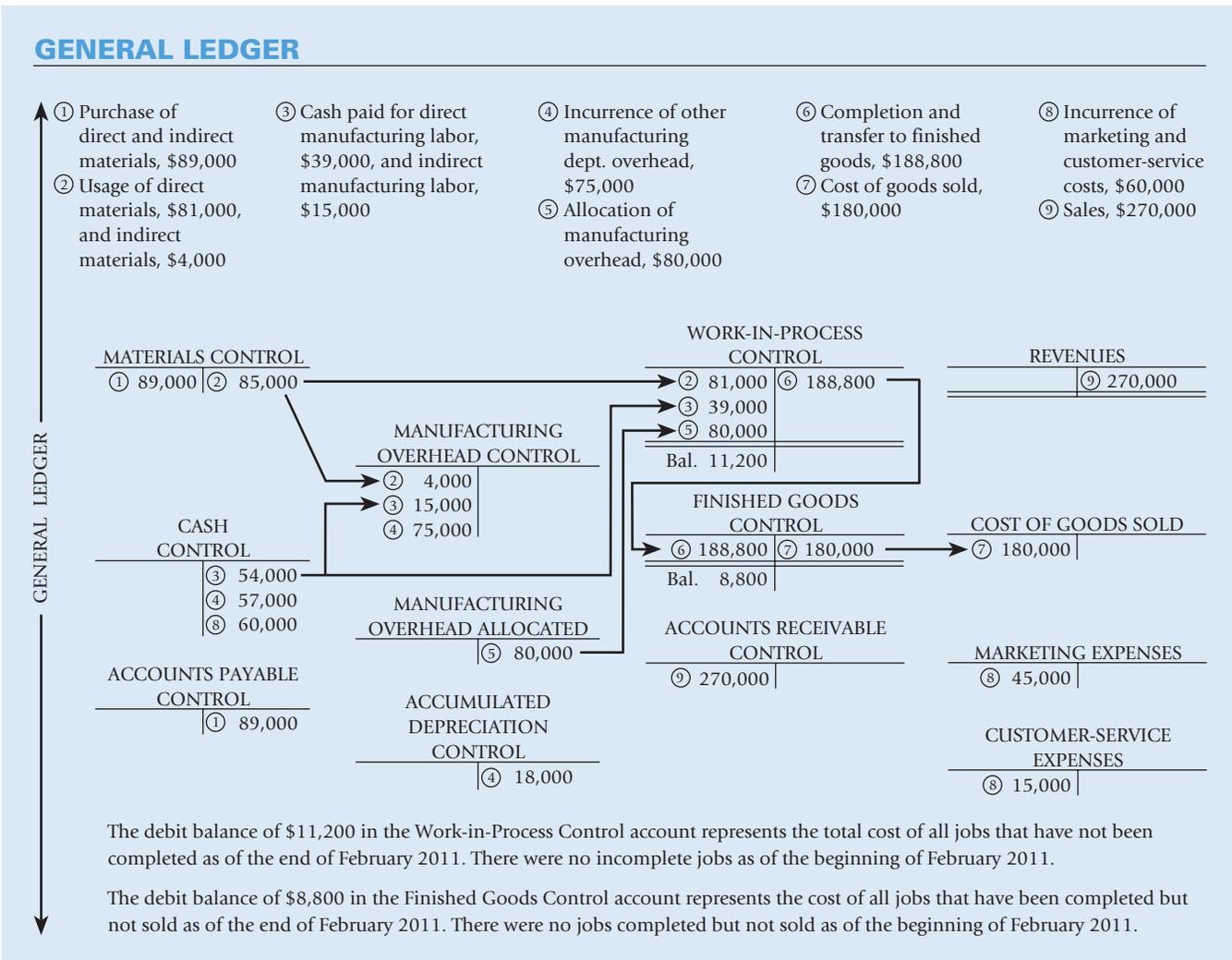


Exhibit 4-7 are based on the transactions and journal entries that follow. As you go through each journal entry, use Exhibit 4-7 to see how the various entries being made come together. General ledger accounts with “Control” in the titles (for example, Materials Control and Accounts Payable Control) have underlying subsidiary ledgers that contain additional details, such as each type of material in inventory and individual suppliers that Robinson must pay.

Some companies simultaneously make entries in the general ledger and subsidiary ledger accounts. Others, such as Robinson, make entries in the subsidiary ledger when transactions occur and entries in the general ledger less frequently, 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 rely on not only the source documents used to record amounts in the subsidiary ledgers, but also on nonfinancial information such as the percentage of jobs requiring rework.

Explanations of Transactions

We next look at a summary of Robinson Company’s transactions for February 2011 and the corresponding journal entries for those transactions.

1. Purchases of materials (direct and indirect) on credit, \$89,000

| | | |
|--------------------------|--------|--------|
| Materials Control | 89,000 | |
| Accounts Payable Control | | 89,000 |

2. Usage of direct materials, \$81,000, and indirect materials, \$4,000

| | | |
|--------------------------------|--------|--------|
| Work-in-Process Control | 81,000 | |
| Manufacturing Overhead Control | 4,000 | |
| Materials Control | | 85,000 |

3. Manufacturing payroll for February: direct labor, \$39,000, and indirect labor, \$15,000, paid in cash

| | | |
|--------------------------------|--------|--------|
| Work-in-Process Control | 39,000 | |
| Manufacturing Overhead Control | 15,000 | |
| Cash Control | | 54,000 |

4. Other manufacturing overhead costs incurred during February, \$75,000, consisting of supervision and engineering salaries, \$44,000 (paid in cash); plant utilities, repairs, and insurance, \$13,000 (paid in cash); and plant depreciation, \$18,000

| | | |
|----------------------------------|--------|--------|
| Manufacturing Overhead Control | 75,000 | |
| Cash Control | | 57,000 |
| Accumulated Depreciation Control | | 18,000 |

5. Allocation of manufacturing overhead to jobs, \$80,000

| | | |
|----------------------------------|--------|--------|
| Work-in-Process Control | 80,000 | |
| Manufacturing Overhead Allocated | | 80,000 |

Under normal costing, **manufacturing overhead allocated**—also called **manufacturing overhead applied**—is the amount of manufacturing overhead costs allocated to individual jobs based on the budgeted rate multiplied by actual quantity used of the allocation base. Keep in mind the distinct difference between transactions 4 and 5. In transaction 4, all actual overhead costs incurred throughout the month are added (debited) to the Manufacturing Overhead Control account. These costs are *not* debited to Work-in-Process Control because, unlike direct costs, they cannot be traced to individual jobs. Manufacturing overhead costs are added (debited) to individual jobs and to Work-in-Process Control *only when* manufacturing overhead costs are allocated in Transaction 5. At the time these costs are allocated, Manufacturing Overhead Control is, *in effect*, decreased (credited) via its contra account, Manufacturing Overhead Allocated. Recall that under normal costing, the budgeted manufacturing overhead rate of \$40 per direct manufacturing labor-hour is calculated

at the beginning of the year on the basis of predictions of annual manufacturing overhead costs and the annual quantity of the cost-allocation base. Almost certainly, the overhead allocated will differ from the actual overhead incurred. In a later section, we discuss what to do with this difference.

6. Completion and transfer of individual jobs to finished goods, \$188,800

| | | |
|-------------------------|---------|---------|
| Finished Goods Control | 188,800 | |
| Work-in-Process Control | | 188,800 |

7. Cost of goods sold, \$180,000

| | | |
|------------------------|---------|---------|
| Cost of Goods Sold | 180,000 | |
| Finished Goods Control | | 180,000 |

8. Marketing costs for February, \$45,000, and customer service costs for February, \$15,000, paid in cash

| | | |
|---------------------------|--------|--------|
| Marketing Expenses | 45,000 | |
| Customer Service Expenses | 15,000 | |
| Cash Control | | 60,000 |

9. Sales revenues, all on credit, \$270,000

| | | |
|-----------------------------|---------|---------|
| Accounts Receivable Control | 270,000 | |
| Revenues | | 270,000 |

Subsidiary Ledgers

Exhibits 4-8 and 4-9 present subsidiary ledgers that contain the underlying details—the “worm’s-eye view” that helps Robinson’s managers keep track of the WPP 298 job, as opposed to the “bird’s-eye view” of the general ledger. The sum of all entries in

