

What Does It Cost to Do the Job?

Each summer, about 7,500 forest fires burn an average of 250,000 square kilometres of Canadian wilderness. A ferocious force of nature, wildfires cost Canadian taxpayers approximately \$417 million per year to suppress. Fires cause evacuations of entire cities, destroy property, create economic hardship, and kill wildlife and people. In May 2011, almost half of Slave Lake in northern Alberta was destroyed by wildfire. But forest fires also renew the forests. In their aftermath, the minerals in the soil are revitalized and the sun penetrates to the forest floor.

The cost to suppress a forest fire depends on how accessible the fire is. Unfortunately, the most inaccessible wildfires are the most destructive and expensive to suppress. These fires are fought primarily using aircraft and fire retardant chemicals. The firefighters are delivered to the site by parachuting in (smoke jumpers) or rappelling in by rope from helicopters. On average, the cost to suppress a Canadian wildfire is approximately \$60,000 per fire. Provincial governments use careful job-costing procedures to refine and improve their cost estimates for fire suppression. Governments need a reliable job-costing system so they can account to the taxpayers when asked how money was spent.

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► Learning Objectives

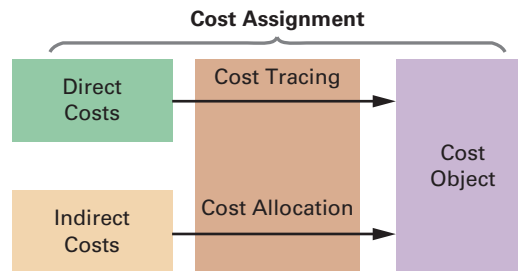
1. Describe the building-block concepts of costing systems.
2. Distinguish job costing from process costing.
3. Describe the approaches to evaluating and implementing job-costing systems.
4. Distinguish between actual, budgeted, and normal costing.
5. Analyze the flow of costs from direct and indirect cost pools to inventory accounts, including adjustments for over- and under-allocated costs.

Building Blocks of Costing Systems

► LO 1

Describe the building-block concepts of costing systems.

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* 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:

1. *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.
2. *Cost-allocation base*. A cost-allocation base (e.g., number of machine-hours, or number of labour-hours) is a systematic way to link an indirect cost or group of indirect costs to cost objects. For example, if the indirect cost 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 are the cost allocation base.

If a product uses 800 machine-hours, it will be allocated \$40,000 ($= \50 per machine-hour \times 800 machine-hours). When the cost object is a job, product, or customer, the cost-allocation base is also called a cost-application base.

These concepts represent the building blocks that we will use to design the costing systems described in this chapter.

Job-Costing and Process-Costing Systems

► LO 2

Distinguish job costing from process costing.

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 Samsung, a repair job done at an Audi service centre, or an advertising campaign produced by Saatchi & Saatchi. Each special machine made by Samsung is unique and distinct. An advertising campaign for one client at Saatchi & Saatchi is unique and distinct from advertising campaigns for other clients.
2. *Process-costing system*. In this system, the cost object is masses of identical or similar units of a product or service. For example, Scotiabank provides the same service to all its customers when processing customer deposits. 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.

	Service Sector	Merchandising Sector	Manufacturing Sector
Job Costing Used	<ul style="list-style-type: none"> • Audit engagements done by PricewaterhouseCoopers • Consulting engagements done by McKinsey & Co. • Advertising-agency campaigns run by DDB Canada • Individual legal cases argued by Borden Ladner Gervais LLP • Computer-repair jobs done by Future Shop • Movies featuring members of ACTRA (the Alliance of Canadian Cinema, Television and Radio Artists) 	<ul style="list-style-type: none"> • Mountain Equipment Co-op sending individual items by mail order • Special promotion of new products by Chapters Indigo 	<ul style="list-style-type: none"> • Assembly of individual aircraft at Bombardier • Construction of automotive components at Linamar Corporation
Process Costing Used	<ul style="list-style-type: none"> • Bank cheque clearing at TD Canada Trust • Postal delivery (standard items) by Canada Post 	<ul style="list-style-type: none"> • Grain dealing by the Canada Malting Co. Limited • Lumber dealing by Weyerhaeuser 	<ul style="list-style-type: none"> • Oil refining by Irving Oil • Beverage production by Molson Inc.

Exhibit 4-1 Examples of Job Costing and Process Costing in the Service, Merchandising, and Manufacturing Sectors

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

Job Costing: Evaluation and Implementation

Job costing is used at the Robinson Company, a company that manufactures and installs specialized machinery for the paper-making industry. In early 2015, 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 has 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? 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 labour, 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? How accurate are the cost estimates, and what is the likelihood of cost overruns?
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.
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

► LO 3

Describe the approaches to evaluating and implementing job-costing systems.

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. 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 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 multiplied by the actual quantities of the direct-cost inputs. It allocates indirect costs based on the actual indirect-cost rates multiplied by 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, an actual costing system calculates the actual costs of a job. Yet, actual costing systems are not commonly found in practice because actual costs cannot be computed in a timely manner.

Actual, Budgeted, and Normal Costing

Normal Costing

► LO 4

Distinguish between actual, budgeted, and 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. The **budgeted indirect-cost rate** for each cost pool is computed as follows:

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

Normal costing is a costing system that (1) traces direct costs to a cost object by using the actual direct-cost rates multiplied by the actual quantities of the direct-cost inputs, and (2) allocates indirect costs based on the budgeted indirect-cost rates multiplied by the actual quantities of the cost-allocation bases.

We illustrate normal costing for the Robinson Company example using the following steps to assign costs to an individual job.

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 2015. Robinson's managers and management accountants gather information to cost jobs through source documents. A **source document** is an original record (such as an invoice) 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.

Step 2: Identify the direct costs of the job. Robinson identifies two direct-manufacturing cost categories: direct materials and direct manufacturing labour.

Direct materials: On the basis of the engineering specifications and drawings provided by WPP, a manufacturing engineer orders materials from the storeroom. The order

Exhibit 4-2 Job-Cost Record for the Paper-Making Machine

	A	B	C	D	E	
1	JOB-COST RECORD					
2	JOB NO:	WPP 298		CUSTOMER:	Western Pulp and Paper	
3	Date Started:	Feb. 7, 2015		Date Completed	Feb. 28, 2015	
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, 2015	2011: 198	MB 468-A	8	\$14	\$112
10	Feb. 7, 2015	2011: 199	TB 267-F	12	63	756
11						•
12						•
13	Total					<u>4,606</u>
14						
15	DIRECT MANUFACTURING LABOUR					
16	<u>Period</u>	<u>Labour 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, 2015	LT 232	551-87-3076	25	\$18	\$ 450
19	Feb. 7-13, 2015	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, 2015	Manufacturing	Direct Manufacturing	88 hours	\$40	\$ 3,520
28			Labour-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						

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.

Direct manufacturing labour: The accounting for direct manufacturing labour is similar to the accounting described for direct materials. The source document for direct manufacturing labour is a **labour-time sheet**, which contains information about the amount of labour time used for a specific job in a specific department.

Exhibit 4-3, Panel B, shows a typical weekly labour-time sheet for a particular employee (G. L. Cook). Each day, Cook records the time spent on individual jobs (in this

Note

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 appears on the job-cost record in Exhibit 4-2. If we add the cost of all materials requisitions, the total actual direct materials cost is \$4,606, which is shown in the direct materials panel of the job-cost record in Exhibit 4-2.

Exhibit 4-3 Robinson Company Source Documents

MATERIALS-REQUISITION RECORD				
Materials-Requisition Record No.		2015: 198		
Job No.	WPP 298	Date:	FEB. 7, 2015	
Part	Part	Unit	Total	
No.	Description	Quantity	Cost	Cost
MB 468-A	Metal Brackets	8	\$14	\$112
Issued By: B. Clyde		Date:	Feb. 7, 2015	
Received By: L. Daley		Date:	Feb. 7, 2015	

LABOUR-TIME SHEET								
Labour-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, 2015			Week End: Feb. 13, 2015			
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, 2015						

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 × \$18 per hour). Similarly, the job-cost record for Job JL 256 will carry a cost of \$216 (= 12 hours × \$18 per hour).

All costs other than direct materials and direct manufacturing labour 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. 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 labour-hours. Robinson, however, chooses direct manufacturing labour-hours as the sole allocation base for linking all indirect manufacturing costs to jobs.

In 2015, Robinson budgets 28,000 direct manufacturing labour-hours for the WPP job.

Step 4: Identify the indirect costs associated with each cost-allocation base. Because Robinson believes that a single cost-allocation base—direct manufacturing labour-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 2015, budgeted manufacturing overhead costs total \$1,120,000.

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:

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

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).

Manufacturing overhead costs allocated to WPP 298 equal \$3,520 (= \$40 per direct manufacturing labour-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 labour	<u>1,579</u>	\$ 6,185
Manufacturing overhead costs		
(\$40 per direct manufacturing labour-hour × 88 hours)		<u>3,520</u>
Total manufacturing costs of job WPP 298		<u>\$ 9,705</u>

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 why some jobs show low profitability. Have direct materials been wasted? Was direct manufacturing labour too high? 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.

