

CHAPTER 3

Product Costing and Cost Accumulation in a Batch Production Environment

ANSWERS TO REVIEW QUESTIONS

- 3-1**
- (a) Use in financial accounting:** In financial accounting, product costs are needed to determine the value of inventory on the balance sheet and to compute the cost-of-goods-sold expense on the income statement.
 - (b) Use in managerial accounting:** In managerial accounting, product costs are needed for planning, for cost control, and for decision making.
 - (c) Use in cost management:** In order to manage, control, or reduce the costs of manufacturing products or providing services, management needs a clear idea of what those costs are.
 - (d) Use in reporting to interested organizations:** Product cost information is used in reporting on relationships between firms and various outside organizations. For example, public utilities such as electric and gas companies record product costs to justify rate increases that must be approved by state regulatory agencies.
- 3-2** In a job-order costing system, costs are assigned to batches or job orders of production. Job-order costing systems are used by firms that produce relatively small numbers of dissimilar products. In a process-costing system, production costs are averaged over a large number of product units. Process-costing systems are used by firms that produce large numbers of nearly identical products.
- 3-3** Concepts of product costing are applied in service industry firms to inform management of the costs of producing services. For example, banks record the costs of producing financial services for the purposes of planning, cost control, and decision making.
- 3-4**
- a. Material requisition form:** A document upon which the production department supervisor requests the release of raw materials for production.
 - b. Labor time record:** A document upon which employees record the time they spend working on each production job or batch.

- c. **Job-cost record:** A document on which the costs of direct material, direct labor, and manufacturing overhead are recorded for a particular production job or batch. The job-cost sheet is a subsidiary ledger account for the Work-in-Process Inventory account in the general ledger.
- 3-5 Although manufacturing-overhead costs are not directly traceable to products, manufacturing operations cannot take place without incurring overhead costs. Consequently, overhead costs are applied to products for the purpose of making pricing decisions, in order to ensure that product prices cover all of the costs of production.
- 3-6 The primary benefit of using a predetermined overhead rate instead of an actual overhead rate is to provide timely information for decision making, planning, and control.
- 3-7 An advantage of prorating overapplied or underapplied overhead is that it results in the adjustment of all the accounts affected by misestimating the overhead rate. These accounts include the Work-in-Process Inventory account, the Finished-Goods Inventory account, and the Cost of Goods Sold account. The resulting balances in these accounts are more accurate when proration is used than when overapplied or underapplied overhead is closed directly into Cost of Goods Sold. The primary disadvantage of prorating overapplied or underapplied overhead is that it is more complicated and time-consuming than the simpler alternative of closing overapplied or underapplied overhead directly into Cost of Goods Sold.
- 3-8 An important cost-benefit issue involving accuracy versus timeliness in accounting for overhead involves the use of a predetermined overhead rate or an actual overhead rate. Since an actual overhead rate is computed after costs have been incurred and activity has been recorded, it is more accurate than a predetermined rate. However, a predetermined overhead rate is more timely than an actual rate, since the predetermined rate is computed earlier and in time to be used for making decisions, planning, and controlling operations.
- 3-9 The difference between actual and normal costing systems involves the procedure for applying manufacturing overhead to Work-in-Process Inventory. Under actual costing, applied overhead is the product of the actual overhead rate (computed at the end of the period) and the actual amount of the cost driver used. Under normal costing, applied overhead is the product of the predetermined overhead rate (computed at the beginning of the period) and the actual amount of the cost driver used.

- 3-10** When a single volume-based cost driver is used to apply manufacturing overhead, the managerial accountant's primary objective is to select a cost driver that varies in a pattern similar to the pattern in which manufacturing overhead varies. Moreover, if a single cost driver is used, it should be some productive input that is common to all of the firm's products.
- 3-11** The benefit of using multiple overhead rates is that the resulting product-costing information is more accurate and more useful for decision making than is the information that results from using a single overhead rate. However, the use of multiple cost drivers and overhead rates is more complicated and more costly.
- 3-12** The development of departmental overhead rates involves a two-stage process. In stage one, overhead costs are assigned to the firm's production departments. First, overhead costs are distributed to all departments, including both service and production departments. Second, costs are allocated from the service departments to the production departments. At the end of stage one, all overhead costs have been assigned to the production departments.

In stage two, the costs that have been accumulated in the production departments are applied to the production jobs that pass through the departments.

- 3-13**
- a. **Overhead cost distribution:** Assignment of all manufacturing-overhead costs to department overhead centers.
 - b. **Service department cost allocation:** Allocation of service department costs to production departments on the basis of the relative proportion of each service department's output that is used by the various production departments.
 - c. **Overhead application (or overhead absorption):** The assignment of all manufacturing overhead costs accumulated in a production department to the jobs that the department has worked on.

These three processes are used in developing departmental overhead rates.

- 3-14** Job-order costing concepts are used in professional service firms. However, rather than referring to production "jobs," such organizations use terminology that reflects their operations. For example, hospitals and law firms assign costs to "cases," and governmental agencies often refer to "programs" or "missions." It is important in such organizations to accumulate the costs of providing the services associated with a case, project, contract, or program. Such cost information is used for planning, cost control, and pricing, among other purposes.

- 3-15** A cost driver is a characteristic of an event or activity that results in the incurrence of costs by that event or activity. A volume-based cost driver is one that is closely associated with production activity, such as the number of units produced, direct-labor hours, or machine hours.
- 3-16** When direct material, direct labor, and manufacturing-overhead costs are incurred, they are applied to Work-in-Process Inventory by debiting the account. When goods are finished, the costs are removed from that account with a credit, and they are transferred to Finished-Goods Inventory by debiting that account. Subsequently, when the goods are sold, Finished-Goods Inventory is credited, and the costs are added to Cost of Goods Sold with a debit.
- 3-17** Hospitals use job-order costing concepts to accumulate the costs associated with each case treated in the hospital. For example, the costs of treating a heart patient would be assigned to that patient's case. These costs would include the hospital room, food and beverages, medications, and specialized services such as diagnostic testing and X rays.
- 3-18** Some manufacturing firms are switching from direct-labor hours to machine hours or throughput time as the basis for overhead application as a result of increased automation in their factories. With increased automation comes a reduction in the amount of direct labor used in the production process. In such cases, direct labor may cease to be a cost driver that varies in a pattern similar to the way in which manufacturing-overhead costs are incurred.
- 3-19** Overapplied or underapplied overhead is caused by errors in estimating the predetermined overhead rate. These errors can occur in the numerator (budgeted manufacturing overhead), or in the denominator (budgeted level of the cost driver).
- 3-20** Overapplied or underapplied overhead can be closed directly into Cost of Goods Sold, or it can be prorated among Work-in-Process Inventory, Finished-Goods Inventory, and Cost of Goods Sold.
- 3-21** A large retailer could use EDI to exchange such documents as purchase orders, shipping and receiving notices, and invoices electronically with its suppliers. Electronic data interchange (EDI) is the direct exchange of data via a computer-to-computer interface.

- 3-22** An engineer could use bar code technology to record how she spends her time. Bar codes would be assigned to her and to each of her activities. Each time she arrived at work, left work, or changed activity at work, the engineer would scan her personal bar code and the bar code of the appropriate action or activity. Examples of activities are designing, redesigning, or testing a product; change orders; visiting the factory floor; constructing a prototype; and being trained.

SOLUTIONS TO EXERCISES

EXERCISE 3-23 (10 MINUTES)

1. Process
2. Job-order
3. Job-order (contracts or projects)
4. Process
5. Process
6. Job-order
7. Process
8. Job-order (contracts or projects)
9. Process
10. Job-order

EXERCISE 3-24 (15 MINUTES)

1.
$$\text{Predetermined overhead rate} = \frac{\text{budgeted overhead}}{\text{budgeted production volume}}$$

(a) At 200,000 chicken volume:

$$\text{Overhead rate} = \frac{\$100,000 + (\$.10)(200,000)}{200,000} = \$.60 \text{ per chicken}$$

(b) At 300,000 chicken volume:

$$\text{Overhead rate} = \frac{\$100,000 + (\$.10)(300,000)}{300,000} = \$.43 \text{ per chicken (rounded)}$$

(c) At 400,000 chicken volume:

$$\text{Overhead rate} = \frac{\$100,000 + (\$.10)(400,000)}{400,000} = \$.35 \text{ per chicken}$$

EXERCISE 3-24 (CONTINUED)

2. The predetermined overhead rate does not change in proportion to the change in production volume. As production volume increases, the \$100,000 of fixed overhead is allocated across a larger activity base. When volume rises by 50%, from 200,000 to 300,000 chickens, the decline in the overhead rate is 28.33% $[(.60 - .43)/.60]$. When volume rises by 33.33%, from 300,000 to 400,000 chickens, the decline in the overhead rate is 18.6% $[(.43 - .35)/.43]$.

EXERCISE 3-25 (5 MINUTES)

Work-in-Process Inventory	5,480	
Raw-Material Inventory		4,600
Wages Payable		680
Manufacturing Overhead		200
 Finished-Goods Inventory	5,480	
Work-in-Process Inventory		5,480

EXERCISE 3-26 (30 MINUTES)

Job-order costing is the appropriate product-costing system for feature film production, because a film is a unique production. The production process for each film would use labor, material and support activities (i.e., overhead) in different ways. This would be true of or any type of film (e.g., filming on location, filming in the studio, or using animation).

EXERCISE 3-27 (20 MINUTES)

1. Raw-material inventory, January 1	\$134,000
Add: Raw-material purchases	191,000
Raw material available for use	<u>\$325,000</u>

	Deduct: Raw-material inventory, January 31	<u>124,000</u>
	Raw material used in January	\$201,000
	Direct labor	<u>300,000</u>
	Total prime costs incurred in January	<u>\$501,000</u>
2.	Total prime cost incurred in January	\$501,000
	Applied manufacturing overhead (60% × \$300,000).....	<u>180,000</u>
	Total manufacturing cost for January	<u>\$681,000</u>

EXERCISE 3-27 (CONTINUED)

3.	Total manufacturing cost for January	\$681,000
	Add: Work-in-process inventory, January 1	<u>235,000</u>
	Subtotal.....	\$916,000
	Deduct: Work-in-process inventory, January 31	<u>251,000</u>
	Cost of goods manufactured	<u>\$665,000</u>
4.	Finished-goods inventory, January 1.....	\$125,000
	Add: Cost of goods manufactured	<u>665,000</u>
	Cost of goods available for sale	\$790,000
	Deduct: Finished-goods inventory, January 31.....	<u>117,000</u>
	Cost of goods sold.....	<u>\$673,000</u>

Since the company accumulates overapplied or underapplied overhead until the end of the year, no adjustment is made to cost of goods sold until December 31.