Exhibit 4-8

Subsidiary Ledger for Materials, Labor, and Manufacturing Department Overhead¹

| PANEL A: Materials Records by Type of Materials | PANEL B: Labor Records by Employee | PANEL C: Manufacturing Department Overhead Records by Month | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|--|--|--|--|--|------|--|--|-------------------------------------|--|--|---------------------------------|--|--|-----|--|--|---|--|--|------|---------|--------------|------|------|------|-----|--|--|--|--|-----|----|------|-------|--|--------|----|----|-----|--|---------|---|----|----|--|--|--|--|-------|------|--|---|--|--|---|---------------------|---------------------|-----------------|------------------------|--------------|---|---|---|---|---|--|--|--|--|--|----------------------------------|--|--|--|--|---------|----------|----------|----------|----------|
| Metal Brackets Part No. MB 468-A | G. L. Cook Empl. No. 551-87-3076 | February 2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Received</th> <th style="width: 45%;">Issued</th> <th style="width: 40%;">Balance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">①</td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Req.</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">Date No. Qty. Rate Amt.</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">2-7 2011: 8 \$14 \$112</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"> 198</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">②</td> <td></td> </tr> </tbody> </table> | Received | Issued | Balance | ① | | | | Req. | | | Date No. Qty. Rate Amt. | | | 2-7 2011: 8 \$14 \$112 | | | 198 | | | ② | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Week</th> <th style="width: 15%;">Job No.</th> <th style="width: 15%;">Hours Worked</th> <th style="width: 15%;">Rate</th> <th style="width: 40%;">Amt.</th> </tr> </thead> <tbody> <tr> <td>2-13</td> <td style="text-align: center;">WPP</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">298</td> <td style="text-align: center;">25</td> <td style="text-align: center;">\$18</td> <td style="text-align: right;">\$450</td> </tr> <tr> <td></td> <td style="text-align: center;">JL 256</td> <td style="text-align: center;">12</td> <td style="text-align: center;">18</td> <td style="text-align: right;">216</td> </tr> <tr> <td></td> <td style="text-align: center;">Mntnce.</td> <td style="text-align: center;">3</td> <td style="text-align: center;">18</td> <td style="text-align: right;">54</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td style="text-align: right; border-top: 1px solid black;">\$720</td> </tr> <tr> <td>2-20</td> <td></td> <td style="text-align: center;">③</td> <td></td> <td></td> </tr> </tbody> </table> | Week | Job No. | Hours Worked | Rate | Amt. | 2-13 | WPP | | | | | 298 | 25 | \$18 | \$450 | | JL 256 | 12 | 18 | 216 | | Mntnce. | 3 | 18 | 54 | | | | | \$720 | 2-20 | | ③ | | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Indir. Matr. Issued</th> <th style="width: 15%;">Indir. Manuf. Labor</th> <th style="width: 15%;">Supervn. & Eng.</th> <th style="width: 15%;">Plant Ins. & Utilities</th> <th style="width: 40%;">Plant Deprn.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">②</td> <td style="text-align: center;">③</td> <td style="text-align: center;">④</td> <td style="text-align: center;">④</td> <td style="text-align: center;">④</td> </tr> <tr> <td></td> <td style="text-align: center;">Manuf. labor-time record or payroll analysis</td> <td></td> <td></td> <td style="text-align: center;">Payroll analysis, invoices, special authorizations</td> </tr> <tr> <td style="text-align: center;">Copies of materials requisitions</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: right; border-top: 1px solid black;">\$4,000</td> <td style="text-align: right; border-top: 1px solid black;">\$15,000</td> <td style="text-align: right; border-top: 1px solid black;">\$44,000</td> <td style="text-align: right; border-top: 1px solid black;">\$13,000</td> <td style="text-align: right; border-top: 1px solid black;">\$18,000</td> </tr> </tbody> </table> | Indir. Matr. Issued | Indir. Manuf. Labor | Supervn. & Eng. | Plant Ins. & Utilities | Plant Deprn. | ② | ③ | ④ | ④ | ④ | | Manuf. labor-time record or payroll analysis | | | Payroll analysis, invoices, special authorizations | Copies of materials requisitions | | | | | \$4,000 | \$15,000 | \$44,000 | \$13,000 | \$18,000 |
| Received | Issued | Balance | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | ② | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Week | Job No. | Hours Worked | Rate | Amt. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-13 | WPP | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 298 | 25 | \$18 | \$450 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | JL 256 | 12 | 18 | 216 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Mntnce. | 3 | 18 | 54 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | \$720 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-20 | | ③ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indir. Matr. Issued | Indir. Manuf. Labor | Supervn. & Eng. | Plant Ins. & Utilities | Plant Deprn. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ② | ③ | ④ | ④ | ④ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Manuf. labor-time record or payroll analysis | | | Payroll analysis, invoices, special authorizations | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Copies of materials requisitions | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| \$4,000 | \$15,000 | \$44,000 | \$13,000 | \$18,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Copies of invoices or receiving reports</p> <p>↑</p> <p>Copies of materials-requisition records</p> <p>↑</p> | <p>Copies of labor-time sheets</p> <p>↑</p> | <p>Copies of materials requisitions</p> <p>↑</p> <p>Manuf. labor-time record or payroll analysis</p> <p>↑</p> <p>Payroll analysis, invoices, special authorizations</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Total cost of all types of materials received in February, \$89,000</p> | <p>Total cost of all types of materials issued in February, \$85,000</p> | <p>Total cost of all direct and indirect manufacturing labor incurred in February, \$54,000 (\$39,000 + \$15,000)</p> | <p>Other manufacturing overhead costs incurred in February, \$75,000</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

¹The arrows show how the supporting documentation (for example, copies of materials requisition records) results in the journal entry number shown in circles (for example, journal entry number 2) that corresponds to the entries in Exhibit 4-7.

Exhibit 4-9

Subsidiary Ledger for Individual Jobs¹

PANEL A: Work-in-Process Inventory Records by Jobs

| Job No. WPP 298 | | | | | | | | |
|-----------------|------------------|----------------|---------------------------|----------------|---------|------------|------|------------|
| In-Process | | | | Completed | Balance | | | |
| Date | Direct Materials | Direct Labor | Allocated Manuf. Overhead | Total Cost | Date | Total Cost | Date | Total Cost |
| 2-7 | \$ 112 | | | \$ 112 | | | | |
| 2-13 | | \$ 450 | | \$ 450 | | | | |
| | | | | | | | | |
| 2-28 | <u>\$4,606</u> | <u>\$1,579</u> | <u>\$3,520</u> | <u>\$9,705</u> | 2-28 | \$9,705 | 2-28 | \$0 |

| | | | |
|---|-----------------------------|--|---------------------------|
| ② | ③ | ⑤ | ⑥ |
| ↑ | ↑ | ↑ | ↑ |
| Copies of materials-requisition records | Copies of labor-time sheets | Budgeted rate × actual direct manuf. labor-hours | Completed job-cost record |

| | | | |
|---|--|---|---|
| Total cost of direct materials issued to all jobs in Feb., \$81,000 | Total cost of direct manuf. labor used on all jobs in Feb., \$39,000 | Total manuf. overhead allocated to all jobs in Feb., \$80,000 | Total cost of all jobs completed and transferred to finished goods in Feb., \$188,800 |
|---|--|---|---|

PANEL B: Finished Goods Inventory Records by Job

| Job No. WPP 298 | | | | | |
|-----------------|---------------------------|--------|----------------------|---------|------|
| Received | | Issued | | Balance | |
| Date | Amt. | Date | Amt. | Date | Amt. |
| 2-28 | \$9,705 | 2-28 | \$9,705 | 2-28 | \$0 |
| | ⑥ | | ⑦ | | |
| | ↑ | | ↑ | | |
| | Completed job-cost record | | Costed sales invoice | | |

| | |
|---|---|
| Total cost of all jobs transferred to finished goods in Feb., \$188,800 | Total cost of all jobs sold and invoiced in Feb., \$180,000 |
|---|---|

¹The arrows show how the supporting documentation (for example, copies of materials requisition records) results in the journal entry number shown in circles (for example, journal entry number 2) that corresponds to the entries in Exhibit 4-7.

underlying subsidiary ledgers equals the total amount in the corresponding general ledger control accounts.

Material Records by Type of Materials

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 4-8 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 (the material requisition record in Exhibit 4-3, Panel A, p. 106) 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 cost of materials received across all types of direct and indirect material records for February 2011 is \$89,000 (Exhibit 4-8, Panel A). The cost of materials issued across all types of direct and indirect material records for February 2011 is \$85,000 (Exhibit 4-8, Panel A).

As direct materials are used, they are recorded as issued in the Materials Records (see Exhibit 4-8, Panel A, for a record of the Metal Brackets issued for the WPP machine job). Direct materials are also charged to Work-in-Process Inventory Records for Jobs, 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 WPP machine job appear as direct material costs of \$112 in the subsidiary ledger under the work-in-process inventory record for WPP 298 (Exhibit 4-9, Panel A, based on the job-cost record source document in Exhibit 4-2, p. 105.). The cost of direct materials used across all job-cost records for February 2011 is \$81,000 (Exhibit 4-9, Panel A).