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

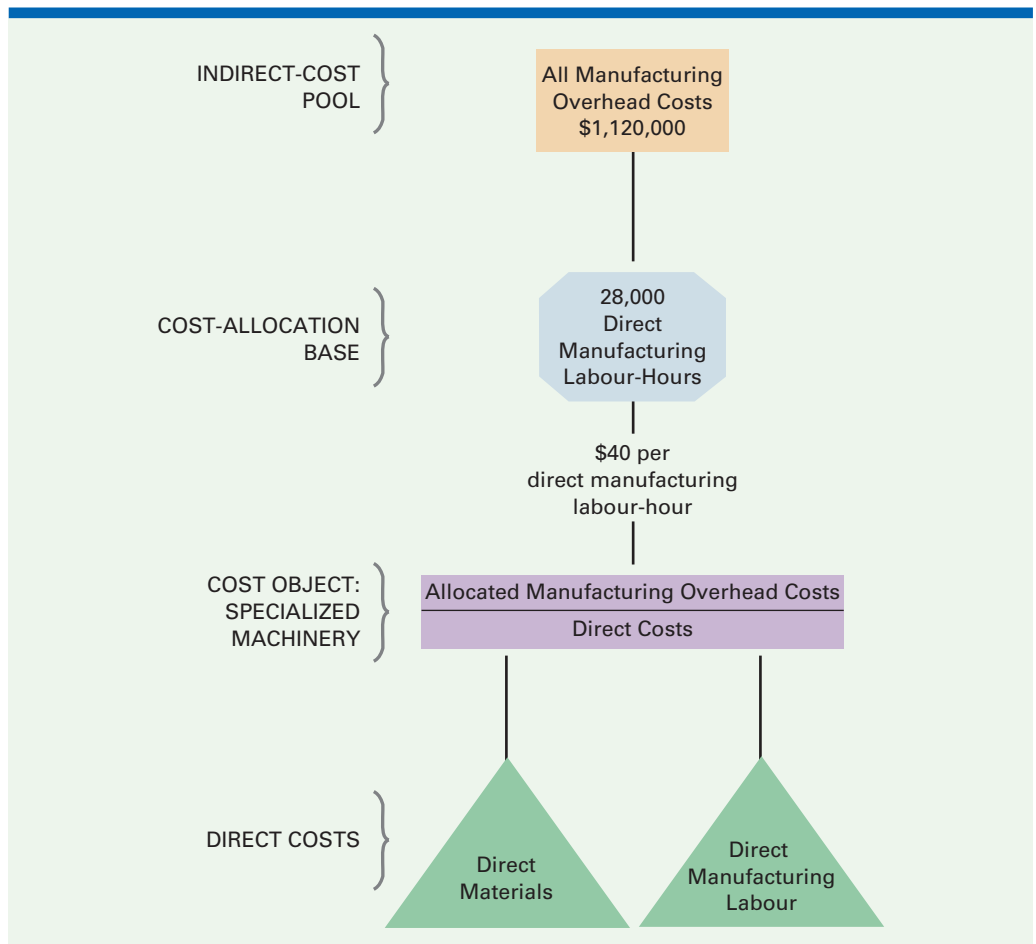


Exhibit 4-4 Robinson Company Job-Costing System Overview

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. (The symbols in Exhibit 4-4 are used consistently in the costing-system overviews presented in this book. A triangle always identifies a direct cost, a rectangle represents the indirect-cost pool, and an octagon describes the cost-allocation base.)

Additional Points to Consider When Calculating Job-Cost Allocation Rates

Information technology simplifies the tracing of costs to jobs. If direct manufacturing labour-hours is used as the cost allocation base, very refined systems can trace direct manufacturing labour in minutes or longer intervals to each job. Employees simply scan their identification card and select the job identification code when they begin and again when they end their task. The computer then reports not only the DMLH spent, but also the indirect costs of fringe benefits and rework for each job. For fixed cost allocation, when the cost object is a job it is sensible to collect the fixed costs incurred during the entire time period of the job. There are two reasons for using longer periods, such as a year, to calculate indirect cost rates:

- ◆ **Seasonal patterns.** The shorter the period is, the greater is the influence of seasonal patterns on the amount of costs. For example, if indirect cost rates were calculated each month, then heating costs would be charged to production only during the winter months. An annual period incorporates the effects of all four seasons into one annual indirect cost rate.
- ◆ **Unitized fixed costs.** Longer periods to produce jobs mean that the unitized fixed cost portion of the machine and other fixed cost pools will be spread out more evenly. Even if output varies from month to month for a single job, the point is to cost the job, not the time period.

Concepts in Action

Job Costing on the Next-Generation Military Fighter Plane

U.S. Air Force photo by Senior Airman Julius Delos Reyes



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

A project team of Northrop Grumman, Lockheed Martin, and BAE Systems was awarded the System Design and Demonstration contract to build the F-35 Lightning II aircraft—also known as the Joint Strike Fighter—in late 2001. This project, worth over \$200 billion, will create

a family of supersonic, multi-role fighter airplanes designed for the militaries of the United States, United Kingdom, Italy, The Netherlands, Turkey, Canada, Australia, Denmark, and Norway. In December 2006, the F-35 Lightning II successfully completed its first test flight; it appears in this photograph during subsequent testing at Edwards Air Force Base, California, in 2009.

The project team for the F-35 Lightning II uses a job-costing system. There are two direct cost pools, material and manufacturing labour. The remaining costs are accumulated in one overhead cost pool. The cost allocation base is the total budgeted direct materials cost. This job-costing system allows managers to assign costs to processes and projects. Managers use this system to actively manage costs. Program representatives from the Department of Defense and members of Congress have access to clear, concise, and transparent costing data when they complete their audits.

Sources: Conversations with Northrop Grumman, Inc. management, www.jsf.mil, and various program announcements and press releases.

For example, an audit firm has a highly seasonal workload. Tax advice accounts for more than 80% of the workload from January through April. Given the following mix of costs for a high-output month such as April and a low-output month such as July, actual indirect cost allocation rates fluctuate by almost 300%. If the low cost allocation rate were charged in April, then clients would be very pleased. If the high cost allocation rate were charged in July, then clients would leave. If costs are allocated and charged at the time they are incurred, then July clients are not paying a fair share of fixed resources for an identical job in April. July clients are penalized for the time of year the resources are consumed. Ultimately the firm could not cover its total annual fixed indirect costs.

	Indirect Costs			Professional Labour-Hours (4)	Allocation Rate per Professional Labour-Hour (5) = (3) ÷ (4)
	Variable (1)	Fixed (2)	Total (3)		
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

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 labour for a job as the work is being done. The only difference between 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.

	Actual
Total manufacturing overhead costs	\$1,215,000
Total direct manufacturing labour-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 labour costs of \$1,579.

Recall from Step 3 that Robinson uses a single cost-allocation base, direct manufacturing labour-hours, to allocate all manufacturing overhead costs to jobs. The actual quantity of direct manufacturing labour-hours for 2015 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 2015 for its single manufacturing overhead cost pool as follows:

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

In Step 6, under an actual-costing system,

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

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

A Normal Job-Costing System and Cost Flow

► LO 5

Analyze the flow of costs from direct and indirect cost pools to inventory accounts, including adjustments for over- and underallocated costs.

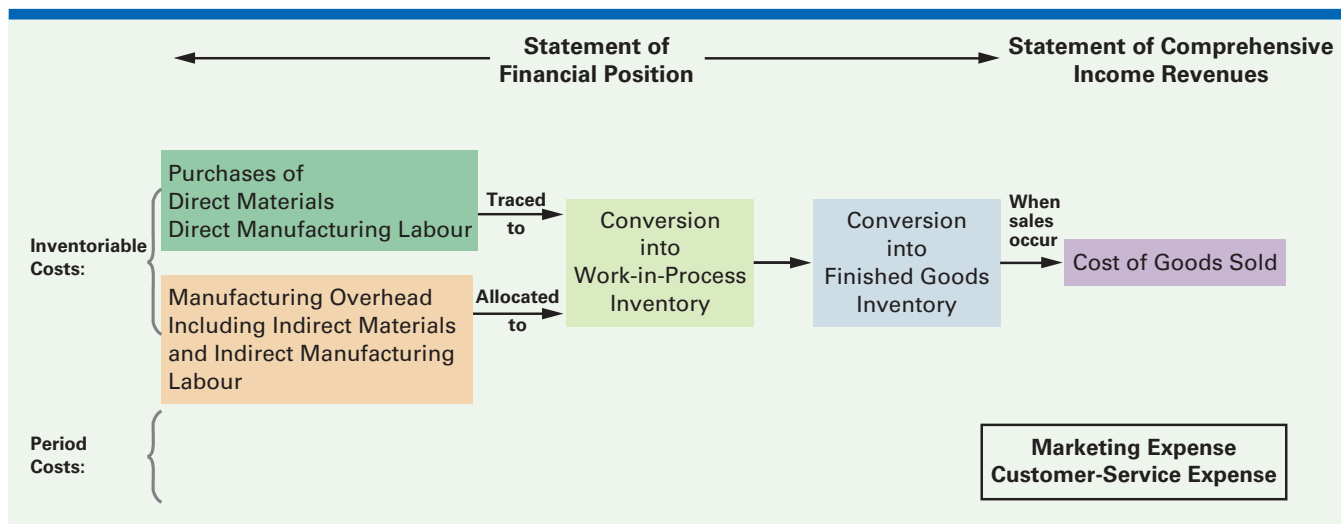
We now explain cost flow for a company with a normal job-costing system, Robinson Company. The following illustration considers events that occurred in February 2015. Exhibit 4-5 illustrates a broad framework for understanding the flow of costs and inventory valuation in job costing.

The upper part of Exhibit 4-5 shows the inventoriable costs from the purchase of materials and other manufacturing inputs, which flow during conversion into work-in-process and finished goods inventory. The sale of the product triggers the transfer of these costs from Cost of Goods Manufactured (COGM) to the Cost of Goods Sold (COGS) account.

Direct materials used and direct manufacturing labour can be easily traced to WPP through the electronic source documents. These costs do not disappear even if they are paid. Rather, these costs are transferred to work-in-process inventory on the statement of financial position. These direct costs are expended to transform or convert raw materials into finished goods inventory. As the goods are converted, value is added, which is why the work-in-process is a current asset.

Robinson also incurs MOH (including indirect materials and indirect manufacturing labour). These indirect support costs cannot be readily traced to WPP because the inputs are common and used in different amounts by all of Robinson’s jobs. First MOH is accumulated in an MOH ledger account and then allocated and assigned to individual jobs. Once assigned to a job, MOH is transferred to the Work-in-Process Inventory account.