5.	Applied manufacturing overhead for January	\$180,000
	Actual manufacturing overhead incurred in January	<u>175,000</u>
	Overapplied overhead as of January 31.....	<u>\$ 5,000</u>

The balance in the Manufacturing Overhead account on January 31 is a \$5,000 credit balance.

NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.

EXERCISE 3-28 (15 MINUTES)

$$\begin{aligned}
 1. \quad \text{Applied manufacturing overhead} &= \text{total manufacturing costs} \times 30\% \\
 &= \$2,500,000 \times 30\% \\
 &= \$750,000
 \end{aligned}$$

$$\text{Applied manufacturing overhead} = \text{direct-labor cost} \times 80\%$$

$$\begin{aligned}
 \text{Direct-labor cost} &= \text{applied manufacturing overhead} \div 80\% \\
 &= \$750,000 \div .8 \\
 &= \$937,500
 \end{aligned}$$

EXERCISE 3-28 (CONTINUED)

$$\begin{aligned}
 2. \quad \text{Direct-material cost} &= \text{total manufacturing cost} \\
 &\quad - \text{direct labor cost} \\
 &\quad - \text{applied manufacturing overhead} \\
 &= \$2,500,000 - \$937,500 - \$750,000 \\
 &= \$812,500
 \end{aligned}$$

3. Let X denote work-in-process inventory on December 31.

Total manufacturing cost	+	work-in-process inventory, Jan.1	-	work-in-process inventory, Dec. 31	=	cost of goods manufactured
\$2,500,000	+	.75X	-	X	=	\$2,425,000
				.25X	=	\$2,500,000 - \$2,425,000
				X	=	\$300,000

Work-in-process inventory on December 31 amounted to \$300,000.

EXERCISE 3-29 (25 MINUTES)

JOB-COST RECORD				
Job Number	<u> TB78 </u>	Description	<u> teddy bears </u>	
Date Started	<u> 4/1 </u>	Date Completed	<u> 4/15 </u>	
		Number of Units Completed	<u> 1,000 </u>	
Direct Material				
Date	Requisition Number	Quantity	Unit Price	Cost
4/1	101	400	\$.80	\$320
4/5	108	500	.30	150
Direct Labor				
Date	Time Card Number	Hours	Rate	Cost
4/1 – 4/8	Various time cards	500	\$12	\$6,000
Manufacturing Overhead				
Date	Activity Base	Quantity	Application Rate	Cost
4/15	Direct-labor hours	500	\$2	\$1,000
Cost Summary				
Cost Item		Amount		
Total Direct Material		\$ 470		
Total Direct Labor		6,000		
Total Manufacturing Overhead		1,000		
Total Cost		\$7,470		
Unit Cost		\$ 7.47		
Shipping Summary				
Date	Units Shipped	Units Remaining In Inventory	Cost Balance	
4/30	700	300	\$2,241*	

*300 units remaining in inventory × \$7.47 = \$2,241

EXERCISE 3-30 (30 MINUTES)

1.

**CRUNCHEM CEREAL COMPANY
SCHEDULE OF COST OF GOODS MANUFACTURED
FOR THE YEAR ENDED DECEMBER 31, 20X1**

Direct material:		
Raw-material inventory, January 1	\$ 30,000	
Add: Purchases of raw material	<u>278,000</u>	
Raw material available for use.....	\$308,000	
Deduct: Raw-material inventory, December 31	<u>33,000</u>	
Raw material used		\$275,000
Direct labor		120,000
Manufacturing overhead		<u>252,000</u> *
Total manufacturing costs		\$647,000
Add: Work-in-process inventory, January 1.....		<u>39,000</u>
Subtotal		\$686,000
Deduct: Work-in-process inventory, December 31		<u>42,900</u>
Cost of goods manufactured		<u>\$643,100</u>

*Applied manufacturing overhead is \$252,000 ($\$120,000 \times 210\%$). Actual manufacturing overhead is also \$252,000, so there is no overapplied or underapplied overhead.

2.	Finished-goods inventory, January 1	\$ 42,000
	Add: Cost of goods manufactured.....	<u>643,100</u>
	Cost of goods available for sale.....	\$685,100
	Deduct: Finished-goods inventory, December 31	<u>46,200</u>
	Cost of goods sold	<u>\$638,900</u>

3. In the electronic version of the solutions manual, press the CTRL key and click on the following link: [BUILD A SPREADSHEET 03-30.XLS](#)

EXERCISE 3-31 (20 MINUTES)

<p>1. Raw-Material Inventory</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; width: 150px; text-align: right;">227,000</td> <td style="border: 1px solid black; width: 150px;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">53,000</td> <td style="border: 1px solid black; text-align: right;">174,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Wages Payable</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">324,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Manufacturing Overhead</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">180,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Sales Revenue</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">195,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Accounts Receivable</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">195,000</td> </tr> </table>	227,000		53,000	174,000	Wages Payable			324,000	Manufacturing Overhead			180,000	Sales Revenue			195,000	Accounts Receivable			195,000	<p>Work-in-Process Inventory</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; width: 150px; text-align: right;">18,000</td> <td style="border: 1px solid black; width: 150px;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">DM 174,000</td> <td style="border: 1px solid black;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">DL 324,000</td> <td style="border: 1px solid black;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">MOH 180,000</td> <td style="border: 1px solid black;"></td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">120,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">576,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Finished-Goods Inventory</td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">30,000</td> <td style="border: 1px solid black;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: right;">120,000</td> <td style="border: 1px solid black;"></td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">132,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">18,000</td> </tr> <tr> <td colspan="2" style="border-top: 1px solid black; text-align: right;">Cost of Goods Sold</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: right;">132,000</td> </tr> </table>	18,000		DM 174,000		DL 324,000		MOH 180,000			120,000	576,000		Finished-Goods Inventory		30,000		120,000			132,000	18,000		Cost of Goods Sold			132,000
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**2. REIMEL FURNITURE COMPANY, INC.
PARTIAL BALANCE SHEET
AS OF DECEMBER 31, 20X2**

Current assets	
Cash.....	XXX
Accounts receivable.....	XXX
Inventory	
Raw material	\$ 53,000
Work in process.....	576,000
Finished goods	18,000

**REIMEL FURNITURE COMPANY, INC.
PARTIAL INCOME STATEMENT
FOR THE YEAR ENDED DECEMBER 31, 20X2**

Sales revenue	\$195,000
Less: Cost of goods sold.....	<u>132,000</u>
Gross margin	\$ 63,000

EXERCISE 3-32 (20 MINUTES)

1. Raw material:

Beginning inventory	\$ 71,000
Add: Purchases	?
Deduct: Raw material used	<u>326,000</u>
Ending inventory	<u>\$ 81,000</u>

Therefore, purchases for the year were..... \$336,000

2. Direct labor:

Total manufacturing cost.....	\$686,000
Deduct: Direct material	<u>326,000</u>
Direct labor and manufacturing overhead.....	<u>360,000</u>

Direct labor + manufacturing overhead	=	\$360,000
Direct labor + (60%) (direct labor)	=	\$360,000
(160%) (direct labor)	=	\$360,000

Direct labor	=	<u>\$360,000</u>
		1.6

Direct labor	=	\$225,000
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3. Cost of goods manufactured:

Work in process, beginning inventory.....	\$ 80,000
Add: Total manufacturing costs.....	686,000
Deduct: Cost of goods manufactured.....	?
Work in process, ending inventory	<u>\$ 30,000</u>

Therefore, cost of goods manufactured was \$736,000

EXERCISE 3-32 (CONTINUED)

4. Cost of goods sold:

Finished goods, beginning inventory	\$ 90,000
Add: Cost of goods manufactured	<u>736,000</u>
Cost of goods available for sale.....	\$826,000
Deduct: Cost of goods sold.....	<u> ?</u>
Finished goods, ending inventory.....	<u>\$110,000</u>
Therefore, cost of goods sold was.....	\$716,000

EXERCISE 3-33 (20 MINUTES)

Calculation of proration amounts:

Account	Amount	Percentage	Calculation of Percentage
Work in Process.....	\$ 35,250	25%	35,250 ÷ \$141,000
Finished Goods.....	49,350	35%	49,350 ÷ \$141,000
Cost of Goods Sold	<u>56,400</u>	<u>40%</u>	56,400 ÷ \$141,000
Total	<u>\$141,000</u>	<u>100%</u>	

Account	Underapplied Overhead	x	Percentage	Amount Added to Account
Work in Process.....	\$16,000*	x	25%	\$4,000
Finished Goods.....	16,000	x	35%	5,600
Cost of Goods Sold	16,000	x	40%	6,400

*Underapplied overhead = actual overhead – applied overhead
 \$16,000 = \$157,000 – \$141,000

Journal entry:

Work-in-Process Inventory	4,000	
Finished-Goods Inventory	5,600	
Cost of Goods Sold	6,400	
Manufacturing Overhead.....		16,000

EXERCISE 3-34 (15 MINUTES)

NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.

1. Predetermined overhead rate = $\frac{\$997,500}{75,000 \text{ hours}} = \13.30 per hour

2. To compute actual manufacturing overhead:

Depreciation.....		\$ 231,000
Property taxes.....		21,000
Indirect labor.....		82,000
Supervisory salaries		200,000
Utilities		59,000
Insurance		30,000
Rental of space		300,000
Indirect material:		
Beginning inventory, January 1	\$ 48,000	
Add: Purchases	<u>94,000</u>	
Indirect material available for use.....	\$142,000	
Deduct: Ending inventory, December 31.....	<u>63,000</u>	
Indirect material used		<u>79,000</u>
Actual manufacturing overhead		<u>\$1,002,000</u>

	=	actual manufacturing overhead	-	applied manufacturing overhead	
Overapplied overhead					
		=		\$1,002,000 - (\$13.30 × 80,000*)	= \$62,000

*Actual direct-labor hours.