As indirect materials (for example, lubricants) are used, they are charged to the Manufacturing Department overhead records (Exhibit 4-8, Panel C), which comprise the

subsidiary ledger for Manufacturing Overhead Control. 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.

Labor Records by Employee

Labor records by employee (see Exhibit 4-8, Panel B for G. L. Cook) are used to trace direct manufacturing labor to individual jobs and to accumulate the indirect manufacturing labor in Manufacturing Department overhead records (Exhibit 4-8, Panel C). The labor records are based on the labor-time sheet source documents (see Exhibit 4-3, Panel B, p. 106). The subsidiary ledger for employee labor records shows the different jobs that G. L. Cook, Employee No. 551-87-3076 worked on and the \$720 of wages owed to Cook, for the week ending February 13. The sum of total wages owed to all employees for February 2011 is \$54,000. The job-cost record for WPP 298 shows direct manufacturing labor costs of \$450 for the time Cook spent on the WPP machine job (Exhibit 4-9, Panel A). Total direct manufacturing labor costs recorded in all job-cost records (the subsidiary ledger for Work-in-Process Control) for February 2011 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 2011 appear in the Manufacturing Department overhead records in the subsidiary ledger (Exhibit 4-8, Panel C). These costs, by definition, cannot be traced to an individual job. Instead, they are allocated to individual jobs as a part of manufacturing overhead.

Manufacturing Department Overhead Records by Month

The Manufacturing Department overhead records (see Exhibit 4-8, Panel C) that make up the subsidiary ledger for Manufacturing Overhead Control show details of different categories of overhead costs such as indirect materials, indirect manufacturing labor, supervision and engineering, plant insurance and utilities, and plant depreciation. 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. Manufacturing department overhead for February 2011 is indirect materials, \$4,000; indirect manufacturing labor, \$15,000; and other manufacturing overhead, \$75,000 (Exhibit 4-8, Panel C).

Work-in-Process Inventory Records by Jobs

As we have already discussed, the job-cost record for each individual job in the subsidiary ledger is debited by the actual cost of direct materials and direct manufacturing labor used by individual jobs. In Robinson's normal-costing system, the job-cost record for each individual job in the subsidiary ledger is also debited for manufacturing overhead allocated based on the budgeted manufacturing overhead rate times the actual direct manufacturing labor-hours used in that job. For example, the job-cost record for Job WPP 298 (Exhibit 4-9, Panel A) shows Manufacturing Overhead Allocated of \$3,520 (budgeted rate of \$40 per labor-hour \times 88 actual direct manufacturing labor-hours used). For the 2,000 actual direct manufacturing labor-hours used for all jobs in February 2011, total manufacturing overhead allocated equals \$40 per labor-hour \times 2,000 direct manufacturing labor-hours = \$80,000.

Finished Goods Inventory Records by Jobs

Exhibit 4-9, 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. The total cost of all jobs completed and transferred to finished goods in February 2011 is \$188,800 (Exhibit 4-9, Panels A and B). Exhibit 4-9, Panel B, indicates that Job WPP 298 was sold and delivered to the customer on February 28, 2011, at which time \$9,705 was transferred from finished goods to cost of goods sold. The total cost of all jobs sold and invoiced in February 2011 is \$180,000 (Exhibit 4-9, Panel B).

Exhibit 4-10

Robinson Company
Income Statement for
the Month Ending
February 2011

| | | |
|---|---------------|------------------|
| Revenues | | \$270,000 |
| Cost of goods sold (\$180,000 + \$14,000 ¹) | | <u>194,000</u> |
| Gross margin | | 76,000 |
| Operating costs | | |
| Marketing costs | \$45,000 | |
| Customer-service costs | <u>15,000</u> | |
| Total operating costs | | <u>60,000</u> |
| Operating income | | <u>\$ 16,000</u> |

¹Cost of goods sold has been increased by \$14,000, the difference between the Manufacturing overhead control account (\$94,000) and the Manufacturing overhead allocated (\$80,000). In a later section of this chapter, we discuss this adjustment, which represents the amount by which actual manufacturing overhead cost exceeds the manufacturing overhead allocated to jobs during February 2011.

Other Subsidiary Records

Just as in manufacturing payroll, Robinson maintains employee labor records in subsidiary ledgers for marketing and customer service payroll as well as records for different types of advertising costs (print, television, and radio). An accounts receivable subsidiary ledger is also used to record the February 2011 amounts due from each customer, including the \$15,000 due from the sale of Job WPP 298.

At this point, pause and review the nine entries in this illustration. Exhibit 4-7 is a handy summary of all nine 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 presented in Exhibit 4-7.

Exhibit 4-10 provides Robinson’s income statement for February 2011 using information from entries 7, 8, and 9. If desired, the cost of goods sold calculations can be further subdivided and presented in the format of Exhibit 2-8, page 40.

Nonmanufacturing Costs and Job Costing

Chapter 2 (pp. 45–47) 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 for government contracting and may also differ from product costs reported to managers for guiding pricing and product-mix decisions. We emphasize that even though 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. Assume marketing and customer-service costs have the same cost-allocation base, revenues, and are included in a single cost pool. Robinson can then calculate a budgeted indirect-cost rate by dividing budgeted indirect marketing costs plus budgeted indirect customer-service costs by budgeted 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 ($0.15 \times \$15,000$, the revenue from the job). By assigning both manufacturing costs and nonmanufacturing costs to jobs, Robinson can compare all costs against the revenues that different jobs generate.

Decision Point

How are transactions recorded in a manufacturing job-costing system?

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

Learning Objective 7

Dispose of under- or overallocated manufacturing overhead costs at the end of the fiscal year using alternative methods

... for example, writing off this amount to the Cost of Goods Sold account

estimates made up to 12 months before actual costs are incurred. We now consider adjustments that are needed 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. 103–104), we do *not* expect actual overhead costs incurred each month to equal overhead costs allocated each month.

Underallocated and Overallocated Direct Costs

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.

$$\text{Underallocated (overallocated) indirect costs} = \\ \text{Actual indirect costs incurred} - \text{Indirect costs allocated}$$

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

Consider the manufacturing overhead 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, utilities, 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

At the end of the year, the overhead accounts show the following amounts.

| Manufacturing Overhead Control | | Manufacturing Overhead Allocated | |
|---------------------------------------|-----------|---|-----------|
| Bal. Dec. 31, 2011 | 1,215,000 | Bal. Dec. 31, 2011 | 1,080,000 |

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 2011 by the budgeted rate of \$40 per direct manufacturing labor-hour.

The \$135,000 (\$1,215,000 – \$1,080,000) 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—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. In our Robinson example, the actual manufacturing overhead (\$1,215,000) exceeds the manufacturing overhead allocated (\$1,080,000) by 12.5% $[(\$1,215,000 - \$1,080,000) \div \$1,080,000]$. At year-end, Robinson could increase the manufacturing overhead allocated to each job in 2011 by 12.5% using a single software command. The command would adjust both the subsidiary ledgers and the general ledger.

Consider the Western Pulp and Paper 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 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 110 that using actual costing, manufacturing overhead allocated to this job is \$3,960 (the actual rate of \$45 per direct manufacturing labor-hour \times 88 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 allocation of actual manufacturing overhead costs 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 inventory, finished goods inventory, 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 Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. Assume the following actual results for Robinson Company in 2011:

|  | | | |
|--|-------------------------|---|--|
| | A | B | C |
| | | | Allocated Manufacturing Overhead Included in Each Account Balance |
| 1 | Account | Account Balance (Before Proration) | Account Balance (Before Proration) |
| 2 | Work-in-process control | \$ 50,000 | \$ 16,200 |
| 3 | Finished goods control | 75,000 | 31,320 |
| 4 | Cost of goods sold | <u>2,375,000</u> | <u>1,032,480</u> |
| 5 | | <u>\$2,500,000</u> | <u>\$1,080,000</u> |

How should Robinson prorate the underallocated \$135,000 of manufacturing overhead at the end of 2011?