Exhibit 4-5 Flow of Costs in Job Costing



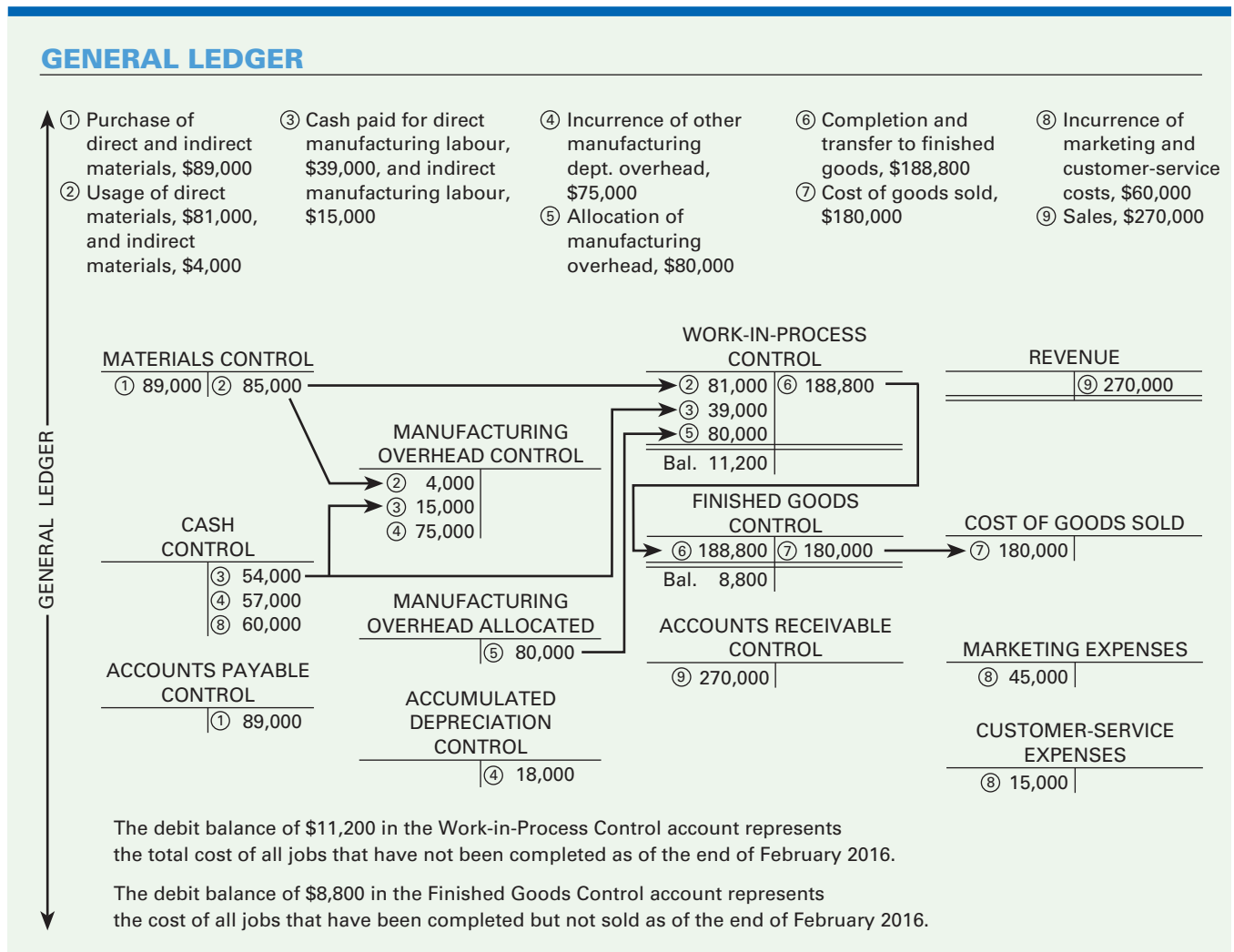
Once complete, all assigned WPP costs are transferred to the Finished Goods Inventory account on the statement of financial position. Only when finished goods are sold is an expense, cost of goods sold, recognized in the statement of comprehensive income and matched against revenue earned from sales.

General Ledger

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 4-6 shows T-accounts for Robinson Company’s general ledger. The general ledger gives a “bird’s-eye view” of the costing system. The amounts shown in Exhibit 4-6 are based on the transactions and journal entries that follow. As you go through each journal entry, use Exhibit 4-6 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.

Exhibit 4-6 Normal Job Costing for WPP: Diagram of General Ledger Relationships for February 2016



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 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 2015 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 labour, \$39,000, and indirect labour, \$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, plant utilities, repairs, insurance, and plant depreciation. The non-cash item, plant depreciation, was \$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 distinct types of jobs based on the budgeted rate multiplied by the actual quantity of the allocation base used.

In transaction 4, actual overhead costs incurred throughout the month are added (debited) to the Manufacturing Overhead Control account. Manufacturing overhead costs are added (debited) to Work-in-Process Control *only when* manufacturing overhead costs are allocated in transaction 5. The amount allocated will differ from the actual overhead costs.

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 4-7 and 4-8 present subsidiary ledgers that contain the underlying details of production, such as each type of materials in inventory and costs accumulated in individual jobs. The sum of all entries in 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). Source documents supporting the receipt and issue of materials are scanned into a computer. Software programs then automatically update the Materials Records and make all the necessary accounting entries in the subsidiary and general ledgers.

Exhibit 4-7 Subsidiary Ledger for Materials, Labour, and Manufacturing Department Overhead 2015

PANEL A: Materials Records by Type of Materials	PANEL B: Labour Records by Employee	PANEL C: Manufacturing Department Overhead Records by Month																																																																																	
<p style="text-align: center; margin: 0;">Metal Brackets Part No. MB 468-A</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 0;"> <thead> <tr> <th style="text-align: left;">Received</th> <th colspan="2" style="text-align: left;">Issued</th> <th style="text-align: left;">Balance</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">①</td> <td style="text-align: center;">Req. Date No.</td> <td style="text-align: center;">Qty.</td> <td style="text-align: center;">Rate Amt.</td> </tr> <tr> <td style="text-align: center;">↑</td> <td style="text-align: center;">2-7 2015: 8</td> <td style="text-align: center;">198</td> <td style="text-align: center;">\$14 \$112</td> </tr> <tr> <td></td> <td style="text-align: center;">②</td> <td></td> <td></td> </tr> </tbody> </table> <p style="margin-top: 10px;">Copies of invoices or receiving reports</p> <p style="margin-top: 10px;">Copies of materials-requisition records</p>	Received	Issued		Balance	①	Req. Date No.	Qty.	Rate Amt.	↑	2-7 2015: 8	198	\$14 \$112		②			<p style="text-align: center; margin: 0;">G. L. Cook Empl. No. 551-87-3076</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 0;"> <thead> <tr> <th style="text-align: left;">Week</th> <th style="text-align: left;">Job No.</th> <th style="text-align: left;">Hours Worked</th> <th style="text-align: left;">Rate</th> <th style="text-align: left;">Amt.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">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: center;">\$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: center;">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: center;">54</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center; border-top: 1px solid black;">\$720</td> </tr> <tr> <td style="text-align: center;">2-17</td> <td></td> <td style="text-align: center;">③</td> <td></td> <td></td> </tr> </tbody> </table> <p style="margin-top: 10px;">Copies of labour-time record</p>	Week	Job No.	Hours Worked	Rate	Amt.	2-13	WPP					298	25	\$18	\$450		JL 256	12	18	216		Mntnce.	3	18	54					\$720	2-17		③			<p style="text-align: center; margin: 0;">February 2015</p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 0;"> <thead> <tr> <th style="text-align: left;">Indir. Matr. Issued</th> <th style="text-align: left;">Indir. Manuf. Labour</th> <th style="text-align: left;">Supervn. & Eng.</th> <th style="text-align: left;">Plant Ins. & Utilities</th> <th style="text-align: left;">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 style="text-align: center;">↑</td> <td style="text-align: center;">↑</td> <td style="text-align: center;">↑</td> <td style="text-align: center;">↑</td> <td style="text-align: center;">↑</td> </tr> <tr> <td></td> <td style="text-align: center;">Manuf. labour-time record or payroll analysis</td> <td></td> <td style="text-align: center;">Payroll analysis, invoices, special authorizations</td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center; border-top: 1px solid black;"><u>\$4,000</u></td> <td style="text-align: center; border-top: 1px solid black;"><u>\$15,000</u></td> <td style="text-align: center; border-top: 1px solid black;"><u>\$44,000</u></td> <td style="text-align: center; border-top: 1px solid black;"><u>\$13,000</u></td> <td style="text-align: center; border-top: 1px solid black;"><u>\$18,000</u></td> </tr> </tbody> </table> <p style="margin-top: 10px;">Copies of materials requisitions</p>	Indir. Matr. Issued	Indir. Manuf. Labour	Supervn. & Eng.	Plant Ins. & Utilities	Plant Deprn.	②	③	④	④	④	↑	↑	↑	↑	↑		Manuf. labour-time record or payroll analysis		Payroll analysis, invoices, special authorizations							<u>\$4,000</u>	<u>\$15,000</u>	<u>\$44,000</u>	<u>\$13,000</u>	<u>\$18,000</u>
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<p style="margin: 0;">Total cost of all types of materials received in February, \$89,000</p> <p style="margin: 0;">Total cost of all types of materials issued in February, \$81,000</p>	<p style="margin: 0;">Total cost of all direct and indirect manufacturing labour incurred in February, \$54,000 (= \$39,000 + \$15,000)</p>	<p style="margin: 0;">Other manufacturing overhead costs incurred in February, \$75,000</p>																																																																																	
<p style="margin: 0;">Note: The 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 4-6.</p>																																																																																			

subsidiary ledger for employee labour records shows the different jobs that G. L. Cook worked on and the \$720 of wages owed to G. L. Cook for the week ending February 13. The sum of total wages owed to all employees for February 2015 is \$54,000. The job-cost record for WPP shows direct manufacturing labour costs of \$450 for the time G. L. Cook spent on the WPP machine job (Exhibit 4-8, Panel A). Total direct manufacturing labour costs recorded in all job-cost records (the subsidiary ledger for Work-in-Process Control) for February 2015 is \$39,000.