3. Manufacturing Overhead	62,000	
Cost of Goods Sold.....		62,000

4. In the electronic version of the solutions manual, press the CTRL key and click on the following link: [Build a Spreadsheet 03-34.xls](#)

EXERCISE 3-35 (20 MINUTES)

NOTE: Budgeted sales revenue, although given in the exercise, is irrelevant to the solution.

1. **Predetermined overhead rate** = $\frac{\text{budgeted manufacturing overhead}}{\text{budgeted level of cost driver}}$
- (a) $\frac{\$364,000}{10,000 \text{ machine hours}}$ = \$36.40 per machine hour
- (b) $\frac{\$364,000}{20,000 \text{ direct-labor hours}}$ = \$18.20 per direct-labor hour
- (c) $\frac{\$364,000}{\$280,000^*}$ = \$1.30 per direct-labor dollar or 130% of direct-labor cost

*Budgeted direct-labor cost = 20,000 × \$14

2. **Actual manufacturing overhead** – **applied manufacturing overhead** = **overapplied or underapplied overhead**
- (a) \$340,000 – (11,000)(\$36.40) = \$60,400 overapplied overhead
- (b) \$340,000 – (18,000)(\$18.20) = \$12,400 underapplied overhead
- (c) \$340,000 – (\$270,000†)(130%) = \$11,000 overapplied overhead

†Actual direct-labor cost = 18,000 × \$15

EXERCISE 3-36 (5 MINUTES)

1.	Work-in-Process Inventory	340,000	
	Manufacturing Overhead		340,000
2.	Work-in-Process Inventory	400,400	
	Manufacturing Overhead		400,400

EXERCISE 3-37 (10 MINUTES)

Budgeted overhead rate = budgeted overhead / budgeted direct professional labor
160% = 400,000 euros / 250,000 euros

Contract to redecorate mayor's offices:

Direct material.....	3,500 euros
Direct professional labor.....	6,000 euros
Overhead (160% × 6,000 euros).....	<u>9,600 euros</u>
Total contract cost.....	<u>19,100 euros</u>

EXERCISE 3-38 (15 MINUTES)

1. **Memorandum**

Date: Today
To: President
From: I.M. Student
Subject: Cost driver for overhead application

I recommend direct-labor hours as the best volume-based cost driver upon which to base the application of manufacturing overhead. Since our products are made by hand, direct labor is a very significant production input. Moreover, the incurrence of manufacturing overhead cost appears to be related to the use of direct labor.

EXERCISE 3-38 (CONTINUED)

2. Memorandum

Date: Today
To: President
From: I.M. Student
Subject: Cost driver for overhead application

I recommend either machine hours or units of production as the most appropriate cost driver for the application of manufacturing overhead. Since our production process is highly automated, machine hours are the most significant production input. Also, our chips are nearly identical, so the amount of overhead incurred in their production does not vary much across product lines. The incurrence of manufacturing overhead cost appears to be related closely both to machine time and units of production.

EXERCISE 3-39 (15 MINUTES)

Work-in-Process Inventory: Tanning Department.....	6,000 ^a	
Manufacturing Overhead		6,000

^a \$6,000 = 100 sq. ft. per set × 20 sets × \$3 per sq. ft.

Work-in-Process Inventory: Assembly Department.....	540 ^b	
Manufacturing Overhead		540

^b \$540 = 3 machine hours × 20 sets × \$9 per machine hour.

Work-in-Process Inventory: Saddle Department.....	3,200 ^c	
Manufacturing Overhead		3,200

^c \$3,200 = 40 direct-labor hours × 20 sets × \$4 per direct-labor hour.

EXERCISE 3-40 (10 MINUTES)

Overhead distribution: Allocation of the hospital's building maintenance and custodial costs to all of the hospital's departments.

Service-department cost allocation: Allocation of the hospital's Personnel Department costs to the direct-patient-care departments in the hospital.

Overhead application: Assignment of the overhead costs in the maternity ward to each patient-day of care provided to new mothers.

EXERCISE 3-41 (15 MINUTES)

1. **Total staff compensation = \$280,000 + \$420,000 = \$700,000**

2. **Overhead rate = total budgeted overhead/total budgeted staff compensation**

$$= \$756,000/\$700,000$$

$$= 108\%$$

3. **Applied overhead = 108% × total direct professional labor**

$$= 108\% \times (\$1,200 + \$2,000)$$

$$= \$3,456$$

4. **Applied overhead using single cost driver = \$3,456**

Applied overhead using two cost drivers = \$3,480 (\$1,080 + \$2,400)

See the illustration in the text.

SOLUTIONS TO PROBLEMS

PROBLEM 3-42 (45 MINUTES)

NOTE: The 12/31/x1 balances for cash and accounts receivable, although given in the problem, are irrelevant to the solution.

1.

TWISTO PRETZEL COMPANY		
SCHEDULE OF COST OF GOODS MANUFACTURED		
FOR THE YEAR ENDED DECEMBER 31, 20X1		
Direct material:		
Raw-material inventory, 12/31/x0	\$10,100	
Add: Purchases of raw material	<u>39,000</u>	
Raw material available for use	\$49,100	
Deduct: Raw-material inventory, 12/31/x1	<u>11,000</u>	
Raw material used		\$38,100
Direct labor		79,000
Manufacturing overhead:		
Indirect material	\$ 4,900	
Indirect labor	29,000	
Depreciation on factory building	3,800	
Depreciation on factory equipment	2,100	
Utilities	6,000	
Property taxes	2,400	
Insurance	3,600	
Rental of warehouse space	<u>3,100</u>	
Total actual manufacturing overhead	\$54,900	
Add: Overapplied overhead*	<u>3,100</u>	
Overhead applied to work in process		<u>58,000</u>
Total manufacturing costs		\$175,100
Add: Work-in-process inventory, 12/31/x0		<u>8,100</u>
Subtotal		\$183,200
Deduct: Work-in-process inventory, 12/31/x1		<u>8,300</u>
Cost of goods manufactured		<u>\$174,900</u>

*The Schedule of Cost of Goods Manufactured lists the manufacturing costs applied to work in process. Therefore, the overapplied overhead, \$3,100, must be added to total actual overhead to arrive at the amount of overhead applied to work in process. If there had been underapplied overhead, the balance would have been deducted from total actual manufacturing overhead. The amount of overapplied overhead is found by subtracting actual overhead, \$54,900 (as computed above), from applied overhead, \$58,000 (given).

PROBLEM 3-42 (CONTINUED)

2.

**TWISTO PRETZEL COMPANY
SCHEDULE OF COST OF GOODS SOLD
FOR THE YEAR ENDED DECEMBER 31, 20X1**

Finished-goods inventory, 12/31/x0.....	\$ 14,000
Add: Cost of goods manufactured*	174,900
Cost of goods available for sale	<u>\$188,900</u>
Deduct: Finished-goods inventory, 12/31/x1	15,400
Cost of goods sold.....	\$173,500
Deduct: Overapplied overhead†	3,100
Cost of goods sold (adjusted for overapplied overhead)	<u><u>\$170,400</u></u>

*The cost of goods manufactured is obtained from the Schedule of Cost of Goods Manufactured.

†The company closes underapplied or overapplied overhead into cost of goods sold. Hence, the balance in overapplied overhead is deducted from cost of goods sold for the month.

3.

**TWISTO PRETZEL COMPANY
INCOME STATEMENT
FOR THE YEAR ENDED DECEMBER 31, 20X1**

Sales revenue		\$205,800
Less: Cost of goods sold		<u>170,400</u>
Gross margin.....		\$ 35,400
Selling and administrative expenses:		
Salaries	\$13,800	
Utilities	2,500	
Depreciation.....	1,200	
Rental of office space	1,700	
Other expenses	<u>4,000</u>	
Total.....		<u>23,200</u>
Income before taxes.....		\$12,200
Income tax expense		<u>5,100</u>
Net income.....		<u><u>\$ 7,100</u></u>

PROBLEM 3-43 (20 MINUTES)

1.
$$\text{Predetermined overhead rate} = \frac{\text{budgeted manufacturing overhead}}{\text{budgeted direct-labor hours}}$$

$$= \frac{\$240,000}{(2,000)(10)} = \$12 \text{ per hour}$$

2. Journal entries:

(a)	Raw-Material Inventory	33,000	
	Accounts Payable		33,000
(b)	Work-in-Process Inventory	460	
	Raw-Material Inventory		460
(c)	Manufacturing Overhead	100	
	Manufacturing-Supplies Inventory		100
(d)	Manufacturing Overhead	8,000	
	Accumulated Depreciation: Building		8,000
(e)	Manufacturing Overhead	400	
	Cash		400
(f)	Work-in-Process Inventory	34,000	
	Wages Payable		34,000

To record direct-labor cost [(1,000 + 700) x \$20].

	Work-in-Process Inventory	20,400	
	Manufacturing Overhead		20,400

To apply manufacturing overhead to work in process (\$20,400 = 1,700 x \$12 per hour).

(g)	Manufacturing Overhead	910	
	Property Taxes Payable		910
(h)	Manufacturing Overhead	2,500	
	Wages Payable		2,500
(i)	Finished-Goods Inventory	14,400	
	Work-in-Process Inventory		14,400

PROBLEM 3-43 (CONTINUED)

(j)	Accounts Receivable	13,500	
	Sales Revenue		13,500
	Cost of Goods Sold.....	10,800*	
	Finished-Goods Inventory		10,800

*\$10,800 = (9/12)(\$14,400)

PROBLEM 3-44 (25 MINUTES)

The completed T-accounts are shown below. (Missing amounts in problem are italicized.)