Robinson prorates underallocated or overallocated amounts on the basis of the total amount of manufacturing overhead allocated in 2011 (before proration) in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. The \$135,000 underallocated overhead is prorated over the three affected accounts in

proportion to the total amount of manufacturing overhead allocated (before proration) in column 2 of the following table, resulting in the ending balances (after proration) in column 5 at actual costs.

|  | | | | | | | |
|---|-------------------------|---------------------------------------|---|--|---|------------------|---|
| | A | B | C | D | E | F | G |
| 10 | | Account Balance (Before Proration) | Allocated Manufacturing Overhead Included in Each Account Balance (Before Proration) | Allocated Manufacturing Overhead Included in Each Account Balance as a Percent of Total | Proration of \$135,000 of Underallocated Manufacturing Overhead | | Account Balance (After Proration) |
| 11 | Account | (1) | (2) | (3) = (2) / \$1,080,000 | (4) = (3) x \$135,000 | | (5) = (1) + (4) |
| 12 | Work-in-process control | \$ 50,000 | \$ 16,200 | 1.5% | 0.015 x \$135,000 = | \$ 2,025 | \$ 52,025 |
| 13 | Finished goods control | 75,000 | 31,320 | 2.9% | 0.029 x 135,000 = | 3,915 | 78,915 |
| 14 | Cost of goods sold | 2,375,000 | 1,032,480 | 95.6% | 0.956 x 135,000 = | 129,060 | 2,504,060 |
| 15 | Total | <u>\$2,500,000</u> | <u>\$1,080,000</u> | <u>100.0%</u> | | <u>\$135,000</u> | <u>\$2,635,000</u> |

Prorating on the basis of the manufacturing overhead allocated (before proration) results in allocating manufacturing overhead based on actual manufacturing overhead costs. Recall that the actual manufacturing overhead (\$1,215,000) in 2011 exceeds the manufacturing overhead allocated (\$1,080,000) in 2011 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 $0.125 \times \$31,320$. Adding these amounts effectively means allocating manufacturing overhead at 112.5% of what had been allocated before. The journal entry to record this proration is as follows:

| | | |
|----------------------------------|-----------|-----------|
| 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 closes (brings to zero) the manufacturing overhead-related accounts and restates the 2011 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 2011 ending balances in the general ledger as the adjusted allocation-rate approach. However, unlike the adjusted allocation-rate approach, the sum of the amounts shown in the subsidiary ledgers will not match the amounts shown in the general ledger after proration. That's because the amounts in the subsidiary ledgers will still show allocated overhead based on budgeted manufacturing overhead rates. The proration approach only adjusts the general ledger and not the subsidiary ledgers to actual manufacturing overhead rates.

Some companies use the proration approach but base it on the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold before proration (column 1 of the preceding table). The following table shows that prorations based on ending account balances are not the same as the more accurate prorations calculated earlier based on the amount of manufacturing overhead allocated to the accounts because the proportions of manufacturing overhead costs to total costs in these accounts are not the same.

|  | | | | | | |
|--|-------------------------|---|--|--|------------------|--|
| | A | B | C | D | E | F |
| 1 | | Account Balance (Before Proration) | Account Balance as a Percent of Total | Proration of \$135,000 of Underallocated Manufacturing Overhead | | Account Balance (After Proration) |
| 2 | Account | (1) | (2) = (1) / \$2,500,000 | (3) = (2) x \$135,000 | | (4) = (1) + (3) |
| 3 | Work-in-process control | \$ 50,000 | 2.0% | 0.02 x \$135,000 = | \$ 2,700 | \$ 52,700 |
| 4 | Finished goods control | 75,000 | 3.0% | 0.03 x 135,000 = | 4,050 | 79,050 |
| 5 | Cost of goods sold | <u>2,375,000</u> | <u>95.0%</u> | 0.95 x 135,000 = | <u>128,250</u> | <u>2,503,250</u> |
| 6 | Total | <u>\$2,500,000</u> | <u>100.0%</u> | | <u>\$135,000</u> | <u>\$2,635,000</u> |

However, proration based on ending balances is frequently justified as being an expedient way of approximating the more accurate results from using manufacturing overhead 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 as follows:

| | | |
|----------------------------------|-----------|-----------|
| Cost of Goods Sold | 135,000 | |
| Manufacturing Overhead Allocated | 1,080,000 | |
| Manufacturing Overhead Control | | 1,215,000 |

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 the purpose of the adjustment. The most common purpose is to state the balance sheet and income statement amounts based on actual rather than budgeted manufacturing overhead rates.

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. Prorating to each individual job (as in the adjusted allocation-rate approach) is only done if the goal is to develop the most accurate record of individual job costs for profitability analysis purposes.

For balance sheet and income statement reporting 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

Decision Point

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

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 result in significant distortions in financial statements.

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. Had Robinson used multiple cost-allocation bases, such as direct manufacturing labor-hours and machine-hours, it would have created two cost pools and calculated two budgeted overhead rates: one based on direct manufacturing labor-hours and the other based on machine-hours to allocate overhead costs to 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

Learning Objective 8

Apply variations from normal costing

... variations from normal costing use budgeted direct-cost rates

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 sheets, 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 number of 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 reason). Also, the hours worked each period might vary significantly depending on the number of working days each month and the demand from clients (a denominator reason). In situations like these, a company needing timely information during the progress of an audit (and not wanting to wait until the end of the fiscal year) will use budgeted rates for some direct costs and budgeted rates for indirect costs. All budgeted rates are calculated at the start of the fiscal year. In contrast, normal costing uses actual cost rates for all direct costs and budgeted cost rates only for indirect costs.

The mechanics of using budgeted rates for direct costs are similar to the methods employed when using budgeted rates for indirect costs in normal costing. We illustrate this for Donahue and Associates, a public accounting firm. For 2011, Donahue budgets total direct-labor costs of \$14,400,000, total indirect costs of \$12,960,000, and total direct (professional) labor-hours of 288,000. In this case,

$$\begin{aligned} \text{Budgeted direct-labor cost rate} &= \frac{\text{Budgeted total direct-labor costs}}{\text{Budgeted total direct-labor hours}} \\ &= \frac{\$14,400,000}{288,000 \text{ direct labor-hours}} = \$50 \text{ per direct labor-hour} \end{aligned}$$

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

$$\begin{aligned} \text{Budgeted indirect cost rate} &= \frac{\text{Budgeted total costs in indirect cost pool}}{\text{Budgeted total quantity of cost-allocation base (direct-labor costs)}} \\ &= \frac{\$12,960,000}{\$14,400,000} = 0.90, \text{ or } 90\% \text{ of direct-labor costs} \end{aligned}$$

Suppose that in March 2011, an audit of Hanley Transport, a client of Donahue, uses 800 direct labor-hours. Donahue calculates the direct-labor costs of the Hanley Transport audit by multiplying the budgeted direct-labor cost rate, \$50 per direct labor-hour, by

800, the actual quantity of direct labor-hours. The indirect costs allocated to the Hanley Transport audit are determined by multiplying the budgeted indirect-cost rate (90%) by the direct-labor costs assigned to the job (\$40,000). Assuming no other direct costs for travel and the like, the cost of the Hanley Transport audit is as follows:

| | |
|--|-----------------|
| Direct-labor costs, $\$50 \times 800$ | \$40,000 |
| Indirect costs allocated, $90\% \times \$40,000$ | <u>36,000</u> |
| Total | <u>\$76,000</u> |

At the end of the fiscal year, the direct costs traced to jobs using budgeted rates will generally not equal 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 Donahue 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) assigned 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.

Decision Point

What are some variations from normal costing?

Problem for Self-Study

You are asked to bring the following incomplete accounts of Endeavor Printing, Inc., up-to-date through January 31, 2012. Consider the data that appear in the T-accounts as well as the following information in items (a) through (j).

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 | Wages Payable Control |
| 12-31-2011 Bal. 15,000 | 1-31-2012 Bal. 3,000 |
| Work-in-Process Control | Manufacturing Overhead Control |
| | 1-31-2012 Bal. 57,000 |
| Finished Goods Control | Costs of Goods Sold |
| 12-31-2011 Bal. 20,000 | |

Additional information follows:

- 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 2012 is \$600,000 for manufacturing overhead costs and \$400,000 for direct manufacturing labor costs.
- b. The only job unfinished on January 31, 2012, 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 2012 are \$90,000.
- d. Cost of goods completed during January is \$180,000.
- e. Materials inventory as of January 31, 2012, is \$20,000.
- f. Finished goods inventory as of January 31, 2012, 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 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 the following:

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, 2011
6. Balance, Work-in-Process Control, January 31, 2012
7. Balance, Work-in-Process Control, December 31, 2011
8. Manufacturing Overhead Underallocated or Overallocated for January 2012

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 (g) × \$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, 2011: \$52,000 (h) + \$3,000 (T) – \$40,000 (see 3) – \$10,000 (g) = \$5,000
6. Work-in-Process Control, January 31, 2012: \$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, 2011: \$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.

Letters alongside entries in T-accounts correspond to letters in the preceding additional information. Numbers alongside entries in T-accounts correspond to numbers in the preceding requirements.