G. L. Cook's employee record shows \$54 for maintenance, which is an indirect manufacturing labour cost. The total indirect manufacturing labour costs of \$15,000 for February 2015 appear in the Manufacturing Department overhead records in the subsidiary ledger (Exhibit 4-7, Panel C). These costs, by definition, are not traced to an individual job. Instead, they are allocated to individual jobs as a part of manufacturing overhead.

Manufacturing Department Overhead Records by Month

The Manufacturing Department overhead records (Exhibit 4-7, 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 labour, 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.

Work-in-Process Inventory Records by Jobs

The job-cost record for each individual job in the subsidiary ledger will be debited by the cost of direct materials and direct manufacturing labour used by individual jobs. The job-cost record for each individual job in the subsidiary ledger will also be debited for manufacturing overhead allocated for the actual direct manufacturing labour-hours used in that job. For example, the job-cost record for Job WPP (Exhibit 4-8, Panel A) shows Manufacturing Overhead Allocated of \$3,520 (budgeted rate of \$40 per labour-hour \times 88 actual direct manufacturing labour-hours used). We assume 2,000 actual direct manufacturing labour-hours were used for all jobs in February 2015, resulting in a total manufacturing overhead allocation of \$40 per labour-hour \times 2,000 direct manufacturing labour-hours = \$80,000.

Finished Goods Inventory Records by Jobs

Exhibit 4-8, Panel A, shows that Job WPP was completed at a cost of \$9,705. Job WPP also simultaneously appears in the finished goods records of the subsidiary ledger. Given Robinson's use of normal costing, cost of goods completed consists of actual direct materials, actual direct manufacturing labour, and manufacturing overhead allocated to each job based on the budgeted manufacturing overhead rate multiplied by the actual direct manufacturing labour-hours. Exhibit 4-8, Panel B, indicates that Job WPP was sold and delivered to the customer on February 28, 2015.

Other Subsidiary Records

Robinson maintains employee labour 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 2015 amounts due from each customer, including the \$15,000 due from the sale of Job WPP.

Non-Manufacturing Costs and Job Costing

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. 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.

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

Using budgeted indirect cost rates and normal costing instead of actual costing has the advantage that indirect costs can be assigned to individual jobs on an ongoing and timely basis, rather than only at the end of the fiscal year when actual costs are known. However, budgeted rates are unlikely to equal actual rates because they are based on estimates made up to 12 months before actual costs are incurred. We now consider adjustments that are needed when, at the end of the fiscal year, indirect costs allocated differ from actual indirect costs incurred.

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

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

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

1. Manufacturing Overhead Control, the record of the actual costs in all the individual overhead categories (such as indirect materials, indirect manufacturing labour, 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 labour-hours.

Assume the following annual data for the Robinson Company:

Manufacturing Overhead Control		Manufacturing Overhead Allocated	
Bal. Dec. 31, 2015	1,215,000	Bal. Dec. 31, 2015	1,080,000

The \$1,080,000 credit balance in Manufacturing Overhead Allocated results from multiplying the 27,000 actual direct manufacturing labour-hours worked on all jobs in 2015 by the budgeted rate of \$40 per direct manufacturing labour-hour.

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

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

There are three main approaches to account for the \$135,000 underallocated manufacturing overhead amount: (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. Consider the Robinson example. The actual manufacturing overhead (\$1,215,000) exceeds the manufacturing overhead allocated (\$1,080,000) by 12.5% [(= \$1,215,000 – \$1,080,000) ÷ \$1,080,000]. At year-end, Robinson could increase the manufacturing overhead allocated to each job in 2015 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. Under normal costing, the manufacturing overhead allocated to the job is \$3,520 (the budgeted rate of \$40 per direct manufacturing labour-hour × 88 hours). Increasing the manufacturing overhead allocated by 12.5%, or \$440 (= \$3,520 × 0.125), means the adjusted amount of manufacturing overhead allocated to Job WPP equals \$3,960 (= \$3,520 + \$440). Note that, using actual costing, manufacturing overhead allocated to this job is also \$3,960 (the actual rate of \$45 per direct manufacturing labour-hour × 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 2015:

	A	B	C
			Allocated Manufacturing Overhead Included in Each Account Balance (Before Proration)
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>

Robinson prorates the underallocated amount of \$135,000 at the end of 2015. 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	<u>2,375,000</u>	<u>1,032,480</u>	<u>95.6</u>	0.956 x 135,000 =	<u>129,060</u>	<u>2,504,060</u>
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 2015 exceeds the manufacturing overhead allocated (\$1,080,000) in 2015 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:

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 2015 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 2015 ending balances in the general ledger as the adjusted allocation-rate approach.

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:

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

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 insignificant

relative to total operating income or some other measure of materiality, then a write-off yields a good approximation to the more complex approaches. Managers must be guided by cost/benefit. Companies have become more stringent in inventory control and work to minimize inventory quantities. As a result, cost of goods sold tends to be higher in relation to the dollar amount of work-in-process and finished goods inventories. Also, the inventory balances of job-costing companies are usually small because goods are often made in response to customer orders. Consequently, writing off, instead of prorating, under- or overallocated overhead will usually not cause a material misstatement in the financial statements.

Regardless of which of the three approaches is used, the underallocated overhead is not carried in the overhead accounts beyond the end of the fiscal year. The reason is that ending balances in Manufacturing Overhead Control and Manufacturing Overhead Allocated are closed to zero when transferred to Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold at year-end.

Pulling it all Together—Problem for Self-Study

(Try to solve this problem before examining the solution that follows.)

Problem

You are asked to bring the following incomplete accounts of Endeavour Printing, Inc., up to date through January 31, 2015. Consider the data that appear in the T-accounts as well as the following information in items (a) through (j).

Endeavour's normal costing system has two direct cost categories (direct material costs and direct manufacturing labour costs) and one indirect cost pool (manufacturing overhead costs, which are allocated using direct manufacturing labour costs).

Materials Control	Wages Payable Control
12-31-2014 Bal. 15,000	1-31-2015 Bal. 3,000
Work-in-Process Control	Manufacturing Overhead Control
	1-31-2015 Bal. 57,000
Finished Goods Control	Costs of Goods Sold
12-31-2014 Bal. 20,000	

Additional Information

- 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 labour costs. The budget for 2015 is \$600,000 for manufacturing overhead costs and \$400,000 for direct manufacturing labour costs.
- The only job unfinished on January 31, 2015, is No. 419, on which direct manufacturing labour costs are \$2,000 (125 direct manufacturing labour-hours) and direct material costs are \$8,000.
- Total direct materials issued to production during January 2015 are \$90,000.
- Cost of goods completed during January is \$180,000.
- Materials inventory as of January 31, 2015, is \$20,000.
- Finished goods inventory as of January 31, 2015, is \$15,000.
- All plant workers earn the same wage rate. Direct manufacturing labour-hours used for January total 2,500 hours. Other labour costs total \$10,000.
- The gross plant payroll paid in January equals \$52,000. Ignore withholdings.
- All "actual" manufacturing overhead incurred during January has already been posted.
- All materials are direct materials.

Required ▶

Calculate the following:

1. Materials purchased during January.
2. Cost of Goods Sold during January.
3. Direct manufacturing labour costs incurred during January.
4. Manufacturing Overhead Allocated during January.
5. Balance, Wages Payable Control, December 31, 2014.
6. Balance, Work-in-Process Control, January 31, 2015.
7. Balance, Work-in-Process Control, December 31, 2014.
- 5 8. Manufacturing Overhead Underallocated or Overallocated for January 2015.

Solution

Letters alongside entries and in T-accounts correspond to letters in the preceding additional information. Numbers alongside entries in T-accounts correspond to numbers in the requirements above. Amounts from the T-accounts are labelled “(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 labour-hours (b) = \$16 per direct manufacturing labour-hour
Direct manufacturing labour costs: 2,500 direct manufacturing labour-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, 2014: \$52,000 (h) + \$3,000 (T) – \$40,000 (see 3) – \$10,000 (g) = \$5,000
6. Work-in-Process Control, January 31, 2015: \$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, 2014: \$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

Materials Control

December 31, 2014 Bal.	(given)	15,000	
	(1)	95,000*	(c) 90,000
January 31, 2015 Bal.	(e)	20,000	

Work-in-Process Control

December 31, 2014 Bal.	(7)	3,000	(d) 180,000
Direct materials	(c)	90,000	
Direct manufacturing labour	(b) (g) (3)	40,000	
Manufacturing overhead allocated	(3) (a) (4)	60,000	
January 31, 2015 Bal.	(b) (6)	13,000	

Finished Goods Control

December 31, 2014 Bal.	(given)	20,000	(2) 185,000
	(d)	180,000	
January 31, 2015 Bal.	(f)	15,000	

Wages Payable Control			
(h) 52,000	December 31, 2014 Bal.	(5) 5,000	
		(g) (3) 40,000	
		(g) 10,000	
January 31, 2015		(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		

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

Summary Points

The following question-and-answer format summarizes the chapter's learning objectives. Each point presents a key question, and the guidelines are the answer to that question.

Learning Objectives

1. What are the building-block concepts of costing systems?
2. What is the difference between job costing and process costing?
3. What are the approaches to evaluating and implementing job costing systems?
4. What are the differences between actual, budgeted, and normal costing?
5. How do we show the flow of costs from direct and indirect cost pools to inventory accounts, including adjustments for over- and underallocated costs?

Guidelines

The building-block concepts of a costing system are a 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 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.

A general approach to implementing costing systems requires identifying the job and the actual direct costs, the budgeted cost-allocation bases, the budgeted indirect-cost pools, the budgeted cost-allocation rates, and the allocated indirect costs (budgeted rates multiplied by actual quantities of an input) to establish 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.

The two standard approaches to disposing of under- or overallocated manufacturing overhead costs at the end of the accounting year for the purposes of stating statement of financial position and statement of comprehensive income amounts at actual costs 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 accounts. Many companies, however, simply write off amounts of under- or overallocated manufacturing overhead to Cost of Goods Sold when amounts are immaterial.