<table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Raw-Material Inventory</th> </tr> <tr> <td style="width: 30%;">Bal. 1/1</td> <td style="width: 30%; text-align: right;">21,000</td> <td style="width: 40%;"></td> </tr> <tr> <td></td> <td style="text-align: right;">135,000</td> <td style="text-align: right;">120,000</td> </tr> <tr> <td>Bal. 12/31</td> <td style="text-align: right;">36,000</td> <td></td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Work-in-Process Inventory</th> </tr> <tr> <td>Bal. 1/1</td> <td style="text-align: right;">17,000</td> <td></td> </tr> <tr> <td>Direct material</td> <td style="text-align: right;">120,000</td> <td></td> </tr> <tr> <td>Direct labor</td> <td style="text-align: right;">150,000</td> <td style="text-align: right;">718,000</td> </tr> <tr> <td>Mfg. overhead</td> <td style="text-align: right;">450,000</td> <td></td> </tr> <tr> <td>Bal. 12/31</td> <td style="text-align: right;">19,000</td> <td></td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Manufacturing Overhead</th> </tr> <tr> <td></td> <td style="text-align: right;">452,500</td> <td style="text-align: right;">450,000</td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Wages Payable</th> </tr> <tr> <td></td> <td style="text-align: right;">2,000</td> <td style="text-align: right;">Bal. 1/1</td> </tr> <tr> <td style="text-align: right;">147,000</td> <td style="text-align: right;">150,000</td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;">5,000</td> <td style="text-align: right;">Bal. 12/31</td> </tr> </table>	Raw-Material Inventory		Bal. 1/1	21,000			135,000	120,000	Bal. 12/31	36,000		Work-in-Process Inventory		Bal. 1/1	17,000		Direct material	120,000		Direct labor	150,000	718,000	Mfg. overhead	450,000		Bal. 12/31	19,000		Manufacturing Overhead			452,500	450,000	Wages Payable			2,000	Bal. 1/1	147,000	150,000			5,000	Bal. 12/31	<table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Accounts Payable</th> </tr> <tr> <td></td> <td style="text-align: right;">2,500</td> <td style="text-align: right;">Bal. 1/1</td> </tr> <tr> <td style="text-align: right;">136,500</td> <td style="text-align: right;">135,000</td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;">1,000</td> <td style="text-align: right;">Bal. 12/31</td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Finished-Goods Inventory</th> </tr> <tr> <td>Bal. 1/1</td> <td style="text-align: right;">12,000</td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;">718,000</td> <td style="text-align: right;">710,000</td> </tr> <tr> <td>Bal. 12/31</td> <td style="text-align: right;">20,000</td> <td></td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Cost of Goods Sold</th> </tr> <tr> <td></td> <td style="text-align: right;">710,000</td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Sales Revenue</th> </tr> <tr> <td></td> <td style="text-align: right;">810,000</td> </tr> </table> <table border="0" style="width: 100%;"> <tr> <th colspan="2" style="text-align: center; border-bottom: 1px solid black;">Accounts Receivable</th> </tr> <tr> <td>Bal. 1/1</td> <td style="text-align: right;">11,000</td> <td></td> </tr> <tr> <td></td> <td style="text-align: right;">810,000</td> <td style="text-align: right;">806,000</td> </tr> <tr> <td>Bal. 12/31</td> <td style="text-align: right;">15,000</td> <td></td> </tr> </table>	Accounts Payable			2,500	Bal. 1/1	136,500	135,000			1,000	Bal. 12/31	Finished-Goods Inventory		Bal. 1/1	12,000			718,000	710,000	Bal. 12/31	20,000		Cost of Goods Sold			710,000	Sales Revenue			810,000	Accounts Receivable		Bal. 1/1	11,000			810,000	806,000	Bal. 12/31	15,000	
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PROBLEM 3-45 (35 MINUTES)

1. Predetermined overhead rate = budgeted overhead ÷ budgeted machine hours
 = \$840,000 ÷ 16,000 = \$52.50 per machine hour

2.	(a)	Work-in-Process Inventory	80,000*	
		Raw-Material Inventory.....		80,000
		Work-in-Process Inventory	130,800**	
		Wages Payable.....		130,800

* \$21,000 + \$44,000 + \$15,000 = \$80,000

** \$35,000 + \$22,000 + \$65,000 + \$8,800 = \$130,800

(b)	Manufacturing Overhead.....	238,500	
	Accumulated Depreciation.....		34,000
	Wages Payable.....		60,000
	Manufacturing Supplies Inventory		5,000
	Miscellaneous Accounts		139,500

(c)	Work-in-Process Inventory	231,000*	
	Manufacturing Overhead.....		231,000

* (1,200 + 700 + 2,000 + 500) x \$52.50 = \$231,000

(d)	Finished-Goods Inventory	315,250*	
	Work-in-Process Inventory		315,250

* Job 64: \$84,000 + \$21,000 + \$35,000 + (1,200 x \$52.50) = \$203,000

Job 65: \$53,500 + \$22,000 + (700 x \$52.50) = \$112,250

\$315,250 = \$203,000 + \$112,250

(e)	Accounts Receivable.....	146,950*	
	Sales Revenue		146,950

* \$112,250 + \$34,700 = \$146,950

	Cost of Goods Sold	112,250	
	Finished-Goods Inventory		112,250

3. Job no. 66 and no. 67 are in production as of March 31:

Job 66: \$44,000 + \$65,000 + (2,000 x \$52.50)\$214,000

Job 67: \$15,000 + \$8,800 + (500 x \$52.50) 50,050

Total\$264,050

PROBLEM 3-45 (CONTINUED)

4. Finished-goods inventory increased by \$203,000 (\$315,250 - \$112,250).
5. The company's actual overhead amounted to \$238,500, whereas applied overhead totaled \$231,000. Thus, overhead was underapplied by \$7,500.

PROBLEM 3-46 (35 MINUTES)

1. Predetermined overhead rate = budgeted overhead ÷ budgeted direct-labor cost
= \$5,460,000 ÷ \$4,200,000 = 130% of direct labor cost
2. Additions (debits) total \$15,605,000 [\$5,600,000 + \$4,350,000 + (\$4,350,000 x 130%)].
3. The finished-goods inventory consisted of job no. 2143, which cost \$351,500 [\$156,000 + \$85,000 + (\$85,000 x 130%)].
4. Since there is no work in process at year-end, all amounts in the Work-in-Process account must be transferred to Finished-Goods Inventory. Thus:

Finished-Goods Inventory	15,761,800*	
Work-in-Process Inventory		15,761,800

*Beginning balance in Work-in-Process Inventory + additions to the account:
\$156,800 + \$15,605,000 = \$15,761,800

5. Finlon's applied overhead totals 130% of direct-labor cost, or \$5,655,000 (\$4,350,000 x 130%). Actual overhead was \$5,554,000, itemized as follows, resulting in overapplied overhead of \$101,000.

Indirect materials used	\$ 65,000	
Indirect labor	2,860,000	
Factory depreciation.....	1,740,000	
Factory insurance	59,000	
Factory utilities	<u>830,000</u>	
Total.....	<u>\$5,554,000</u>	
Manufacturing Overhead.....	101,000	
Cost of Goods Sold		101,000

PROBLEM 3-46 (CONTINUED)

6. The company's cost of goods sold totals \$15,309,300:

Finished-goods inventory, Jan. 1.....	\$	0
Add: Cost of goods manufactured.....		<u>15,761,800</u>
Cost of goods available for sale.....		\$15,761,800
Less: Finished-goods inventory, Dec. 31.....		<u>351,500</u>
Unadjusted cost of goods sold.....		\$15,410,300
Less: Overapplied overhead.....		<u>101,000</u>
Cost of goods sold.....		<u>\$15,309,300</u>

7. No, selling and administrative expenses are operating expenses of the firm and are treated as period costs rather than product costs. Such costs are unrelated to manufacturing overhead and cost of goods sold.

PROBLEM 3-47 (30 MINUTES)

1. Traceable costs total \$2,500,000, computed as follows:

	Total Cost	Percent Traceable	Traceable Cost
Professional staff salaries.....	\$2,500,000	80%	\$2,000,000
Administrative support staff.....	300,000	60	180,000
Travel.....	250,000	90	225,000
Photocopying.....	50,000	90	45,000
Other operating costs.....	<u>100,000</u>	50	<u>50,000</u>
Total.....	<u>\$3,200,000</u>		<u>\$2,500,000</u>

JLR's overhead (i.e., the nontraceable costs) total \$700,000 (\$3,200,000 - \$2,500,000).

- Predetermined overhead rate = budgeted overhead ÷ traceable costs
 = \$700,000 ÷ \$2,500,000 = 28% of traceable costs
- Target profit percentage = target profit ÷ total cost
 = \$640,000 ÷ \$3,200,000 = 20% of cost

PROBLEM 3-47 (CONTINUED)

4. The total cost of the Martin Manufacturing project is \$64,000, and the billing is \$76,800, as follows:

Professional staff salaries.....	\$41,000
Administrative support staff.....	2,600
Travel.....	4,500
Photocopying.....	500
Other operating costs.....	<u>1,400</u>
Subtotal.....	\$50,000
Overhead (\$50,000 x 28%).....	<u>14,000</u>
Total cost.....	\$64,000
Markup (\$64,000 x 20%).....	<u>12,800</u>
Billing to Martin.....	<u>\$76,800</u>

5. Possible nontraceable costs include utilities, rent, depreciation, advertising, top management salaries, and insurance.
6. Professional staff members are compensated for attending training sessions and firm-wide planning meetings, paid vacations, and completion of general, non-client-related paperwork and reports. These activities benefit multiple clients, the consultant, and/or the overall firm, making traceability to specific clients difficult if not impossible.

PROBLEM 3-48 (30 MINUTES)

NOTE: Actual selling and administrative expense, although given in the exercise, is irrelevant to the solution.