Materials Control

| | | | | |
|-------------------------|---------|---------|-----|--------|
| December 31, 2011, Bal. | (given) | 15,000 | | |
| | (1) | 95,000* | (c) | 90,000 |
| January 31, 2012, Bal. | (e) | 20,000 | | |

Work-in-Process Control

| | | | | |
|----------------------------------|-------------|--------|-----|---------|
| December 31, 2011, Bal. | (7) | 3,000 | (d) | 180,000 |
| Direct materials | (c) | 90,000 | | |
| Direct manufacturing labor | (b) (g) (3) | 40,000 | | |
| Manufacturing overhead allocated | (3) (a) (4) | 60,000 | | |
| January 31, 2012, Bal. | (b) (6) | 13,000 | | |

Finished Goods Control

| | | | | |
|-------------------------|---------|---------|-----|---------|
| December 31, 2011, Bal. | (given) | 20,000 | (2) | 185,000 |
| | (d) | 180,000 | | |
| January 31, 2012, Bal. | (f) | 15,000 | | |

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

| Wages Payable Control | | | | | |
|-----------------------|-----|--------|-------------------------|---------|--------|
| | (h) | 52,000 | December 31, 2011, Bal. | (5) | 5,000 |
| | | | | (g) (3) | 40,000 |
| | | | | (g) | 10,000 |
| | | | January 31, 2012 | (given) | 3,000 |

| Manufacturing Overhead Control | | |
|--------------------------------|---------|--------|
| Total January charges | (given) | 57,000 |

| Manufacturing Overhead Allocated | | |
|----------------------------------|--|--------------------|
| | | (3) (a) (4) 60,000 |

| Cost of Goods Sold | | |
|--------------------|-------------|---------|
| | (d) (f) (2) | 185,000 |

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?
2. How do you distinguish job costing from process costing?
3. What is the main challenge of implementing job-costing systems?
4. How do you implement a normal-costing system?
5. How do you distinguish actual costing from normal costing?

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.

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.

The main challenge of implementing job-costing systems is estimating actual costs of jobs in a timely manner.

A general seven-step approach to normal costing requires identifying (1) the job, (2) the actual direct costs, (3) the budgeted cost-allocation bases, (4) the budgeted indirect cost pools, (5) the budgeted cost-allocation rates, (6) the allocated indirect costs (budgeted rate times actual quantity), and (7) the total direct and indirect costs of a job.

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

| | Actual Costing | Normal Costing |
|---------------------|----------------|----------------|
| Direct-cost rates | Actual rates | Actual rates |
| Indirect-cost rates | Actual rates | Budgeted rates |

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

6. How are transactions recorded in a manufacturing job-costing system? A job-costing system in manufacturing records the flow of inventoriable costs in the general and subsidiary ledgers for (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. The job costing system also expenses period costs, such as marketing costs, as they are incurred.
7. How should managers dispose of under- or over-allocated 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 for correctly stating balance sheet and income statement amounts are (1) to adjust the allocation rate and (2) 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 when amounts are immaterial.
8. What are some variations from normal costing? 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 the book contain definitions of the following important terms:

| | | |
|--|---|--|
| actual costing (p. 102) | job-cost sheet (p. 104) | overabsorbed indirect costs (p. 118) |
| actual indirect-cost rate (p. 110) | job-costing system (p. 100) | overallocated indirect costs (p. 118) |
| adjusted allocation-rate approach (p. 118) | labor-time sheet (p. 106) | overapplied indirect costs (p. 118) |
| budgeted indirect-cost rate (p. 104) | manufacturing overhead allocated (p. 113) | process-costing system (p. 101) |
| cost-allocation base (p. 100) | manufacturing overhead applied (p. 113) | proration (p. 119) |
| cost-application base (p. 100) | materials-requisition record (p. 105) | source document (p. 104) |
| cost pool (p. 100) | normal costing (p. 104) | underabsorbed indirect costs (p. 118) |
| job (p. 100) | | underallocated indirect costs (p. 118) |
| job-cost record (p. 104) | | underapplied indirect costs (p. 118) |

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.
- 4-5** Give examples of two cost objects in companies using job costing?
- 4-6** Describe three major source documents used in job-costing systems.
- 4-7** What is the advantage of using computerized source documents to prepare job-cost records?
- 4-8** Give two reasons why most organizations use an annual period rather than a weekly or monthly period to compute budgeted indirect-cost rates.
- 4-9** Distinguish between actual costing and normal costing.
- 4-10** Describe two ways in which a house construction company may use job-cost information.
- 4-11** 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."
- 4-12** Describe three different debit entries to the Work-in-Process Control T-account under normal costing.
- 4-13** Describe three alternative ways to dispose of under- or overallocated overhead costs.
- 4-14** When might a company use budgeted costs rather than actual costs to compute direct-labor rates?
- 4-15** Describe briefly why 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 | i. A landscaping company |
| b. An oil refinery | m. A cola-drink-concentrate producer |
| c. A custom furniture manufacturer | n. A movie studio |
| d. A tire manufacturer | o. A law firm |
| e. A textbook publisher | p. A commercial aircraft manufacturer |
| f. A pharmaceutical company | q. A management consulting firm |
| g. An advertising agency | r. A breakfast-cereal company |
| h. An apparel manufacturing plant | s. A catering service |
| i. A flour mill | t. A paper mill |
| j. A paint manufacturer | u. An auto repair shop |
| k. A medical care facility | |

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:

| | Budget for 2011 | Actual Results for 2011 |
|----------------------------------|-----------------|-------------------------|
| Direct material costs | \$2,000,000 | \$1,900,000 |
| Direct manufacturing labor costs | 1,500,000 | 1,450,000 |
| Manufacturing overhead costs | 2,700,000 | 2,755,000 |

1. Compute the actual and budgeted manufacturing overhead rates for 2011.
2. During March, the job-cost record for Job 626 contained the following information:

Required

| | |
|----------------------------------|----------|
| 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 2011, 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. Amesbury 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 2010, Amesbury budgets 2011 assembly-support costs to be \$8,300,000 and 2011 direct labor-hours to be 166,000.

At the end of 2011, Amesbury is comparing the costs of several jobs that were started and completed in 2011.

| | Laguna Model | Mission Model |
|-----------------------|---------------|---------------|
| Construction period | Feb–June 2011 | May–Oct 2011 |
| Direct material costs | \$106,760 | \$127,550 |
| Direct labor costs | \$ 36,950 | \$ 41,320 |
| Direct labor-hours | 960 | 1,050 |

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 2011 actual assembly-support costs were \$6,520,000, and the actual direct labor-hours were 163,000.

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 Amesbury Construction prefer normal costing over actual costing?

Required

4-19 Budgeted manufacturing overhead rate, allocated manufacturing overhead. Gammaro Company uses normal costing. It allocates manufacturing overhead costs using a budgeted rate per machine-hour. The following data are available for 2011:

| | |
|---------------------------------------|-------------|
| Budgeted manufacturing overhead costs | \$4,200,000 |
| Budgeted machine-hours | 175,000 |
| Actual manufacturing overhead costs | \$4,050,000 |
| Actual machine-hours | 170,000 |

Required

1. Calculate the budgeted manufacturing overhead rate.
2. Calculate the manufacturing overhead allocated during 2011.
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 normal 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 manufacturing 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 2011 budget for the plant is as follows:

| | Machining Department | Assembly Department |
|----------------------------------|-----------------------------|----------------------------|
| Manufacturing overhead | \$1,800,000 | \$3,600,000 |
| Direct manufacturing labor costs | \$1,400,000 | \$2,000,000 |
| Direct manufacturing labor-hours | 100,000 | 200,000 |
| Machine-hours | 50,000 | 200,000 |

Required

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

| | Machining Department | Assembly Department |
|----------------------------------|-----------------------------|----------------------------|
| Direct materials used | \$45,000 | \$70,000 |
| Direct manufacturing labor costs | \$14,000 | \$15,000 |
| Direct manufacturing labor-hours | 1,000 | 1,500 |
| Machine-hours | 2,000 | 1,000 |

Compute the total manufacturing overhead costs allocated to Job 494.

3. At the end of 2011, 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 underallocated manufacturing overhead for each department.