Terms to Learn

This chapter and the Glossary at the end of the book contain definitions of the following important terms:

adjusted allocation-rate approach (p. 112)	materials-requisition record (p. 101)	overallocated indirect costs (p. 112)
budgeted indirect-cost rate (p. 100)	manufacturing overhead allocated (p. 108)	proration (p. 113)
job-cost record (p. 100)	manufacturing overhead applied (p. 108)	source document (p. 100)
labour-time sheet (p. 101)		underallocated indirect costs (p. 112)

Assignment Material

MyAccountingLab The questions, exercises, and problems marked in red can be found on MyAccountingLab. You can practice them as often as you want, and most feature step-by-step guided instructions to help you find the right answers. Exercises and Problems with an Excel icon in the margin have an accompanying Excel template on MyAccountingLab.

Short-Answer Questions

- 4-1** How does a job-costing system differ from a process-costing system?
- 4-2** What is the benefit of creating more than one manufacturing overhead cost pool?
- 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 chequing account deposits?
- 4-4** Describe the seven steps in job costing.
- 4-5** What are the two major types of organizational elements that managers focus on in companies using job costing?
- 4-6** Describe the three major source documents used in job-costing systems.
- 4-7** What is the main concern about source documents used 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 allocation rates.
- 4-9** How does actual costing differ from 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 in the Work-in-Process Control general ledger T-account.
- 4-13** Describe three alternative ways to dispose of underallocated or overallocated indirect costs.
- 4-14** When might a company use budgeted costs rather than actual costs to compute direct labour rates?
- 4-15** Describe briefly why modern technology such as Electronic Data Interchange (EDI) is helpful to managers.

Exercises

4-16 Terminology. A number of terms are listed below:

source document	actual
cost tracing	cost allocation rate
proration	opportunity cost
cost pool	

Required

Select the terms from the above list to complete the following sentences. Use each term only once.

1. _____ spreads underallocated overhead or overallocated overhead among ending work-in-process inventory, finished goods inventory, and cost of goods sold.
2. The benefits of using a(n) _____ cost system is that your costing information is very accurate.
3. The _____ is the result of dividing the indirect cost pool by the cost allocation base.
4. A _____ is an original record that supports journal entries in an accounting system.
5. A(n) _____ is the contribution to income lost or forgone by not using a limited resource in its next-best alternative use.
6. _____ is the assigning of direct costs to the chosen cost object.
7. A _____ is a grouping of individual cost items.

4-17 Job costing, process costing. In each of the following situations, determine whether job costing or process costing would be more appropriate. ◀ LO 1

- | | |
|--|---|
| <ol style="list-style-type: none"> a. A public accounting firm b. An oil refinery c. A custom furniture manufacturer d. A tire manufacturer e. A textbook publisher f. A pharmaceutical company g. An advertising agency h. An apparel manufacturing factory i. A flour mill j. A paint manufacturer k. A medical care facility | <ol style="list-style-type: none"> l. A landscaping company m. A cola-drink-concentrate producer n. A movie studio o. A law firm p. A commercial aircraft manufacturer q. A management consulting firm r. A breakfast cereal company s. A catering service t. A paper mill u. An auto repair garage |
|--|---|

4-18 Actual costing, normal costing, manufacturing overhead. Destin Products uses a job-costing system with two direct cost categories (direct materials and direct manufacturing labour) and one manufacturing overhead cost pool. Destin allocates manufacturing overhead costs using direct manufacturing labour costs. Destin provides the following information: ◀ LO 3, 4
1. Budget is 85% of direct labour-costs.

	Budget for Year 2015	Actuals for Year 2015
Direct manufacturing labour costs	\$2,600,000	\$2,540,000
Direct manufacturing overhead costs	2,210,000	2,311,400
Direct materials costs	1,800,000	1,740,000

Required

1. Compute the actual and budgeted manufacturing overhead rates for 2015.
2. During March, the cost record for Job 626 contained the following:

Direct materials used	\$48,000
Direct manufacturing labour costs	27,000

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

3. At the end of 2015, compute the underallocated or overallocated manufacturing overhead under Destin's normal costing system. Why is there no underallocated or overallocated overhead under Destin's actual costing system?
4. Comment briefly on the advantages and disadvantages of actual costing systems and normal costing systems.

4-19 Job costing; actual, normal, and variation of normal costing. Chirac & Partners is a Quebec-based public accounting partnership specializing in audit services. Its job-costing system has a single direct cost category (professional labour) and a single indirect cost pool (audit support, which contains all the costs in the Audit Support Department). Audit support costs are allocated to individual jobs using actual professional labour-hours. Chirac & Partners employs ten professionals who are involved in their auditing services. ◀ LO 3, 4
1a. Direct cost rate, \$58 per professional labour-hour; Indirect cost rate, \$48 per professional labour-hour

Budgeted and actual amounts for 2015 are as follows:

Budget for 2015

Professional labour compensation	\$ 960,000
Audit support department costs	\$ 720,000
Professional labour-hours billed to clients	16,000 hours

Actual results for 2015

Audit support department costs	\$ 744,000
Professional labour-hours billed to clients	15,500 hours
Actual professional labour cost rate	\$58 per hour

Required

1. Identify the direct cost rate per professional labour-hour and the indirect cost rate per professional labour-hour for 2015 under (a) actual costing, (b) normal costing, and (c) variation of normal costing that uses budgeted rates for direct costs.
2. The audit of Pierre & Company done in 2015 was budgeted to take 110 hours of professional labour time. The actual professional labour time on the audit was 120 hours. Compute the 2015 job cost using (a) actual costing, (b) normal costing, and (c) variation of normal costing that uses budgeted rates for direct costs. Explain any differences in the job cost.

LO 2, 4 ▶

1a. Direct cost rate, \$60 per professional labour-hour; indirect cost rate, \$109.09 per professional labour-hour

4-20 Job costing; actual, normal, and variation from normal costing. Michael and Gabitel (MG) is a law firm that specializes in writing wills. Its job-costing system has one direct cost pool, professional labour, and a single indirect cost pool that includes all supporting costs of running the law office. The support costs are allocated to clients on the basis of professional labour-hours. In addition to the two senior partners at MG, there are six associates who work directly with clients. Each of the eight lawyers is expected to work for approximately 2,500 hours per year.

Budgeted and actual costs for 2015 were:

Budgeted professional labour costs	\$1,100,000
Budgeted support costs	2,000,000
Actual professional labour costs	1,320,000
Actual support costs	2,400,000
Actual total professional hours	22,000 hours

Required

1. Compute the direct cost rate and the indirect cost rate per professional labour-hour under:
 - a. Actual costing.
 - b. Normal costing.
 - c. Variation from normal costing that uses budgeted rates for direct costs.
2. The will for a rich tycoon, Ari Roos, was very complex and took four lawyers at the firm 500 hours each to prepare. What would be the cost of writing this will under each of the costing methods in requirement 1?

LO 3, 4, 5 ▶

1a. \$50 per direct labour-hour;
b. \$42 per direct labour-hour

4-21 Job costing, normal, and actual costing. Anderson Construction assembles residential homes. It uses a job-costing system with two direct cost categories (direct materials and direct labour) and one indirect cost pool (assembly support). The allocation base for assembly support costs is direct labour-hours. In December 2015, Anderson budgets 2016 assembly support costs to be \$8,000,000 and 2016 direct labour-hours to be 160,000.

At the end of 2016, Anderson is comparing the costs of several jobs that were started and completed in 2016. Information for a couple of jobs follows.

Construction Period	Laguna Model February–June 2016	Mission Model May–October 2016
Direct materials	\$106,450	\$127,604
Direct labour	\$ 36,276	\$ 41,410
Direct labour-hours	900	1,010

Direct materials and direct labour are paid for on a contract basis. The costs of each are known when direct materials are used or direct labour-hours are worked. The 2016 actual assembly support costs were \$6,888,000, while the actual direct labour-hours were 164,000.

Required

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

4-22 Normal costing, manufacturing overhead. Trenton Ltd. uses a normal job-costing system and applies manufacturing overhead to products on the basis of machine-hours. At the beginning of 2015, the company controller budgeted annual overhead at \$1,500,000. She also forecast that machine-hours would total 48,000. Actual costs were as follows:

◀ LO 4, 5

1. \$31.25 per machine-hour

Direct material (DM) used	\$ 340,000
Direct labour	875,000
Manufacturing overhead (MOH)	1,605,000

Actual machine-hours worked during the year were 49,200. Trenton adjusts any underallocated or overallocated overhead to cost of goods sold. The company's records show that total sales for the year were \$2,938,000 and cost of goods sold (before adjustment) equalled \$2,260,000.

Required

1. Determine the company's budgeted overhead rate.
2. Determine the amount of underallocated or overallocated overhead for the year.
3. Compute the company's cost of goods sold after the adjustment for overhead.

4-23 Job costing, accounting for manufacturing overhead, budgeted rates. Lynn Company uses a job-costing system at its Mississauga 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 labour) and two manufacturing overhead cost pools (the Machining Department, allocated using actual machine-hours (MH), and the Assembly Department, allocated using actual direct manufacturing labour cost). The 2016 budget for the plant is as follows:

◀ LO 3, 4, 5

1. Total MOH allocated to Job 494, \$99,000

	Machining Department	Assembly Department
Manufacturing overhead (MOH)	\$1,800,000	\$3,600,000
Direct manufacturing labour cost	\$1,400,000	\$2,000,000
Direct manufacturing labour-hours (DMLH)	100,000	200,000
Machine-hours (MH)	50,000	200,000

The company uses a budgeted overhead rate for allocating overhead to production orders on a machine-hour basis in Machining and on a direct-manufacturing-labour-cost basis in Assembly.

Required

1. During February, the cost record for Job 494 contained the following:

	Machining Department	Assembly Department
Direct materials used	\$45,000	\$70,000
Direct manufacturing labour cost	\$14,000	\$15,000
Direct manufacturing labour-hours (DMLH)	1,000	1,500
Machine-hours (MH)	2,000	1,000

Compute the total manufacturing overhead costs of Job 494.