1. Machining Dept. overhead rate = budgeted overhead ÷ budgeted machine hours
 = \$4,000,000 ÷ 400,000 = \$10 per machine hour

Assembly Dept. overhead rate = budgeted overhead ÷ budgeted direct-labor cost
 = \$3,080,000 ÷ \$5,600,000 = 55% of direct-labor cost

PROBLEM 3-48 (CONTINUED)

2. The ending work-in-process inventory is carried at a cost of \$153,530, computed as follows:

Machining Department:		
Direct material.....	\$24,500	
Direct labor.....	27,900	
Manufacturing overhead (360 x \$10).....	<u>3,600</u>	\$ 56,000
Assembly Department:		
Direct material.....	\$ 6,700	
Direct labor.....	58,600	
Manufacturing overhead (\$58,600 x 55%).....	<u>32,230</u>	<u>97,530</u>
Total cost.....		<u>\$153,530</u>

3. Actual overhead in the Machining Department amounted to \$4,260,000, whereas applied overhead totaled \$4,250,000 (425,000 hours x \$10). Thus, overhead was underapplied by \$10,000 during the year.
4. Actual overhead in the Assembly Department amounted to \$3,050,000, whereas applied overhead totaled \$3,179,000 (\$5,780,000 x 55%). Thus, overhead was overapplied by \$129,000.
5. The company's manufacturing overhead was overapplied by \$119,000 (\$129,000 - \$10,000). As a result, excessive overhead flowed from Work-in-Process Inventory, to Finished-Goods Inventory, to Cost of Goods Sold, meaning that the Cost of Goods Sold account must be decreased at year-end.
6. The Work-in-Process account is charged with applied overhead, or \$7,429,000 (\$4,250,000 + \$3,179,000).
7. The firm's selection of cost drivers (or application bases) seems appropriate. There should be a strong correlation between the cost driver and the amount of overhead incurred. In the Machining Department, much of the overhead is probably related to the operation of machines. Similarly, in the Assembly Department, a considerable portion of the overhead incurred is related to manual assembly (i.e., labor) operations.

PROBLEM 3-49 (25 MINUTES)

1. Predetermined overhead rate = $\frac{\text{budgeted manufacturing overhead}}{\text{budgeted machine hours}}$
 = $\frac{\$1,464,000}{73,200} = \$20 \text{ per machine hour}$

2. Journal entries:

(a)	Raw-Material Inventory	7,850	
	Accounts Payable		7,850
(b)	Work-in-Process Inventory	180	
	Raw-Material Inventory		180
(c)	Manufacturing Overhead	30	
	Manufacturing-Supplies Inventory.....		30
(d)	Manufacturing Overhead	800	
	Cash		800
(e)	Work-in-Process Inventory	75,000	
	Wages Payable		75,000
(f)	Selling and Administrative Expense	1,800	
	Prepaid Insurance		1,800
(g)	Raw-Material Inventory	3,000	
	Accounts Payable		3,000
(h)	Accounts Payable.....	1,700	
	Cash		1,700
(i)	Manufacturing Overhead	21,000	
	Wages Payable		21,000
(j)	Manufacturing Overhead	7,000	
	Accumulated Depreciation: Equipment..		7,000
(k)	Finished-Goods Inventory.....	1,100	
	Work-in-Process Inventory		1,100

PROBLEM 3-49 (CONTINUED)

(l)	Work-in-Process Inventory.....	140,000*	
	Manufacturing Overhead.....		140,000

*Applied manufacturing overhead = 7,000 machine hours × \$20 per hour.

(m)	Accounts Receivable.....	176,000	
	Sales Revenue.....		176,000
	Cost of Goods Sold.....	139,000	
	Finished-Goods Inventory.....		139,000

PROBLEM 3-50 (45 MINUTES)

1.

HURON CORPORATION
SCHEDULE OF COST OF GOODS MANUFACTURED
FOR THE YEAR ENDED DECEMBER 31, 20X2

Direct material:			
	Raw material inventory, 12/31/x1	\$ 89,000	
	Add: Purchases of raw material	<u>731,000</u>	
	Raw material available for use	\$820,000	
	Deduct: Raw-material inventory, 12/31/x2.....	<u>59,000</u>	
	Raw material used.....		\$761,000
	Direct labor		474,000
Manufacturing overhead:			
	Indirect material.....	\$ 45,000	
	Indirect labor.....	150,000	
	Depreciation on factory building.....	125,000	
	Depreciation on factory equipment	60,000	
	Utilities	70,000	
	Property taxes	90,000	
	Insurance	<u>40,000</u>	
	Total actual manufacturing overhead.....	\$580,000	
	Deduct: Underapplied overhead*	<u>2,500</u>	
	Overhead applied to work in process.....		<u>577,500</u>
	Total manufacturing costs.....		\$1,812,500
	Add: Work-in-process inventory, 12/31/x1		<u>-0-</u>
	Subtotal.....		\$1,812,500
	Deduct: Work-in-process inventory, 12/31/x2.....		<u>40,000</u>
	Cost of goods manufactured.....		<u>\$1,772,500</u>

*The Schedule of Cost of Goods Manufactured lists the manufacturing costs applied to work in process. Therefore, the underapplied overhead, \$2,500, must be deducted from total actual overhead to arrive at the amount of overhead applied to work in process. If there had been overapplied overhead, the balance would have been added to total manufacturing overhead.

The amount of underapplied overhead is found by subtracting the applied manufacturing overhead, \$577,500, from the total actual manufacturing overhead, \$580,000.

PROBLEM 3-50 (CONTINUED)

2.

**HURON CORPORATION
SCHEDULE OF COST OF GOODS SOLD
FOR THE YEAR ENDED DECEMBER 31, 20X2**

Finished-goods inventory, 12/31/x1	\$ 35,000
Add: cost of goods manufactured	<u>1,772,500</u>
Cost of goods available for sale	\$1,807,500
Deduct: Finished-goods inventory, 12/31/x2	<u>40,000</u>
Cost of goods sold	\$1,767,500
Add: Underapplied overhead*	<u>2,500</u>
Cost of goods sold (adjusted for underapplied overhead)	<u><u>\$1,770,000</u></u>

*The company closes underapplied or overapplied overhead into cost of goods sold. Hence the \$2,500 balance in underapplied overhead is added to cost of goods sold for the month.

3.

**HURON CORPORATION
INCOME STATEMENT
FOR THE YEAR ENDED DECEMBER 31, 20X2**

Sales revenue	\$2,105,000
Less: Cost of goods sold	<u>1,770,000</u>
Gross margin	\$ 335,000
Selling and administrative expenses	<u>269,000</u>
Income before taxes	\$ 66,000
Income tax expense	<u>25,000</u>
Net income	<u><u>\$ 41,000</u></u>

4. In the electronic version of the solutions manual, press the CTRL key and click on the following link: [Build a Spreadsheet 03-50.xls](#)

PROBLEM 3-51 (15 MINUTES)

1. \$40,000. Since there was no work-in-process inventory at the beginning of 20x2, all of the costs in the year-end work-in-process inventory were incurred during 20x2.
2. The direct-material cost would have been larger, probably by roughly 20 percent, because direct material is a variable cost.
3. Depreciation is a fixed cost, so it would not have been any larger if the firm's volume had increased.

PROBLEM 3-51 (CONTINUED)

4. Only the \$30,000 of equipment depreciation would have been included in manufacturing overhead on the Schedule of Cost of Goods Manufactured. The \$30,000 of depreciation related to selling and administrative equipment would have been treated as a period cost and expensed during 20x2.

PROBLEM 3-52 (30 MINUTES)

1.

MARCO POLO MAP COMPANY
SCHEDULE OF COST OF GOODS MANUFACTURED
FOR THE MONTH OF MARCH

Direct material:		
Raw-material inventory, March 1	\$ 17,000	
Add: March purchases of raw material	<u>113,000</u>	
Raw material available for use	\$130,000	
Deduct: Raw-material inventory, March 31	<u>26,000</u>	
Raw materials used		\$104,000
Direct labor		160,000 *
Manufacturing overhead applied (50% of direct labor)		<u>80,000</u>
Total manufacturing costs		\$344,000
Add: Work-in-process inventory, March 1		<u>40,000</u>
Subtotal		\$384,000
Deduct: Work-in-process inventory,		
March 31 (90% × \$40,000)		<u>36,000</u>
Cost of goods manufactured		<u>\$348,000</u> †

*Work upward from the bottom of the statement, using the information available. Direct labor + manufacturing overhead = total manufacturing costs – direct material cost = \$344,000 – \$104,000 = \$240,000. Since manufacturing overhead = 50% of direct labor, then manufacturing overhead = \$80,000 and direct labor = \$160,000.

†Cost of goods manufactured = cost of goods sold + increase in finished-goods inventory = \$345,000 + \$3,000 = \$348,000.

PROBLEM 3-52 (CONTINUED)

**2. MARCO POLO MAP COMPANY
SCHEDULE OF PRIME COSTS
FOR THE MONTH OF MARCH**

Raw material:	
Beginning inventory	\$ 17,000
Add: Purchases	<u>113,000</u>
Raw material available for use.....	\$130,000
Deduct: Ending inventory	<u>26,000</u>
Raw material used	\$104,000
Direct labor	<u>160,000</u>
Total prime costs.....	<u>\$264,000</u>

**3. MARCO POLO MAP COMPANY
SCHEDULE OF CONVERSION COSTS
FOR THE MONTH OF MARCH**

Direct labor.....	\$160,000
Manufacturing overhead applied (50% of direct labor).....	<u>80,000</u>
Total conversion cost.....	<u>\$240,000</u>

PROBLEM 3-53 (30 MINUTES)

$$\begin{aligned}
 1. \quad \text{Predetermined overhead rate} &= \frac{\text{budgeted manufacturing overhead}}{\text{budgeted machine hours}} \\
 &= \frac{\$235,000}{47,000} = \$5 \text{ per machine hour}
 \end{aligned}$$

2. Calculation of applied manufacturing overhead:

$$\text{Applied manufacturing overhead} = \text{machine hrs. used} \times \text{predetermined overhead rate}$$

$$\$20,000 = 4,000 \text{ hrs.} \times \$5 \text{ per hr.}$$

3. Underapplied overhead = actual overhead – applied overhead

$$\$6,000 = \$26,000 - \$20,000$$

4. Cost of Goods Sold.....	6,000	
Manufacturing Overhead.....		6,000

PROBLEM 3-53 (CONTINUED)

5. (a) Calculation of proration amounts:

Account	Explanation	Amount*	Percentage	Calculation of Percentage
Work in Process	Job P82 only	\$ 2,500	12.5%	2,500 ÷ 20,000
Finished Goods	Job N08 only	12,500	62.5%	12,500 ÷ 20,000
Cost of Goods Sold				
Sold	Job A79 only	<u>5,000</u>	<u>25.0%</u>	5,000 ÷ 20,000
Total		<u>\$20,000</u>	<u>100.0%</u>	

*Machine hours used on job × predetermined overhead rate.