4-21 Job costing, consulting firm. Turner & Associates, a consulting firm, has the following condensed budget for 2011:

| | | |
|--------------------|--------------|---------------------|
| Revenues | | \$21,250,000 |
| Total costs: | | |
| Direct costs | | |
| Professional Labor | \$ 5,312,500 | |
| Indirect costs | | |
| Client support | 13,600,000 | 18,912,500 |
| Operating income | | <u>\$ 2,337,500</u> |

Turner 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. Calculate the 2011 budgeted indirect-cost rate for Turner & Associates.
2. The markup rate for pricing jobs is intended to produce operating income equal to 11% of revenues. Calculate the markup rate as a percentage of professional labor costs.
3. Turner is bidding on a consulting job for Tasty Chicken, a fast-food chain specializing in poultry meats. The budgeted breakdown of professional labor on the job is as follows:

| Professional Labor Category | Budgeted Rate per Hour | Budgeted Hours |
|------------------------------------|-------------------------------|-----------------------|
| Director | \$198 | 4 |
| Partner | 101 | 17 |
| Associate | 49 | 42 |
| Assistant | 36 | 153 |

Calculate the budgeted cost of the Tasty Chicken job. How much will Turner bid for the job if it is to earn its target operating income of 11% of revenues?

4-22 Time period used to compute indirect cost rates. Splash Manufacturing produces outdoor wading and slide pools. The company uses a normal-costing system and allocates manufacturing overhead on the basis of direct manufacturing labor-hours. Most of the company's production and sales occur in the first and second quarters of the year. The company is in danger of losing one of its larger customers, Sotco Wholesale, due to large fluctuations in price. The owner of Splash has requested an analysis of the manufacturing cost per unit in the second and third quarters. You have been provided the following budgeted information for the coming year:

| | Quarter | | | |
|-----------------------------|---------|-----|-----|-----|
| | 1 | 2 | 3 | 4 |
| Pools manufactured and sold | 700 | 500 | 150 | 150 |

It takes 0.5 direct manufacturing labor-hour to make each pool. The actual direct material cost is \$7.50 per pool. The actual direct manufacturing labor rate is \$16 per hour. The budgeted variable manufacturing overhead rate is \$12 per direct manufacturing labor-hour. Budgeted fixed manufacturing overhead costs are \$10,500 each quarter.

1. Calculate the total manufacturing cost per unit for the second and third quarter assuming the company allocates manufacturing overhead costs based on the budgeted manufacturing overhead rate determined for each quarter.
2. Calculate the total manufacturing cost per unit for the second and third quarter assuming the company allocates manufacturing overhead costs based on an annual budgeted manufacturing overhead rate.
3. Splash Manufacturing prices its pools at manufacturing cost plus 30%. Why might Sotco Wholesale be seeing large fluctuations in the prices of pools? Which of the methods described in requirements 1 and 2 would you recommend Splash use? Explain.

Required

4-23 Accounting for manufacturing overhead. Consider the following selected cost data for the Pittsburgh Forging Company for 2011.

| | |
|---------------------------------------|-------------|
| Budgeted manufacturing overhead costs | \$7,500,000 |
| Budgeted machine-hours | 250,000 |
| Actual manufacturing overhead costs | \$7,300,000 |
| Actual machine-hours | 245,000 |

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.

Required

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 2011:

| | |
|---|--------|
| Direct materials and supplies purchased on credit | \$ 800 |
| Direct materials used | 710 |
| Indirect materials issued to various production departments | 100 |
| Direct manufacturing labor | 1,300 |
| Indirect manufacturing labor incurred by various production departments | 900 |
| Depreciation on building and manufacturing equipment | 400 |
| Miscellaneous manufacturing overhead* incurred by various production departments (ordinarily would be detailed as repairs, photocopying, utilities, etc.) | 550 |
| Manufacturing overhead allocated at 160% of direct manufacturing labor costs | ? |
| Cost of goods manufactured | 4,120 |
| Revenues | 8,000 |
| Cost of goods sold (before adjustment for under- or overallocated manufacturing overhead) | 4,020 |
| Inventories, December 31, 2010 (not 2011): | |

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

| | |
|-------------------------|-----|
| Materials Control | 100 |
| Work-in-Process Control | 60 |
| Finished Goods Control | 500 |

Required

1. Prepare an overview diagram of the job-costing system at the University of Chicago Press.
2. Prepare journal entries to summarize the 2011 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.
3. Show posted T-accounts for all inventories, Cost of Goods Sold, Manufacturing Overhead Control, and Manufacturing Overhead Allocated.

4-25 Journal entries, T-accounts, and source documents. Production Company produces gadgets for the coveted small appliance market. The following data reflect activity for the year 2011:

| | | |
|---|------------------------|--------------------------|
| Costs incurred: | | |
| Purchases of direct materials (net) on credit | | \$124,000 |
| Direct manufacturing labor cost | | 80,000 |
| Indirect labor | | 54,500 |
| Depreciation, factory equipment | | 30,000 |
| Depreciation, office equipment | | 7,000 |
| Maintenance, factory equipment | | 20,000 |
| Miscellaneous factory overhead | | 9,500 |
| Rent, factory building | | 70,000 |
| Advertising expense | | 90,000 |
| Sales commissions | | 30,000 |
| Inventories: | | |
| | January 1, 2011 | December 31, 2011 |
| Direct materials | \$ 9,000 | \$11,000 |
| Work in process | 6,000 | 21,000 |
| Finished goods | 69,000 | 24,000 |

Production Co. uses a normal costing system and allocates overhead to work in process at a rate of \$2.50 per direct manufacturing labor dollar. Indirect materials are insignificant so there is no inventory account for indirect materials.

Required

1. Prepare journal entries to record the transactions for 2011 including an entry to close out over- or underallocated overhead to cost of goods sold. For each journal entry indicate the source document that would be used to authorize each entry. Also note which subsidiary ledger, if any, should be referenced as backup for the entry.
2. Post the journal entries to T-accounts for all of the inventories, Cost of Goods Sold, the Manufacturing Overhead Control Account, and the Manufacturing Overhead Allocated Account.

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 2011). The following data (in millions) pertain to operations for 2011:

| | |
|---|-------|
| Materials Control, beginning balance, January 1, 2011 | \$ 12 |
| Work-in-Process Control, beginning balance, January 1, 2011 | 2 |
| Finished Goods Control, beginning balance, January 1, 2011 | 6 |
| Materials and supplies purchased on credit | 150 |
| Direct materials used | 145 |
| Indirect materials (supplies) issued to various production departments | 10 |
| Direct manufacturing labor | 90 |
| Indirect manufacturing labor incurred by various production departments | 30 |
| Depreciation on plant and manufacturing equipment | 19 |
| Miscellaneous manufacturing overhead incurred (ordinarily would be detailed as repairs, utilities, etc., with a corresponding credit to various liability accounts) | 9 |
| Manufacturing overhead allocated, 2,100,000 actual machine-hours | ? |
| Cost of goods manufactured | 294 |
| Revenues | 400 |
| Cost of goods sold | 292 |

1. Prepare an overview diagram of Donnell Transport's job-costing system.
2. Prepare journal entries. Number your entries. Explanations for each entry may be omitted. 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.

Required

4-27 Job costing, unit cost, ending work in process. Rafael Company produces pipes for concert-quality organs. Each job is unique. In April 2011, it completed all outstanding orders, and then, in May 2011, it worked on only two jobs, M1 and M2:

| | A | B | C |
|---|---------------------------------|---------------|---------------|
| 1 | Rafael Company, May 2011 | Job M1 | Job M2 |
| 2 | Direct materials | \$ 78,000 | \$ 51,000 |
| 3 | Direct manufacturing labor | 273,000 | 208,000 |

Direct manufacturing labor is paid at the rate of \$26 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.

1. Calculate the total cost for Job M1.
2. 1,100 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?

Required

4-28 Job costing; actual, normal, and variation from normal costing. Chico & 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. Chico & Partners employs 10 professionals to perform audit services.

Budgeted and actual amounts for 2011 are as follows:

| | A | B | C |
|----|--|-----------|----------|
| 1 | Chico & Partners | | |
| 2 | Budget for 2011 | | |
| 3 | Professional labor compensation | \$990,000 | |
| 4 | Audit support department costs | \$774,000 | |
| 5 | Professional labor-hours billed to clients | 18,000 | hours |
| 6 | | | |
| 7 | Actual results for 2011 | | |
| 8 | Audit support department costs | \$735,000 | |
| 9 | Professional labor-hours billed to clients | 17,500 | |
| 10 | Actual professional labor cost rate | \$ 59 | per hour |

1. Compute the direct-cost rate and the indirect-cost rate per professional labor-hour for 2011 under (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.
2. Chico's 2011 audit of Pierre & Co. was budgeted to take 150 hours of professional labor time. The actual professional labor time spent on the audit was 160 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.

Required

4-29 Job costing; actual, normal, and variation from normal costing. Braden Brothers, Inc., is an architecture firm specializing in high-rise buildings. Its job-costing system has a single direct-cost category (architectural labor) and a single indirect-cost pool, which contains all costs of supporting the office. Support costs are allocated to individual jobs using architect labor-hours. Braden Brothers employs 15 architects.