2. At the end of 2016, the actual manufacturing overhead costs were \$1,900,000 in Machining and \$4,000,000 in Assembly. Assume that 55,000 actual machine-hours were used in Machining and that actual direct manufacturing labour costs in Assembly were \$2,200,000. Compute the overallocated or underallocated manufacturing overhead for each department.

LO 3, 4, 5 ▶

1. Unit cost, \$54.01

4-24 Job costing, budgeted rates, unit costs. Lytton Ltd. uses a normal job-costing system with two direct cost categories (direct materials and direct labour) and one indirect cost pool. It allocates manufacturing overhead to jobs using a predetermined overhead rate based on direct labour-hours. At the start of the year, the company estimated that manufacturing overhead would be \$632,000, and direct labour-hours were estimated at 32,000 hours for the year. In November, Job #X905 was completed. Materials costs on the job totalled \$13,200 and labour costs totalled \$10,120 at \$22 per hour. At the end of the year, it was determined that the company worked 34,100 direct labour-hours for the year and incurred \$656,125 in actual manufacturing overhead costs.

Required

1. Job #X905 contained 600 units. Determine the unit cost that would appear on the job-cost sheet.
2. Assuming Lytton prices its products to achieve a 25% margin, what would be the selling price of Job #X905?
3. Determine the underallocated or overallocated overhead for the year.

LO 2 ▶

2a. Hansen operating income, \$275.

4-25 Computing indirect cost rates, services. Mike Rotundo, the president of Tax Assist, is examining alternative ways to compute indirect cost rates. He collects the following information from the budget for 2016:

- ◆ Budgeted variable indirect costs: \$12 per hour of professional labour time
- ◆ Budgeted fixed indirect costs: \$60,000 per quarter

The budgeted billable professional labour-hours per quarter are:

January–March	24,000 hours
April–June	12,000 hours
July–September	4,800 hours
October–December	7,200 hours

Rotundo pays all tax professionals employed by Tax Assist on an hourly basis (\$36 per hour, including all fringe benefits).

Tax Assist's job-costing system has a single direct cost category (professional labour at \$36 per hour) and a single indirect cost pool (office support that is allocated using professional labour-hours).

Tax Assist charges clients \$78 per professional labour-hour. All four jobs described below use 10 hours of professional labour time.

Required

1. Compute budgeted indirect cost rates per professional labour-hour using
 - a. Quarterly budgeted billable hours as the denominator.
 - b. Annual budgeted billable hours as the denominator.
2. Compute the operating income for the following four customers using
 - a. Quarterly based indirect cost rates.
 - b. An annual indirect cost rate.
 - ◆ Stan Hansen: 10 hours in February.
 - ◆ Lelani Kai: 6 hours in March and 4 hours in April.
 - ◆ Ken Patera: 4 hours in June and 6 hours in August.
 - ◆ Evelyn Stevens: 5 hours in January, 2 hours in September, and 3 hours in November.
3. Comment on your results in requirement 2.

LO 3, 5 ▶

1. Overallocation, \$130

4-26 Job costing, journal entries. The University of Toronto 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. A job-costing system is used to cost each job. There are two direct cost categories (direct materials and direct manufacturing labour) and one indirect cost pool (manufacturing overhead, allocated based on direct labour costs).

The following data (in thousands) pertain to 2016:

Direct materials and supplies purchased on account	\$ 800
Direct materials used	710
Indirect materials issued to various production departments	100
Direct manufacturing labour	1,300
Indirect manufacturing labour incurred by various departments	900
Depreciation on building and manufacturing equipment	400
Miscellaneous manufacturing overhead* incurred by various departments (ordinarily would be detailed as repairs, photocopying, utilities, etc.)	650
Manufacturing overhead allocated at 160% of direct manufacturing labour costs	?
Cost of goods manufactured	4,120
Revenues	8,000
Cost of goods sold	4,020
Inventories, December 31, 2015:	
Materials control	100
Work-in-process control	60
Finished goods control	500

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

Required

1. Prepare general journal entries to summarize 2016 transactions. As your final entry, dispose of the year-end overallocated or underallocated manufacturing overhead as a direct write-off to Cost of Goods Sold. Number your entries. Explanations for each entry may be omitted.
2. Show posted T-accounts for all inventories, Cost of Goods Sold, Manufacturing Overhead Control, and Manufacturing Overhead Allocated.

4-27 Job costing, journal entries. Duchess Ltd. manufactures and installs kitchen cabinetry. It uses normal job costing with two direct cost categories (direct materials and direct manufacturing labour) and one indirect cost pool for manufacturing overhead (MOH), applied on the basis of machine-hours (MH). At the beginning of the year, the company estimated that it would work 980,000 MH and had budgeted \$73,500,000 for MOH. The following data (in \$ millions) pertain to operations for the year 2016:

Materials control (beginning balance), December 31, 2015	\$ 6.0
Work-in-process control (beginning balance), December 31, 2015	1.8
Finished goods control (beginning balance), December 31, 2015	7.2
Materials and supplies purchased on account	238
Direct materials used	194
Indirect materials (supplies) issued to various production departments	27
Direct manufacturing labour	123
Indirect manufacturing labour incurred by various departments	19
Depreciation on plant and manufacturing equipment	21
Miscellaneous manufacturing overhead incurred (credit Various Liabilities; ordinarily would be detailed as repairs, utilities, etc.)	9
Manufacturing overhead allocated (972,000 actual MH)	?
Cost of goods manufactured	374.3
Revenues	512
Cost of goods sold	368.4

◀ LO 3, 5

1. WIP ending balance, \$17.40

Required

1. Prepare general journal entries. Post to T-accounts. What is the ending balance of Work-in-Process Control?
2. Show the journal entry for disposing of overallocated or underallocated manufacturing overhead directly as a year-end write-off to Cost of Goods Sold. Post the entry to T-accounts.

LO 3, 5 ►
1. \$551,500

4-28 Job costing, unit cost, ending work-in-process. Coakwell Company worked on only two jobs during May. Information on the jobs is given below:

	Job A701	Job A702
Direct materials	\$ 80,000	\$ 92,000
Direct labour	287,000	219,000
Direct manufacturing labour-hours (DMLH)	20,500	14,600

At the beginning of the year, annual manufacturing overhead (MOH) was budgeted at \$3,780,000 and Coakwell budgeted 35,000 DMLH per month. Job A701 was completed in May.

Required

1. Compute the total cost of Job A701.
2. Calculate per unit cost for Job A701 assuming it has 5,000 units.
3. Make this journal entry transferring Job A701 to Finished Goods.
4. Determine the ending balance in the Work-in-Process account.

LO 3, 5 ►
1a. \$25 per direct labour-hour

4-29 Job costing, various cost drivers. (J. Watson) Rochester Ltd. has budgeted \$435,000 for manufacturing overhead for the upcoming year. It forecast that 72,500 machine-hours will be used in the factory, and budgeted direct labour-hours were 17,400. The average direct labour rate is budgeted to be \$20. Actual data for the year were:

Actual manufacturing overhead	\$434,300
Actual machine-hours	73,010
Actual direct labour wage rate	\$ 19.60
Actual direct labour-hours worked	17,630

Required

1. Compute the budgeted manufacturing overhead rate under each of the following cost drivers:
 - a. Direct labour-hours
 - b. Direct labour cost
 - c. Machine-hours
2. Compute the amount of underallocated or overallocated manufacturing overhead under each of the cost drivers listed in requirement 1.

LO 3, 5 ►
2. Overallocation, \$16,000

4-30 Job costing, journal entries, T-accounts, source documents. Production Company produces gadgets for the coveted small appliance market. The following data reflect activity for the most recent year, 2015:

Costs incurred

Purchases of direct materials (net) on account	\$124,000
Direct manufacturing labour cost	80,000
Indirect labour	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

Beginning and ending inventories for the year were as follows:

	January 1, 2015	December 31, 2015
Direct materials	\$ 9,000	\$11,000
Work-in-process	6,000	21,000
Finished goods	69,000	24,000

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

Required

1. Prepare journal entries to record the 2015 transactions including an entry to close out overallocated 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, Manufacturing Overhead Control, and Manufacturing Overhead Allocated accounts.

4-31 Accounting for manufacturing overhead. Consider the following selected cost data for KYM Inc. for 2016:

◀ LO 3, 5
1. \$22 per MH

Budgeted manufacturing overhead (MOH)	\$4,180,000
Budgeted machine-hours (MH)	190,000
Actual manufacturing overhead (MOH) ending balance	\$4,230,000
Actual machine-hours (MH)	192,000

KYM's job-costing system has a single manufacturing overhead cost pool (allocated using a budgeted rate based on actual MH). Any amount of underallocation or overallocation is immediately written off to cost of goods sold.

Required

1. Compute the budgeted manufacturing overhead (MOH) rate.
2. Journalize the allocation of manufacturing overhead (MOH).
3. Compute the amount of underallocation or overallocation of MOH. Is the amount significant? Journalize the disposition of this amount based on the ending balances in the relevant accounts.

4-32 Proration of overhead. The Ride-On-Water (ROW) Company produces a line of non-motorized boats. ROW uses a normal job-costing system and allocates manufacturing overhead costs using direct manufacturing labour cost. The following data are available for 2015:

◀ LO 3, 5
1. 50% of direct manufacturing labour-costs

Budgeted manufacturing overhead costs	\$100,000
Budgeted direct manufacturing labour cost	200,000
Actual manufacturing overhead costs	106,000
Actual direct manufacturing labour cost	220,000

Inventory balances on December 31, 2015, were:

Account	Ending Balance	2015 Direct Manufacturing Labour Cost in Ending Balance
Work-in-Process	\$ 50,000	\$ 20,000
Finished Goods	240,000	60,000
Cost of Goods Sold	560,000	140,000

Required

1. Calculate the budgeted manufacturing overhead rate.
2. Calculate the amount of underallocated or overallocated manufacturing overhead.
3. Calculate the ending balances in Work-in-Process, Finished Goods, and Cost of Goods Sold if underallocated or overallocated overhead is:
 - 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 2015 in the ending balances, before proration, in each of the three accounts.
4. Which disposition method do you prefer in requirement 3? Explain.