Account	Underapplied Overhead	×	Percentage	Amount Added to Account
Work in Process	\$6,000	×	12.5%	\$ 750
Finished Goods	6,000	×	62.5%	3,750
Cost of Goods Sold	6,000	×	25.0%	<u>1,500</u>
Total				<u>\$6,000</u>

(b) Journal entry:

Work-in-Process Inventory.....	750	
Finished-Goods Inventory.....	3,750	
Cost of Goods Sold.....	1,500	
Manufacturing Overhead.....		6,000

PROBLEM 3-54 (40 MINUTES)

1. In accordance with the IMA Statement of Ethical Professional Practice, the appropriateness of Marc Jackson's three alternative courses of action is described as follows:

(a) *Follow Brown's directive and do nothing further.* This action is inappropriate as Jackson has ethical responsibilities to take further action in accordance with the following standards of ethical conduct.

PROBLEM 3-54 (CONTINUED)

Competence:

- Maintain an appropriate level of professional expertise by continually developing knowledge and skills.
- Perform professional duties in accordance with relevant laws, regulations, and technical standards.
- Provide decision support information and recommendations that are accurate, clear, concise, and timely.
- Recognize and communicate professional limitations or other constraints that would preclude responsible judgment or successful performance of an activity.

Integrity:

- Mitigate actual conflicts of interest. Regularly communicate with business associates to avoid apparent conflicts of interest. Advise all parties of any potential conflicts.
- Refrain from engaging in any conduct that would prejudice carrying out duties ethically.
- Abstain from engaging in or supporting any activity that might discredit the profession.

Credibility:

- Communicate information fairly and objectively.

- Disclose all relevant information that could reasonably be expected to influence an intended user’s understanding of the reports, analyses, or recommendations.
- Disclose delays or deficiencies in information, timeliness, processing, or internal controls in conformance with organization policy and/or applicable law.

(b) Attempt to convince Brown to make the proper adjustments and to advise the external auditors of her actions. This action is appropriate as Jackson has taken the ethical conflict to his immediate superior for resolution. Unless Jackson suspects that his superior is involved, this alternative is the first step for the resolution of an ethical conflict.

PROBLEM 3-54 (CONTINUED)

(c) Tell the Audit Committee of the Board of Directors about the problem and give them the appropriate accounting data. This action is not appropriate as a first step since the resolution of ethical conflicts requires Jackson to first discuss the matter with his immediate superior.

2. The next step that Jackson should take in resolving this conflict is to inform Brown that he is planning to discuss the conflict with the next higher managerial level. Jackson should pursue discussions with successively higher levels of management, including the Audit Committee and the Board of Directors, until the matter is satisfactorily resolved. At the same time, Jackson should “clarify relevant concepts by confidential discussion with an objective advisor to obtain an understanding of possible courses of action.” If the ethical conflict still exists after exhausting all levels of internal review, Jackson may have no course other than to resign from the organization.

PROBLEM 3-55 (25 MINUTES)

- 1.

Quarter	Predetermined Overhead Rate	Calculations
1 st	\$4 per hour	\$100,000/25,000
2 nd	5 per hour	\$80,000/16,000
3 rd	4 per hour	\$50,000/12,500
4 th	5 per hour	\$70,000/14,000

2.

	January	April
Direct material.....	\$100	\$100
Direct labor	300	300
Manufacturing overhead:		
20 hrs × \$4 per hr	80	
20 hrs × \$5 per hr		<u>100</u>
Total cost	<u>\$480</u>	<u>\$500</u>

3.

	January	April
Total cost	\$480	\$500
Markup (10%)	<u>48</u>	<u>50</u>
Price.....	<u>\$528</u>	<u>\$550</u>

4. Predetermined rate = $\frac{\text{annual budgeted manufacturing overhead}}{\text{annual budgeted direct-labor hours}}$

$$= \frac{\$300,000}{67,500} = \$4.44 \text{ per hour (rounded)}$$

5.

	January	April
Direct material.....	\$100.00	\$100.00
Direct labor	300.00	300.00
Manufacturing overhead (20 hrs × \$4.44)...	<u>88.80</u>	<u>88.80</u>
Total cost	<u>\$488.80</u>	<u>\$488.80</u>

PROBLEM 3-55 (CONTINUED)

6. Total cost	\$488.80
Markup (10%)	<u>48.88</u>
Price.....	<u>\$537.68</u>

Notice that with quarterly overhead rates, the firm may underprice its product in January and overprice it in April.

PROBLEM 3-56 (45 MINUTES)

1. Predetermined overhead rate:

$$\frac{\text{Budgeted manufacturing overhead}}{\text{Budgeted direct-labor hours}} = \frac{\$606,000^*}{120,000} = \$5.05 \text{ per direct-labor hour}$$

*Budgeted manufacturing overhead = variable overhead + fixed overhead
 $\$606,000 = \$390,000 + \$216,000$

2. Cost of job 77:

Cost in beginning work-in-process inventory	\$ 54,000
Direct material	45,000
Direct labor (3,500 hours × \$24.00 per hour)*	84,000
Applied manufacturing overhead (3,500 hours × \$5.05 per hour).....	<u>17,675</u>
Total cost	<u><u>\$200,675</u></u>

*Direct-labor rate = $\frac{\text{direct-labor wages}}{\text{direct-labor hours}} = \frac{\$204,000}{8,500} = \$24.00 \text{ per hour}$

3. Manufacturing overhead applied to job 79:

$$\text{Direct-labor hours} \times \text{predetermined overhead rate} = 2,000 \text{ hours} \times \$5.05 \text{ per hour} = \$10,100$$

PROBLEM 3-56 (CONTINUED)

4. Total manufacturing overhead applied during November:

$$\text{Total direct-labor hours} \times \text{predetermined overhead rate} = 8,500 \text{ hours} \times \$5.05 = \$42,925$$

5. Actual manufacturing overhead incurred during November:

Indirect material (supplies).....	\$12,000
-----------------------------------	----------

Indirect-labor wages	15,000
Supervisory salaries	6,000
Building occupancy costs, factory facilities	6,400
Production equipment costs	<u>8,100</u>
Total	<u>\$47,500</u>

6. Underapplied overhead for November:

$$\begin{aligned}
 &\text{Actual manufacturing overhead – applied manufacturing overhead} \\
 &= \$47,500 – \$42,925 \\
 &= \$4,575 \text{ underapplied}
 \end{aligned}$$

PROBLEM 3-57 (75 MINUTES)

1. Predetermined overhead rate = $\frac{\text{budgeted manufacturing overhead}}{\text{budgeted direct - labor hours}}$

$$= \frac{\$426,300}{20,300} = \$21 \text{ per direct - labor hour}$$

2. Journal entries:

(a) Raw-Material Inventory	5,000	
Accounts Payable		5,000
(b) Raw-Material Inventory	4,000	
Accounts Payable		4,000
(c) Work-in-Process Inventory	11,250*	
Raw-Material Inventory		11,250
*(250 sq. ft. × \$5 per sq. ft.) + (1,000 lbs. × \$10 per lb.)		
Manufacturing Overhead**	100	
Manufacturing-Supplies Inventory.....		100

**Valve lubricant is an indirect material, so it is considered an overhead cost.

(d) Work-in-Process Inventory	34,000
Manufacturing Overhead	13,000

Wages Payable		47,000
Work-in-Process Inventory	35,700*	
Manufacturing Overhead		35,700

*Applied manufacturing overhead = 1,700 direct-labor hours × \$21 per hour.

(e) Manufacturing Overhead	12,000	
Accumulated Depreciation: Building and Equipment.....		12,000
(f) Manufacturing Overhead	1,200	
Cash		1,200

PROBLEM 3-57 (CONTINUED)

(g) Manufacturing Overhead	2,100	
Accounts Payable		2,100
(h) Manufacturing Overhead	2,400	
Cash		2,400
(i) Manufacturing Overhead	3,100	
Prepaid Insurance		3,100
(j) Selling and Administrative Expenses	8,000	
Cash		8,000
(k) Selling and Administrative Expenses	4,000	
Accumulated Depreciation: Buildings and Equipment.....		4,000
(l) Selling and Administrative Expenses	1,000	
Cash		1,000
(m) Finished-Goods Inventory	34,050*	
Work-in-Process Inventory		34,050

*Cost of Job T81:

Direct material (250 × \$5).....	\$ 1,250
Direct labor (800 × \$20).....	16,000

Manufacturing overhead (800 × \$21) ..	<u>16,800</u>
Total cost	<u>\$34,050</u>

(n) Accounts Receivable	26,600*	
Sales Revenue		26,600
*(76 ÷ 2) × \$700 per trombone		.
Cost of Goods Sold	17,025**	
Finished-Goods Inventory		17,025

**17,025 = \$34,050 ÷ 2

PROBLEM 3-57 (CONTINUED)

3. T-accounts and posting of journal entries:

Cash	
Bal	10,000
	1,200 (f)
	2,400 (h)
	8,000 (j)
	1,000 (l)

Accounts Payable	
	13,000 Bal
	5,000 (a)
	4,000 (b)
	2,100 (g)

Accounts Receivable	
Bal.	21,000
(n)	26,600

Wages Payable	
	8,000 Bal.
	47,000 (d)

Prepaid Insurance	
Bal.	5,000
	3,100 (i)

Accumulated Depreciation: Buildings and Equipment	
	102,000 Bal.
	12,000 (e)
	4,000 (k)