Budgeted and actual amounts for 2010 are as follows:

| Braden Brothers, Inc. | |
|---|----------------|
| Budget for 2010 | |
| Architect labor cost | \$2,880,000 |
| Office support costs | \$1,728,000 |
| Architect labor-hours billed to clients | 32,000 hours |
| Actual results for 2010 | |
| Office support costs | \$1,729,500 |
| Architect labor-hours billed to clients | 34,590 hours |
| Actual architect labor cost rate | \$ 92 per hour |

Required

1. Compute the direct-cost rate and the indirect-cost rate per architectural labor-hour for 2010 under (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.
2. Braden Brother's architectural sketches for Champ Tower in Houston was budgeted to take 275 hours of architectural labor time. The actual architectural labor time spent on the job was 250 hours. Compute the cost of the Champ Tower sketches using (a) actual costing, (b) normal costing, and (c) the variation from normal costing that uses budgeted rates for direct costs.

4-30 Proration of overhead. The Ride-On-Wave Company (ROW) produces a line of non-motorized boats. ROW uses a normal-costing system and allocates manufacturing overhead using direct manufacturing labor cost. The following data are for 2011:

| | |
|--|-----------|
| Budgeted manufacturing overhead cost | \$125,000 |
| Budgeted direct manufacturing labor cost | \$250,000 |
| Actual manufacturing overhead cost | \$117,000 |
| Actual direct manufacturing labor cost | \$228,000 |

Inventory balances on December 31, 2011, were as follows:

| Account | Ending balance | 2011 direct manufacturing labor cost in ending balance |
|--------------------|----------------|--|
| Work in process | \$ 50,700 | \$ 20,520 |
| Finished goods | 245,050 | 59,280 |
| Cost of goods sold | 549,250 | 148,200 |

Required

1. Calculate the manufacturing overhead allocation rate.
2. Compute the amount of under- or overallocated manufacturing overhead.
3. Calculate the ending balances in work in process, finished goods, and cost of goods sold if under-allocated manufacturing overhead is as follows:
 - a. Written off to cost of goods sold
 - b. Prorated based on ending balances (before proration) in each of the three accounts
 - c. Prorated based on the overhead allocated in 2011 in the ending balances (before proration) in each of the three accounts
4. Which method makes the most sense? Justify your answer.



Problems

4-31 Job costing, accounting for manufacturing overhead, budgeted rates. The Fasano Company uses a job-costing system at its Dover, Delaware, plant. The plant has a machining department and a finishing department. Fasano 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 2011 budget for the plant is as follows:

| | Machining Department | Finishing Department |
|----------------------------------|----------------------|----------------------|
| Manufacturing overhead costs | \$10,660,000 | \$7,372,000 |
| Direct manufacturing labor costs | \$ 940,000 | \$3,800,000 |
| Direct manufacturing labor-hours | 36,000 | 145,000 |
| Machine-hours | 205,000 | 32,000 |

1. Prepare an overview diagram of Fasano's job-costing system.
2. What is the budgeted manufacturing 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:

Required

| | Machining Department | Finishing Department |
|----------------------------------|----------------------|----------------------|
| Direct materials used | \$15,500 | \$ 5,000 |
| Direct manufacturing labor costs | \$ 400 | \$1,100 |
| Direct manufacturing labor-hours | 50 | 50 |
| Machine-hours | 130 | 20 |

Compute the total manufacturing overhead cost allocated to Job 431.

4. Assuming that Job 431 consisted of 400 units of product, what is the cost per unit?
5. Amounts at the end of 2011 are as follows:

| | Machining Department | Finishing Department |
|----------------------------------|----------------------|----------------------|
| Manufacturing overhead incurred | \$11,070,000 | \$8,236,000 |
| Direct manufacturing labor costs | \$ 1,000,000 | \$4,400,000 |
| Machine-hours | 210,000 | 31,000 |

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

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

4-32 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 2011 is \$104,000. Each professional is budgeted to have 1,600 billable hours to clients in 2011. 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 2011 is \$2,200,000.

1. Prepare an overview diagram of Keating's job-costing system.
2. Compute the 2011 budgeted direct-cost rate per hour of professional labor.
3. Compute the 2011 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.

Required

4-33 Service industry, job costing, two direct- and two indirect-cost categories, law firm (continuation of 4-32). 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 2011 related to the two direct-cost categories is as follows:

| | Professional Partner Labor | Professional Associate Labor |
|---|----------------------------|------------------------------|
| Number of professionals | 5 | 20 |
| Hours of billable time per professional | 1,600 per year | 1,600 per year |
| Total compensation (average per professional) | \$200,000 | \$80,000 |

Budgeted information for 2011 relating to the two indirect-cost categories is as follows:

| | General Support | Secretarial Support |
|----------------------|--------------------------|---------------------|
| Total costs | \$1,800,000 | \$400,000 |
| Cost-allocation base | Professional labor-hours | Partner labor-hours |

1. Compute the 2011 budgeted direct-cost rates for (a) professional partners and (b) professional associates.
2. Compute the 2011 budgeted indirect-cost rates for (a) general support and (b) secretarial support.

Required

3. Compute the budgeted costs for the Richardson and Punch jobs, given the following information:

| | Richardson, Inc. | Punch, Inc. |
|-------------------------|------------------|-------------|
| Professional partners | 60 hours | 30 hours |
| Professional associates | 40 hours | 120 hours |

4. Comment on the results in requirement 3. Why are the job costs different from those computed in Problem 4-32?

4-34 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 2011:

| | |
|---------------------------------------|---------------|
| Budgeted manufacturing overhead costs | \$4,800,000 |
| Overhead allocation base | Machine-hours |
| Budgeted machine-hours | 80,000 |
| Manufacturing overhead costs 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:

| | Actual Machine-Hours | 2011 End-of-Year Balance |
|-------------------------|----------------------|--------------------------|
| Cost of Goods Sold | 60,000 | \$8,000,000 |
| Finished Goods Control | 11,000 | 1,250,000 |
| Work-in-Process Control | 4,000 | 750,000 |

Required

1. Compute the budgeted manufacturing overhead rate for 2011.
2. Compute the under- or overallocated manufacturing overhead of Zaf Radiator in 2011. Dispose of this amount using the following:
 - a. Write-off to Cost of Goods Sold
 - b. Proration based on ending balances (before proration) in Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold
 - c. Proration based on the overhead allocated in 2011 (before proration) in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold
3. Which method do you prefer in requirement 2? Explain.

4-35 Normal costing, overhead allocation, working backward. Gibson Manufacturing uses normal costing for its job-costing system, which has two direct-cost categories (direct materials and direct manufacturing labor) and one indirect-cost category (manufacturing overhead). The following information is obtained for 2011:

- Total manufacturing costs, \$8,000,000
- Manufacturing overhead allocated, \$3,600,000 (allocated at a rate of 200% of direct manufacturing labor costs)
- Work-in-process inventory on January 1, 2011, \$320,000
- Cost of finished goods manufactured, \$7,920,000

Required

1. Use information in the first two bullet points to calculate (a) direct manufacturing labor costs in 2011 and (b) cost of direct materials used in 2011.
2. Calculate the ending work-in-process inventory on December 31, 2011.

4-36 Proration of overhead with two indirect cost pools. New Rise, Inc., produces porcelain figurines. The production is semi-automated where the figurine is molded almost entirely by operator-less machines and then individually hand-painted. The overhead in the molding department is allocated based on machine-hours and the overhead in the painting department is allocated based on direct manufacturing labor-hours. New Rise, Inc., uses a normal-costing system and reported actual overhead for the month of May of \$17,248 and \$31,485 for the molding and painting departments, respectively. The company reported the following information related to its inventory accounts and cost of goods sold for the month of May:

| | Work in Process | Finished Goods | Cost of Goods Sold |
|--|-----------------|----------------|--------------------|
| Balance before proration | \$27,720 | \$15,523.20 | \$115,156.80 |
| Molding Department Overhead Allocated | \$ 4,602 | \$ 957.00 | \$ 12,489.00 |
| Painting Department Overhead Allocated | \$ 2,306 | \$ 1,897.00 | \$ 24,982.00 |

1. Calculate the over- or underallocated overhead for each of the Molding and Painting departments for May. **Required**
2. Calculate the ending balances in work in process, finished goods, and cost of goods sold if the under- or overallocated overhead amounts in *each* department are as follows:
 - a. Written off to cost of goods sold
 - b. Prorated based on the ending balance (before proration) in each of the three accounts
 - c. Prorated based on the overhead allocated in May (before proration) in the ending balances in each of the three accounts
3. Which method would you choose? Explain.