Problems**LO 5 ►**

1. Underallocated, \$35,000

4-33 Disposition of underallocated or overallocated overhead. Delcour Manufacturing budgeted \$325,000 and incurred \$337,000 of overhead costs in the past year. During the year, it allocated \$302,000 to its production. An extract from the company's financial records showed the following account balances:

Allocated MOH in Work-in-Process Inventory	\$ 52,246
Allocated MOH in Finished Goods Inventory	75,802
Allocated MOH in Cost of Goods Sold	173,952

Required

1. Calculate the amount of underallocated or overallocated manufacturing overhead for the year.
2. Prepare the journal entry to dispose of this underallocated or overallocated overhead amount using
 - a. Immediate write-off to Cost of Goods Sold.
 - b. Proration based on the manufacturing overhead allocated (before proration) in Work-in-Process Inventory, Finished Goods Inventory, and Cost of Goods Sold.
3. Which method do you recommend for this company?

LO 2, 4 ►

1. \$65 per professional labour-hour

4-34 Job costing, law firm. Keating & Partners is a law firm specializing in labour relations and employee-related work. It employs 25 professionals (5 partners and 20 managers) who work directly with its clients. The average budgeted total compensation per professional for 2016 is \$104,000. Each professional is budgeted to have 1,600 billable hours to clients in 2016. Keating is a highly respected firm, and all professionals work for clients to their maximum 1,600 billable hours available. All professional labour costs are included in a single direct cost category and are traced to jobs on a per-hour basis.

All costs of Keating & Partners other than professional labour costs are included in a single indirect cost pool (legal support) and are allocated to jobs using professional labour-hours as the allocation base. The budgeted level of indirect costs in 2016 is \$2.2 million.

Required

1. Compute the 2016 budgeted professional labour-hour direct cost rate.
2. Compute the 2016 budgeted indirect cost rate per hour of professional labour.
3. Keating & Partners is considering bidding on two jobs:
 - a. Litigation work for Richardson Inc. that requires 100 budgeted hours of professional labour.
 - b. Labour contract work for Punch Inc. that requires 150 budgeted hours of professional labour.

Prepare a cost estimate for each job.

LO 2, 4 ►1a. \$125 per hour
b. \$50 per hour

4-35 Job costing with two direct cost and two indirect cost categories, law firm (continuation of 4-34). 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 labour and professional manager labour) and two indirect cost categories (general support and

administration support) would yield more accurate job costs. Budgeted information for 2016 related to the two direct cost categories is as follows:

	Professional Partner Labour	Professional Manager Labour
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 2016 relating to the two indirect cost categories is

	General Support	Administration Support
Total costs	\$1,800,000	\$400,000
Cost allocation base	Professional labour-hours	Partner labour-hours

Required

1. Compute the 2016 budgeted direct cost rates for (a) professional partners and (b) professional managers.
2. Compute the 2016 budgeted indirect cost rates for (a) general support and (b) administration support.
3. Compute the budgeted job costs for the Richardson and Punch jobs, given the following information:

	Richardson Inc.	Punch Inc.
Professional partners	60 hours	30 hours
Professional managers	40 hours	120 hours

4. Comment on the results in requirement 3. Why are the job costs different from those computed in Problem 4-34?

4-36 Normal costing, overhead allocation, working backwards. Gaston Ltd. uses a normal job-costing system with two direct cost categories—direct materials and direct manufacturing labour—and one indirect cost category—manufacturing overhead. At the beginning of 2016, Gaston had \$236,000 in work-in-process inventory. The company allocates manufacturing overhead at the rate of 180% of direct manufacturing labour costs. Total allocated manufacturing overhead for the year was \$5,175,000. Manufacturing costs incurred for the year were \$9,732,500 and the cost of goods manufactured for the year totalled \$9,612,200.

◀ LO 4
1. \$2,875,000

Required

1. What was the total direct labour cost in 2016?
2. What was the total cost of direct materials used in 2016?
3. What was the dollar amount of work-in-process inventory on December 31, 2016?

4-37 Disposition of overhead overallocation or underallocation, two indirect cost pools. Glavine Corporation manufactures precision equipment made to order for the semiconductor industry. Glavine uses two manufacturing overhead cost pools—one for the overhead costs incurred in its highly automated Machining Department and another for overhead costs incurred in its labour-based Assembly Department. Glavine uses a normal costing system. It allocates Machining Department overhead costs to jobs based on actual machine-hours using a budgeted machine-hour overhead rate. It allocates Assembly Department overhead costs to jobs based on actual direct manufacturing labour-hours using a budgeted direct manufacturing labour-hour rate.

The following data are for the year 2016:

	Machining Department	Assembly Department
Budgeted overhead	\$5,850,000	\$7,812,000
Budgeted machine-hours (MH)	90,000	0
Budgeted direct manufacturing labour-hours (DMLH)	0	124,000
Actual manufacturing overhead costs	\$5,470,000	\$8,234,000

◀ LO 2, 4, 5
2. Machining Department: Overallocation, \$510,000; Assembly Department: Underallocation, \$170,000

Machine-hours and direct manufacturing labour-hours and the ending balances (before proration of under-allocated overhead) are as follows:

	Actual Machine-Hours	Actual Direct Manufacturing Labour-Hours	Balance before Proration, December 31, 2016
Cost of Goods Sold	69,000	83,200	\$21,600,000
Finished Goods	6,900	12,800	2,800,000
Work-in-Process	16,100	32,000	7,600,000

Required

1. Compute the budgeted overhead rates for the year in the Machining and Assembly Departments.
2. Compute the underallocated or overallocated overhead in *each* department for the year. Dispose of the underallocated or overallocated amount in *each* department using:
 - a. Immediate write-off to Cost of Goods Sold.
 - b. Proration based on ending balances (before proration) in Cost of Goods Sold, Finished Goods, and Work-in-Process.
 - c. Proration based on the allocated overhead amount (before proration) in the ending balances of Cost of Goods Sold, Finished Goods, and Work-in-Process.
3. Which disposition method do you prefer in requirement 2? Explain.

LO 3, 4, 5 ►

1. Underallocated, \$21,100

4-38 Job costing, normal versus actual under- or overapplied overhead. (J. Watson) The following information relates to the activities of King Ltd. for the year 2016:

Advertising Costs	\$ 62,500	Beginning Work-in-Process	\$ 34,000
Direct Labour	320,000	Beginning Direct Materials	52,000
Indirect Labour	61,400	Factory Depreciation	162,000
Factory Equipment Maintenance	13,300	Ending Work-in-Process	45,000
Ending Direct Materials	42,500	Factory Utilities	26,000
Office Depreciation	13,000	Sales Commissions	24,000
Purchases of Direct Materials	156,000	Corporate Salaries	289,000
Factory Supplies	4,400	Insurance on Factory	22,600

The company uses normal costing and applies overhead on the basis of machine-hours (MH). The company had calculated its overhead rate to be \$4.25 per MH on the basis of 60,000 budgeted MH. Actual MH worked in the plant were 63,200.

Required

1. Compute the amount of overallocated or underallocated overhead for the year.
2. Prepare the journal entry to record the disposition of the amount of overallocated or underallocated overhead assuming the company writes off the difference to Cost of Goods Sold.
3. Identify and briefly outline an alternative treatment (from requirement 2) for disposing of overallocated or underallocated overhead.
4. Briefly explain the differences between actual and normal costing, and state how the Schedule of Cost of Goods Manufactured would differ under actual costing.

LO 4 ►

1. \$820.30 per seat

4-39 Job costing and governance. Jack Halpern is the owner and CEO of Aerospace Comfort, a firm specializing in the manufacture of seats for air transport. He has just received a copy of a letter written to the Auditor General of the Canadian government. He believes it is from an ex-employee of Aerospace.

Dear Sir,

Aerospace Comfort in 2016 manufactured 100 X7 seats for the Canadian Forces. You may be interested to know the following:

1. Direct materials cost billed for the 100 X7 seats was \$40,000.
2. Direct manufacturing labour cost billed for 100 X7 seats was \$8,400. This cost includes 16 hours of setup labour at \$50 per hour, an amount included in the manufacturing overhead cost pool as well. The

\$8,400 also includes 15 hours of design time at \$120 an hour. Design time was explicitly identified as a cost the Canadian Forces was not to reimburse.

3. Manufacturing overhead cost billed for 100 X7 seats was \$14,700 (175% of direct manufacturing labour costs). This amount includes the 16 hours of setup labour at \$50 per hour that is incorrectly included as part of direct manufacturing labour costs.

You may also want to know that over 40% of the direct materials is purchased from Frontier Technology, a company that is 51% owned by Jack Halpern's brother.

For obvious reasons, this letter will not be signed.

c.c.: *The Globe and Mail*

Jack Halpern, CEO of Aerospace Comfort

Aerospace Comfort's contract states that the Canadian Forces reimburses Aerospace at 130% of manufacturing costs.

Required

Assume that the facts in the letter are correct as you answer the following questions.

1. What is the cost amount per X7 seat that Aerospace Comfort billed the Canadian Forces? Assume that the actual direct materials costs are \$40,000.
2. What is the amount per X7 seat that Aerospace Comfort should have billed the Canadian Forces? Assume that the actual direct materials costs are \$40,000.
3. Based on the problems highlighted in the letter, what should the Canadian Forces do to tighten its procurement procedures to reduce the likelihood of such situations reoccurring?

4-40 Allocation of manufacturing overhead and disposition of overallocation or underallocation. (SMA, heavily adapted) Nicole Limited is a company that produces machinery to customer order. Its job-costing system (using normal costing) has two direct cost categories (direct materials and direct manufacturing labour) and one indirect cost pool (manufacturing overhead, allocated using a budgeted rate based on direct manufacturing labour costs). The budget for 2016 was:

◀ **LO 5**
2. Overallocation, \$48,800

Direct manufacturing labour	\$630,000
Manufacturing overhead	441,000

At the end of 2016, two jobs were incomplete: No. 1768B (total direct manufacturing labour costs were \$15,000) and No. 1819C (total direct manufacturing labour costs were \$48,000). Machine time totalled 318 hours for No. 1768B and 654 hours for No. 1819C. Direct materials issued to No. 1768B amounted to \$30,600. Direct materials for No. 1819C came to \$56,800.