Manufacturing-Supplies Inventory	
Bal.	500
	100 (c)

Manufacturing Overhead	
(c)	100 35,700 (d)
(d)	13,000
(e)	12,000
(f)	1,200
(g)	2,100
(h)	2,400

				(i)	3,100		
Raw-Material Inventory				Cost of Goods Sold			
Bal.	149,000			(n)	17,025		
(a)	5,000	11,250	(c)				
(b)	4,000						
Work-in-Process Inventory				Selling and Administrative Expenses			
Bal.	91,000			(j)	8,000		
(c)	11,250	34,050	(m)	(k)	4,000		
(d)	34,000			(l)	1,000		
(d)	35,700						

PROBLEM 3-57 (CONTINUED)

Finished-Goods Inventory				Sales Revenue			
Bal.	220,000				26,600	(n)	
(m)	34,050	17,025	(n)				

4. (a) Calculation of actual overhead:

Indirect material (valve lubricant).....	\$ 100
Indirect labor	13,000
Depreciation: factory building and equipment.....	12,000
Rent: warehouse.....	1,200
Utilities.....	2,100
Property taxes.....	2,400
Insurance.....	3,100
Total actual overhead	<u>\$33,900</u>

(b) Overapplied overhead = $\left(\begin{matrix} \text{actual manufacturing} \\ \text{overhead} \end{matrix} \right) - \left(\begin{matrix} \text{applied manufacturing} \\ \text{overhead} \end{matrix} \right)$

= \$33,900 – \$35,700*

= \$1,800 overapplied

*\$35,700 = 1,700 direct-labor hours × \$21 per hour.

(c) Manufacturing Overhead.....	1,800	
Cost of Goods Sold		1,800

PROBLEM 3-57 (CONTINUED)

5.

**SCHOLASTIC BRASS CORPORATION
SCHEDULE OF COST OF GOODS MANUFACTURED
FOR THE MONTH OF MARCH**

Direct material:		
Raw-material inventory, March 1.....	\$149,000	
Add: March purchases of raw material.....	<u>9,000</u>	
Raw material available for use	\$158,000	
Deduct: Raw-material inventory, March 31	<u>146,750</u>	
Raw material used.....		\$ 11,250
Direct labor		34,000
Manufacturing overhead:		
Indirect material.....	\$ 100	
Indirect labor.....	13,000	
Depreciation on factory building and equipment ..	12,000	
Rent: Warehouse.....	1,200	
Utilities	2,100	
Property taxes	2,400	
Insurance	<u>3,100</u>	
Total actual manufacturing overhead.....	\$33,900	
Add: overapplied overhead*	<u>1,800</u>	
Overhead applied to work in process.....		<u>35,700</u>
Total manufacturing costs.....		\$ 80,950
Add: Work-in-process inventory, March 1.....		<u>91,000</u>
Subtotal		\$171,950
Deduct: Work-in-process inventory, March 31.....		<u>137,900</u>
Cost of goods manufactured†.....		<u>\$ 34,050</u>

*The Schedule of Cost of Goods Manufactured lists the manufacturing costs *applied* to work in process. Therefore, the overapplied overhead, \$1,800, must be added to actual overhead to arrive at the amount of overhead *applied* to work in process during March.

†Cost of Job T81, which was completed during March.

PROBLEM 3-57 (CONTINUED)

6.

**SCHOLASTIC BRASS CORPORATION
SCHEDULE OF COST OF GOODS SOLD
FOR THE MONTH OF MARCH**

Finished-goods inventory, March 1	\$220,000
Add: Cost of goods manufactured.....	<u>34,050</u>
Cost of goods available for sale.....	\$254,050
Deduct: Finished-goods inventory, March 31	<u>237,025</u>
Cost of goods sold	\$ 17,025
Deduct: Overapplied overhead*	<u>1,800</u>
Cost of goods sold (adjusted for overapplied overhead).....	<u>\$ 15,225</u>

*The company closes underapplied or overapplied overhead into cost of goods sold. Hence the balance in overapplied overhead is deducted from cost of goods sold for the month.

7. **SCHOLASTIC BRASS CORPORATION**
INCOME STATEMENT
FOR THE MONTH OF MARCH

Sales revenue	\$26,600
Less: Cost of goods sold	<u>15,225</u>
Gross margin.....	\$11,375
Selling and administrative expenses.....	<u>13,000</u>
Income (loss)	<u>\$ (1,625)</u>

PROBLEM 3-58 (20 MINUTES)

JOB-COST RECORD				
Job Number	T81	Description	Trombones	
Date Started	March 5	Date Completed	March 20	
		Number of Units Completed	76	
Direct Material				
Date	Requisition Number	Quantity	Unit Price	Cost
3/5	112	250	\$5.00	\$1,250
Direct Labor				
Date	Time Card Number	Hours	Rate	Cost
3/8 to 3/12	3-08 through 3-12	800	\$20	\$16,000

Manufacturing Overhead				
Date	Activity Base	Quantity	Application Rate	Cost
3/8 to 3/12	Direct-labor hours	800	\$21	\$16,800

Cost Summary	
Cost Item	Amount
Total direct material	\$ 1,250
Total direct labor	16,000
Total manufacturing overhead	16,800
Total cost	\$34,050
Unit cost	\$448.03*

Shipping Summary			
Date	Units Shipped	Units Remaining In Inventory	Cost Balance
March	38	38	\$17,025†

*Rounded

†\$17,025 = \$34,050 ÷ 2

PROBLEM 3-59 (55 MINUTES)

The answers to the questions are as follows:

- | | |
|--------------|--------------|
| 1. \$216,000 | 6. \$60,000 |
| 2. \$19,000 | 7. \$150,000 |
| 3. \$70,000 | 8. \$40,000 |
| 4. \$38,000 | 9. \$15,000 |
| 5. \$80,000 | 10. Zero |

The completed T accounts, along with supporting calculations, follow.

Raw-Material Inventory			Accounts Payable		
Bal. 10/31	15,000	40,000	81,000	12,000	Bal. 10/31
	70,000			70,000	
Bal. 11/30	45,000			1,000	Bal. 11/30
Work-in-Process Inventory			Finished-Goods Inventory		

Bal. 10/31	8,000	150,000
Direct material	40,000	
Direct labor	80,000	
Overhead	60,000	
Bal. 11/30	38,000	

Bal. 10/31	35,000	180,000
	150,000	
Bal. 11/30	5,000	180,000
Cost of Goods Sold		
		180,000

Manufacturing Overhead	
60,000	60,000

Sales Revenue	
	216,000

Wages Payable		
	1,000	Bal. 10/31
79,500	80,000	
	1,500	Bal. 11/30

Accounts Receivable		
Bal. 10/31	8,000	
	216,000	205,000
Bal. 11/30	19,000	

Supporting Calculations:

1. Sales revenue = cost of goods sold × 120%
 = \$180,000 × 120%
 = \$216,000

PROBLEM 3-59 (CONTINUED)

2. Ending balance in accounts receivable = beginning balance + sales revenue – collections
 = \$8,000 + \$216,000 – \$205,000
 = \$19,000

3. Purchases of raw material = addition to accounts payable

Addition to accounts payable = ending balance + payments – beginning balance
 = \$1,000 + \$81,000 – \$12,000
 = \$70,000

$$\begin{aligned}
 4. \quad \text{November 30 balance in work-in-process inventory} &= \text{direct material} + \text{direct labor} + \text{manufacturing overhead} \\
 &= \$20,500 + (500)(\$20) + (500)(\$15^*) \\
 &= \$38,000 \\
 \\
 \text{*Predetermined overhead rate} &= \frac{\text{budgeted overhead}}{\text{budgeted direct-labor hours}^\dagger} \\
 &= \frac{\$720,000}{48,000} \\
 &= \$15 \text{ per direct-labor hour} \\
 \\
 \text{†Budgeted direct-labor hours} &= \frac{\text{budgeted direct-labor cost}}{\text{direct-labor rate}} = \frac{\$960,000}{\$20} = 48,000 \\
 \\
 5. \quad \text{Addition to work in process for direct labor} &= \text{November credit to wages payable} \\
 \\
 \text{November credit to wages payable} &= \text{ending balance} + \text{payments} - \text{beginning balance} \\
 &= \$1,500 + \$79,500 - \$1,000 \\
 &= \$80,000
 \end{aligned}$$

PROBLEM 3-59 (CONTINUED)

$$\begin{aligned}
 6. \quad \text{November applied overhead} &= \text{direct labor hours} \times \text{predetermined overhead rate} \\
 &= 4,000^* \times \$15 \\
 &= \$60,000 \\
 \\
 \text{Direct labor hours} &= \frac{\text{addition to work in process for direct labor}}{\text{direct-labor rate}} \\
 &= \frac{\$80,000}{\$20} = 4,000 \text{ hours}
 \end{aligned}$$

7. Cost of goods completed during November = $\frac{\text{beginning balance in work in process} + \text{additions during November} - \text{ending balance in work in process}}$
 = \$8,000 + (\$40,000 + \$80,000 + \$60,000) – \$38,000
 = \$150,000
8. Raw material used in November = November credit to raw-material inventory = \$40,000 (given)
9. October 31 balance in raw-material inventory = $\frac{\text{November 30 balance in raw-material inventory} + \text{direct material used} - \text{purchases}}{\text{used}}$
 = \$45,000 + \$40,000 – \$70,000
 = \$15,000
10. Overapplied or underapplied overhead = actual overhead – applied overhead
 = \$60,000 – \$60,000
 = 0

PROBLEM 3-60 (50 MINUTES)

1. Schedule of budgeted overhead costs:

	Department A	Department B
Variable overhead		
A 20,000 × \$16.....	\$320,000	
B 20,000 × \$4.....		\$ 80,000
Fixed overhead.....	<u>200,000</u>	<u>200,000</u>
Total overhead.....	<u>\$520,000</u>	<u>\$280,000</u>
Grand total of budgeted overhead (A + B):	\$800,000	

$$\begin{aligned} \text{Predetermined overhead rate} &= \frac{\text{total budgeted overhead rate}}{\text{total budgeted direct-labor hours}} \\ &= \frac{\$800,000}{40,000} = \$20 \text{ per hour} \end{aligned}$$