4-37 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 2011 are as follows:

| Direct Materials Control | | Work-in-Process Control | | Finished Goods Control | | | |
|---------------------------------------|---------|---|-------------|---------------------------|----------|---------|---------|
| 1-1-2011 | 30,000 | 380,000 | 1-1-2011 | 20,000 | 1-1-2011 | 10,000 | 900,000 |
| | 400,000 | | Dir. manuf. | | | 940,000 | |
| | | | labor | 360,000 | | | |
| | | | | | | | |
| Manufacturing Overhead Control | | Manufacturing Overhead Allocated | | Cost of Goods Sold | | | |
| 540,000 | | | | | | | |

Additional information follows:

- 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.
1. What was the amount of direct materials issued to production during 2011? **Required**
 2. What was the amount of manufacturing overhead allocated to jobs during 2011?
 3. What was the total cost of jobs completed during 2011?
 4. What was the balance of work-in-process inventory on December 31, 2011?
 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 2011?
 7. Dispose of the under- or overallocated manufacturing overhead using the following:
 - a. Write-off to Cost of Goods Sold
 - b. Proration based on ending balances (before proration) in Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold
 8. Using each of the approaches in requirement 7, calculate Needham's operating income for 2011.
 9. Which approach in requirement 7 do you recommend Needham use? Explain your answer briefly.

4-38 Overview of general ledger relationships. Brady Company uses normal costing in its job-costing system. The company produces custom bikes for toddlers. The beginning balances (December 1) and ending balances (as of December 30) in their inventory accounts are as follows:

| | Beginning Balance 12/1 | Ending Balance 12/30 |
|---|------------------------|----------------------|
| Materials Control | \$1,200 | \$ 7,600 |
| Work-in-Process Control | 5,800 | 8,100 |
| Manufacturing Department Overhead Control | — | 94,070 |
| Finished Goods Control | 3,500 | 18,500 |

Additional information follows:

- a. Direct materials purchased during December were \$65,400.
- b. Cost of goods manufactured for December was \$225,000.
- c. No direct materials were returned to suppliers.
- d. No units were started or completed on December 31.
- e. The manufacturing labor costs for the December 31 working day: direct manufacturing labor, \$3,850, and indirect manufacturing labor, \$950.
- f. Manufacturing overhead has been allocated at 120% of direct manufacturing labor costs through December 30.

Required

1. Prepare journal entries for the December 31 payroll.
2. Use T-accounts to compute the following:
 - a. The total amount of materials requisitioned into work in process during December
 - b. The total amount of direct manufacturing labor recorded in work in process during December (Hint: You have to solve requirements **2b** and **2c** simultaneously)
 - c. The total amount of manufacturing overhead recorded in work in process during December
 - d. Ending balance in work in process, December 31
 - e. Cost of goods sold for December before adjustments for under- or overallocated manufacturing overhead
3. Prepare closing journal entries related to manufacturing overhead. Assume that all under- or overallocated manufacturing overhead is closed directly to Cost of Goods Sold.

4-39 Allocation and proration of overhead. Tamden, Inc., prints custom marketing materials. The business was started January 1, 2010. The company uses a normal-costing system. It has two direct cost pools, materials and labor and one indirect cost pool, overhead. Overhead is charged to printing jobs on the basis of direct labor cost. The following information is available for 2010.

| | |
|-------------------------------|-----------|
| Budgeted direct labor costs | \$150,000 |
| Budgeted overhead costs | \$180,000 |
| Costs of actual material used | \$126,500 |
| Actual direct labor costs | \$148,750 |
| Actual overhead costs | \$176,000 |

There were two jobs in process on December 31, 2010: Job 11 and Job 12. Costs added to each job as of December 31 are as follows:

| | Direct materials | Direct labor |
|--------|------------------|--------------|
| Job 11 | \$3,620 | \$4,500 |
| Job 12 | \$6,830 | \$7,250 |

Tamden, Inc., has no finished goods inventories because all printing jobs are transferred to cost of goods sold when completed.

Required

1. Compute the overhead allocation rate.
2. Calculate the balance in ending work in process and cost of goods sold before any adjustments for under- or overallocated overhead.
3. Calculate under- or overallocated overhead.
4. Calculate the ending balances in work in process and cost of goods sold if the under- or overallocated overhead amount is as follows:
 - a. Written off to cost of goods sold
 - b. Prorated using the ending balance (before proration) in cost of goods sold and work-in-process control accounts
5. Which of the methods in requirement 4 would you choose? Explain.

4-40 Job costing, contracting, ethics. Kingston Company manufactures modular homes. The company has two main products that it sells commercially: a 1,000 square foot, one-bedroom model and a 1,500 square foot, two-bedroom model. The company recently began providing emergency housing (huts) to FEMA. The emergency housing is similar to the 1,000 square foot model.

FEMA has requested Kingston to create a bid for 150 emergency huts to be sent for flood victims in the south. Your boss has asked that you prepare this bid. In preparing the bid, you find a recent invoice to FEMA for 200 huts provided after hurricane Katrina. You also have a standard cost sheet for the 1,000 square foot model sold commercially. Both are provided as follows:

Standard cost sheet: 1,000 sq. ft. one-bedroom model

| | | |
|-----------------------------|-----------------------------|-----------------|
| Direct materials | | \$ 8,000 |
| Direct manufacturing labor | 30 hours | 600 |
| Manufacturing overhead* | \$3 per direct labor dollar | 1,800 |
| Total cost | | <u>\$10,400</u> |
| Retail markup on total cost | | 20% |
| Retail price | | <u>\$12,480</u> |

*Overhead cost pool includes inspection labor (\$15 per hour), setup labor (\$12 per hour), and other indirect costs associated with production.

INVOICE:
DATE: September 15, 2005
BILL TO: FEMA
FOR: 200 Emergency Huts
SHIP TO: New Orleans, Louisiana

| | |
|--|--------------------|
| Direct materials | \$1,840,000 |
| Direct manufacturing labor** | 138,400 |
| Manufacturing overhead | 415,200 |
| Total cost | <u>2,393,600</u> |
| Government contract markup on total cost | 15% |
| Total due | <u>\$2,752,640</u> |

**Direct manufacturing labor includes 28 production hours per unit, 4 inspection hours per unit, and 6 setup hours per unit

1. Calculate the total bid if you base your calculations on the standard cost sheet assuming a cost plus 15% government contract.
2. Calculate the total bid if you base your calculations on the September 15, 2005, invoice assuming a cost plus 15% government contract.
3. What are the main discrepancies between the bids you calculated in #1 and #2?
4. What bid should you present to your boss? What principles from the IMA *Standards of Ethical Conduct for Practitioners of Management Accounting and Financial Management* should guide your decision?

Required

Collaborative Learning Problem

4-41 Job costing—service industry. Cam Cody schedules book signings for science fiction authors and creates e-books and books on CD to sell at each signing. Cody uses a normal-costing system with two direct cost pools, labor and materials, and one indirect cost pool, general overhead. General overhead is allocated to each signing based on 80% of labor cost. Actual overhead equaled allocated overhead in March 2010. Actual overhead in April was \$1,980. All costs incurred during the planning stage for a signing and during the signing are gathered in a balance sheet account called "Signings in Progress (SIP)." When a signing is completed, the costs are transferred to an income statement account called "Cost of Completed Signings (CCS)." Following is cost information for April 2010:

| Author | From Beginning SIP | | Incurred in April | |
|--------------------|--------------------|-------|-------------------|-------|
| | Materials | Labor | Materials | Labor |
| <i>N. Asher</i> | \$425 | \$750 | \$ 90 | \$225 |
| <i>T. Bucknell</i> | 710 | 575 | 150 | 75 |
| <i>S. Brown</i> | 200 | 550 | 320 | 450 |
| <i>S. King</i> | — | — | 650 | 400 |
| <i>D. Sherman</i> | — | — | 150 | 200 |

The following information relates to April 2010.

As of April 1, there were three signings in progress, *N. Asher*, *T. Bucknell*, and *S. Brown*. Signings for *S. King* and *D. Sherman* were started during April. The signings for *T. Bucknell* and *S. King* were completed during April.

1. Calculate SIP at the end of April.
2. Calculate CCS for April.
3. Calculate under/overallocated overhead at the end of April.
4. Calculate the ending balances in SIP and CCS if the under/overallocated overhead amount is as follows:
 - a. Written off to CCS
 - b. Prorated based on the ending balances (before proration) in SIP and CCS
 - c. Prorated based on the overhead allocated in April in the ending balances of SIP and CCS (before proration)
5. Which of the methods in requirement 4 would you choose?

Required