Total charges to the Manufacturing Overhead Control account for the year were \$406,200. Direct manufacturing labour charges made to all jobs were \$650,000, representing 25,000 direct manufacturing labour-hours (DMLH).

There were no beginning inventories. In addition to the ending work-in-process, the ending finished goods showed a balance of \$204,500 (including a direct manufacturing labour cost component of \$60,000). Sales for 2016 totalled \$3,124,000, cost of goods sold was \$2,200,000, and marketing costs were \$523,900.

Nicole prices on a cost-plus basis. It currently uses a guideline of cost plus 40% of cost.

Required

1. Prepare a detailed schedule showing the ending balances in the inventories and cost of goods sold (before considering any underallocated or overallocated manufacturing overhead). Show also the manufacturing overhead allocated to these ending balances.
2. Compute the underallocated or overallocated manufacturing overhead for 2016.
3. Prorate the amount computed in requirement 2 on the basis of:
 - a. The ending balances (before proration) of work-in-process, finished goods, and cost of goods sold.
 - b. The allocated overhead amount (before proration) in the ending balances of work-in-process, finished goods, and cost of goods sold.
4. Assume that Nicole decides to immediately write off to Cost of Goods Sold any underallocated or overallocated manufacturing overhead. Will operating income be higher or lower than the operating income that would have resulted from the proration in requirements 3(a) and 3(b)?
5. Calculate the cost of job No. 1819C if Nicole Limited had used the adjusted allocation rate approach to disposing of underallocated or overallocated manufacturing overhead in 2016.

- LO 3, 5** ► **4-41 General ledger relationships, underallocation and overallocation.** (S. Sridhar, adapted) Northley Industries is a manufacturer of sailboats. The following partial information for 2016 is available:

Material Control		Work-in-Process Control		
1-1-2016	32,000	403,000	1-1-2016	18,000
	431,000		Direct Manufacturing Labour	380,000
Finished Goods Control		Manufacturing Overhead Allocated		
1-1-2016	12,250	1,280,000		
	1,307,250			
Manufacturing Overhead Control		Cost of Goods Sold		
	543,000			

Additional Information

- Direct manufacturing labour wage rate was \$16 per hour.
- Manufacturing overhead (MOH) is allocated at \$25 per direct manufacturing labour-hour (DMLH).
- During the year, sales revenues were \$1,664,000, and marketing and distribution expenses were \$199,700.

Required

- What was the amount of direct materials issued to manufacturing during the year?
- What was the amount of manufacturing overhead allocated to jobs during the year?
- What was the cost of jobs completed during the year?
- What was the balance in work-in-process inventory on December 31, 2016?
- What was the cost of goods sold before any proration of underallocated or overallocated overhead?
- What was the underallocated or overallocated manufacturing overhead for the year?
- Dispose of the underallocated or overallocated manufacturing overhead using:
 - Immediate write-off to Cost of Goods Sold.
 - Proration based on ending balances (before proration) in Work-in-Process, Finished Goods, and Cost of Goods Sold.
- Using each of the disposition methods in requirement 7, calculate operating income for the year.
- Which disposition method in requirement 7 do you recommend Northley use? Explain your answer briefly.

- LO 3, 4** ► **4-42 Normal costing, departments.** (J. Watson) Kolor Ltd. uses a normal job-costing system with two direct cost categories, direct materials and direct labour, and one indirect cost pool. Manufacturing overhead is allocated based on direct labour costs. Any overallocated or underallocated overhead is written off to Cost of Goods Sold. Each product goes through two departments, Fabrication and Assembly. The Fabrication process is automated whereas the Assembly Department is highly labour intensive. Kolor's budget for 2016 was as follows:

Budgeted	Fabrication	Assembly
Direct Materials (DM)	\$3,500,000	\$2,100,000
Direct Labour	\$ 735,000	\$3,825,000
Factory Overhead	\$6,450,000	\$1,530,000
Machine-Hours (MH)	2,580,000	250,000

Kolor started the year without any work-in-process. During the year it had the following results:

Actual	Fabrication	Assembly
Direct Materials (DM)	\$3,350,000	\$2,200,000
Direct Labour	\$ 750,000	\$3,750,000
Factory Overhead	\$6,390,000	\$1,590,000
Machine-Hours (MH)	2,610,000	260,000

At December 31, 2016, the company had only two jobs still in process, #Z438 and #Q917. Job #Z438 had \$7,000 of direct materials and \$1,500 of direct labour and had used 3,400 MH in fabrication. It had not yet been transferred to the Assembly Department. Job #Q917 had incurred \$4,000 and \$6,000 of direct materials costs in Fabrication and Assembly, respectively. It had used 1,800 MH in Fabrication and 800 MH in Assembly. Labour charges in the two departments were \$9,000 and \$18,000 for Fabrication and Assembly, respectively.

Required

1. Calculate Cost of Goods Manufactured for the year ended December 31, 2016, assuming the company uses its current overhead costing method.
2. Under the current costing system, what is the amount of overallocated or underallocated overhead?
3. What would be the amount of overallocated or underallocated overhead at the end of the year if the company had used departmental overhead rates with the most appropriate base for each department?

4-43 Disposition of underallocated or overallocated overhead—Advanced. (Z. Iqbal, adapted) Naf Radiator Company uses a normal costing system with a single manufacturing overhead (MOH) cost pool and machine-hours (MH) as the cost allocation base. The following data are for 2016:

◀ **LO 3, 4, 5**
1. \$60 per machine hour

Budgeted manufacturing overhead (MOH)	\$4,800,000
Overhead allocation base	machine-hours (MH)
Budgeted machine-hours (MH)	80,000
Manufacturing overhead (MOH) incurred	\$4,900,000
Actual machine-hours (MH)	75,000

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

	Actual Machine-Hours (MH)	2016 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 2016.
2. Compute the underallocated or overallocated manufacturing overhead of Naf Radiator in 2016. Dispose of this underallocated or overallocated amount using:
 - 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 allocated overhead amount (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.

Collaborative Learning Cases

4-44 Normal job costing, unit costs. (J. Watson) Pearson Ltd. uses a normal job-costing system and applies overhead on the basis of direct labour-hours. At the beginning of the year, the company estimated that total overhead costs for the year would be \$180,000, and it budgeted total labour-hours of 15,000. Actual labour-hours worked for the period January 1 to November 30 were 13,750.

◀ **LO 2, 4**
1. \$12 per direct labour-hour

On December 1, the company had three jobs in process:

Job Number	Work-in-Process at December 1		
	815	817	822
Direct Materials (DM)	\$1,400	\$2,500	\$1,700
Direct Labour (DL)	1,200	2,400	600
Overhead (OH)	600	1,350	450
Total	3,200	6,250	2,750

During the month of December the following costs were incurred by job:

Job #	815	817	822	823	824
DM	\$500	\$ 700	\$1,300	\$1,250	\$1,500
DL	\$900	\$1,440	\$3,060	\$3,960	\$5,940
DL hours	50 hours	80 hours	170 hours	220 hours	330 hours

In addition, the company incurred the following costs during the month of December (these costs have not yet been recorded in the books):

DM purchases	\$7,800	Advertising expense	\$5,200
Plant depreciation	2,490	Factory repairs and maintenance	1,500
Factory utilities	1,800	Factory supplies	1,800
Production supervisor salary	2,200	Sales personnel salaries	9,700
Administrative salaries	3,450	Interest expense	1,400

Additional Information

1. The balance in the Overhead Control account on December 1 was \$195,010.
2. There were no jobs in Finished Goods as of December 1.
3. Jobs # 815, 822, 823, and 824 were completed during December.
4. Job 824 is the only job in Finished Goods as of December 31.
5. The company's pricing policy is 200% of total manufacturing cost.

Required

1. Calculate the budgeted overhead rate used by Pearson.
2. Calculate the unit cost of ending work-in-process inventory assuming that the number of units in the job(s) total 250 units.
3. Calculate the cost of goods manufactured and the unadjusted gross margin for the month of December.
4. Calculate the amount of overallocated or underallocated overhead for the year.

LO 2, 4 ► 1. \$2,100

4-45 Job costing, service industry. Michael Scott books tours for new bands, and arranges to print T-shirts and produce demo CDs to sell on the tour. Scott's agency uses a normal costing system with two direct cost pools, labour and materials, and one indirect cost pool, general overhead. General overhead is allocated to each tour at 150% of labour cost. The following information relates to the agency for 2016:

1. As of June 1, there were tours in progress for two bands: Grunge Express and Different Strokes.
2. During June, both bands finished their tours.
3. New tours were started for three bands, As I Lay Dying, Ask Me Later, and Maybe Tomorrow. Of these bands, only Maybe Tomorrow finished its tour by the end of June.

All costs incurred during the planning stage for a tour are gathered in a statement of financial position account called "Tours In Process (TIP)". When a tour is completed, the costs are transferred to a statement of comprehensive income account called "Cost of Completed Tours (CCT)."

The following cost information is for June:

	From Beginning TIP		Incurred in June	
	Materials	Labour	Materials	Labour
Grunge Express	\$400	\$600	\$ 0	\$100
Different Strokes	300	400	175	300
As I Lay Dying	0	0	250	400
Ask Me Later	0	0	350	200
Maybe Tomorrow	0	0	275	400

Actual overhead in June was \$2,500.

Required

1. Calculate the TIP for the end of June.
2. Calculate CCT for June.
3. Calculate underallocated or overallocated overhead at the end of June.
4. Calculate the ending balances in work-in-process and cost of goods sold if the underallocated or overallocated overhead amount is:
 - a. Written off to CCT.
 - b. Prorated using the ending balances (before proration) in TIP and CCT.
 - c. Prorated based on the overhead allocated in June in the ending balances of TIP and CCT (before proration).
5. Which of the methods in requirement 4 would you choose? Explain.