2. Product prices:

	Basic System	Advanced System
Total cost	\$1,100	\$1,500
Markup, 10% of cost.....	<u>110</u>	<u>150</u>
Price	<u>\$1,210</u>	<u>\$1,650</u>

3. Departmental overhead rates:

	Department A	Department B
Budgeted overhead (from requirement 1)	\$520,000	\$280,000
Budgeted direct-labor hours	20,000	20,000
Predetermined overhead rates.....	<u>\$520,000</u> 20,000	<u>\$280,000</u> 20,000
	\$26 per direct-labor hour	\$14 per direct-labor hour

PROBLEM 3-60 (CONTINUED)

4. New product costs:

	Basic System	Advanced System
Direct material	\$ 400	\$ 800
Direct labor	300	300
Manufacturing overhead:		
Department A:		
Basic system 5 × \$26.....	130	
Advanced system 15 × \$26		390
Department B:		
Basic system 15 × \$14.....	210	
Advanced system 5 × \$14		<u>70</u>
Total	<u>\$1,040</u>	<u>\$1,560</u>

5. New product prices:

	Basic System	Advanced System
Total cost	\$1,040	\$1,560
Markup, 10% of cost.....	<u>104</u>	<u>156</u>
Price	<u>\$1,144</u>	<u>\$1,716</u>

PROBLEM 3-60 (CONTINUED)

6. TELETECH CORPORATION

Memorandum

Date: Today
 To: President, TeleTech Corporation
 From: I. M. Student
 Subject: Departmental overhead rates

Until now the company has used a single, plantwide overhead rate in computing product costs. This approach resulted in a product cost of \$1,100 for the basic system and a cost of \$1,500 for the advanced system. Under the company's pricing policy of adding a 10 percent markup, this yielded prices of \$1,210 for the basic system and \$1,650 for the advanced system.

When departmental overhead rates are computed, it is apparent that the two production departments have very different cost structures. Department A is a relatively expensive department to operate, while Department B is less costly. It is important to recognize the different rates of cost incurrence in the two departments, because our two products require different amounts of time in the two departments. The basic system spends most of its time in Department B, the inexpensive department. The advanced system spends most of its time in Department A, the more expensive department. Thus, using departmental overhead rates shows that the basic system costs less than we had previously realized; the advanced system costs more. The revised product costs are \$1,040 and \$1,560 for the basic and advanced systems, respectively. With a 10 percent markup, these revised product costs yield prices of \$1,144 for the basic system and \$1,716 for the

advanced system. We have been overpricing the basic system and underpricing the advanced system.

I recommend that the company switch to a product costing system that incorporates departmental overhead rates.

SOLUTIONS TO CASES

CASE 3-61 (45 MINUTES)

1. A job-order costing system is appropriate in any environment where costs can be readily identified with specific products, batches, contracts, or projects. This situation typically occurs in a manufacturing setting when relatively small numbers of heterogeneous products are produced.
2. The only job remaining in CompuFurn's work-in-process inventory on December 31 is job PS812. The cost of job PS812 can be calculated as follows:

Job PS812 balance, 11/30.....		\$250,000	
December additions:			
Direct material	\$124,000		
Purchased parts	87,000		
Direct labor	200,500		
Manufacturing overhead (19,500 machine hrs × \$5*)	<u>97,500</u>	<u>509,000</u>	
Work-in-process inventory, 12/31			<u>\$759,000</u>

$$* \text{ Manufacturing overhead rate} = \frac{\$4,500,000}{900,000 \text{ hours}} = \$5 \text{ per machine hour}$$

3. The cost of the chairs remaining in CompuFurn's finished-goods inventory on December 31 is \$455,600, calculated as follows:

- Units of chairs in finished-goods inventory on December 31:

	Chair Units
Finished-goods inventory, 11/30	19,400
Add: Units completed in December	<u>15,000</u>
Units available.....	34,400
Deduct: Units shipped in December	<u>21,000</u>
Finished-goods inventory, 12/31	<u>13,400</u>

CASE 3-61 (CONTINUED)

Since CompuFurn uses the first-in, first-out (FIFO) inventory method, all units remaining in finished- goods inventory were completed in December.

- Unit cost of chairs completed in December:

Work in process inventory, 11/30		\$431,000
December additions:		
Direct material	\$ 3,000	
Purchased parts.....	10,800	
Direct labor.....	43,200	
Manufacturing overhead (4,400 machine hrs × \$5)	<u>22,000</u>	<u>79,000</u>
Total cost.....		<u>\$510,000</u>

$$\text{Unit cost} = \frac{\text{total cost}}{\text{units completed}} = \frac{\$510,000}{15,000} = \$34 \text{ per unit}$$

- Cost of finished-goods inventory = unit cost × quantity
= \$34 × 13,400
= \$455,600

4. Overapplied overhead is \$7,500, calculated as follows:

Machine hours used:

January through November	830,000
December.....	<u>49,900</u>
Total.....	<u>879,900</u>

Applied manufacturing overhead = 879,900 machine hours × \$5 = \$4,399,500

Actual manufacturing overhead:

January through November	\$4,140,000
December.....	<u>252,000</u>
Total.....	<u>\$4,392,000</u>

Overapplied overhead = applied overhead – actual overhead
= \$4,399,500 – \$4,392,000
= \$7,500

CASE 3-61 (CONTINUED)

5. If the amount of overapplied or underapplied overhead is not significant, the amount is generally treated as a period cost and closed to Cost of Goods Sold. If the amount is significant, the amount is sometimes prorated over the relevant accounts, i.e., Work-in-Process Inventory, Finished-Goods Inventory, and Cost of Goods Sold.

CASE 3-62 (50 MINUTES)

1. Manufacturers use predetermined overhead rates to allocate to production jobs the production costs that are not directly traceable to specific jobs. As a result, management will have timely, accurate job-cost information. Predetermined overhead rates are easy to apply and avoid fluctuations in job costs caused by changes in production volume or overhead costs throughout the year.
2. The manufacturing overhead applied through November 30 is calculated as follows:

$$\text{Machine hours} \times \text{predetermined overhead rate} = \text{overhead applied}$$

$$73,000 \times \$15 = \$1,095,000$$

3. The manufacturing overhead applied in December is calculated as follows:

$$\text{Machine hours} \times \text{predetermined overhead rate} = \text{overhead applied}$$

$$6,000 \times \$15 = \$90,000$$

4. Underapplied manufacturing overhead through December 31 is calculated as follows:

Actual overhead (\$1,100,000 + \$96,000).....	\$1,196,000
Applied overhead (\$1,095,000 + \$90,000)	(1,185,000)
Underapplied overhead.....	<u>\$ 11,000</u>

CASE 3-62 (CONTINUED)

5. The balance the Finished-Goods Inventory account on December 31 is comprised only of Job No. N11-013 and is calculated as follows:

November 30 balance for Job No. N11-013	\$55,000
December direct material.....	4,000
December direct labor.....	12,000
December overhead (1,000 × \$15).....	<u>15,000</u>
Total finished-goods inventory	<u>\$86,000</u>

6. FiberCom’s Schedule of Cost of Goods Manufactured for the year just completed is constructed as follows:

**FIBERCOM COMPANY
SCHEDULE OF COST OF GOODS MANUFACTURED
FOR THE YEAR ENDED DECEMBER 31**

Direct material:		
Raw-material inventory, 1/1		\$ 105,000
Raw-material purchases (\$965,000 + \$98,000)		<u>1,063,000</u>
Raw material available for use		\$1,168,000
Deduct: Indirect material used (\$125,000 + \$9,000)	\$134,000	
Raw-material inventory 12/31	<u>85,000</u>	<u>219,000</u>
Raw material used.....		\$ 949,000
Direct labor (\$845,000 + \$80,000)		925,000
Manufacturing overhead:		
Indirect material (\$125,000 + \$9,000).....	\$134,000	
Indirect labor (\$345,000 + \$30,000)	375,000	
Utilities (\$245,000 + \$22,000)	267,000	
Depreciation (\$385,000 + \$35,000)	<u>420,000</u>	
Total actual manufacturing overhead.....		1,196,000
Deduct: Underapplied overhead		<u>11,000</u>
Overhead applied to work in process.....		<u>\$1,185,000</u>
Total manufacturing costs.....		<u>\$3,059,000</u>
Add: Work-in-process inventory, 1/1		<u>60,000</u>
Subtotal.....		\$3,119,000
Deduct: Work-in-process inventory, 12/31*		<u>150,200</u>
Cost of goods manufactured.....		<u>\$2,968,800</u>

*Supporting calculations follow.

CASE 3-62 (CONTINUED)

***Supporting calculations for work in process 12/31:**

	D12-002	D12-003	Total
Direct material	\$37,900	\$26,000	\$ 63,900
Direct labor	20,000	16,800	36,800
Applied overhead:			
2,500 hrs. × \$15	37,500		37,500
800 hrs. × \$15		<u>\$12,000</u>	<u>12,000</u>
Total	<u>\$95,400</u>	<u>\$54,800</u>	<u>\$150,200</u>

FOCUS ON ETHICS (See page 109 in the text.)

Did Boeing exploit accounting rules to conceal cost overruns and production snafus?

According to the circumstances alleged in the *Business Week* article cited in the text (page 000), Boeing did not handle its cost overruns, production problems, and the merger with McDonnell-Douglas in a transparent manner. Boeing allegedly acted to conceal its worsening operational problems through “earnings management” to ensure that the merger would be approved by the stockholders of both companies. While the method of “program accounting” is common in the aircraft industry, in this rather extreme case that accounting method did not result in a fair portrayal of the company’s financial and operational situation. As a result, the merger was approved on the basis of alleged misleading information, and it is the investors who will bear the brunt of this action.

The company’s top executives and their accountants must share the responsibility for these actions, the former for providing the data and the latter for approving it for public release. No accounting system should be used as a tool to cover up operational problems and mislead shareholders. One wonders also what the auditors were doing to assess the accuracy of the accounting information.

[Final version]