*CHAPTER 3*

Product Costing and Cost Accumulation in a Batch Production Environment

# Focus on ethics (Located before the Chapter Summary 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, 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.

# 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.

1. Use in managerial accounting: In managerial accounting, product costs are needed for planning, for cost control, and for decision making.
2. 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 would assign overhead costs as part of the cost of goods sold. At a retailer, such costs tend to be the support costs associated with moving products to be sold, controlling those products (theft prevention), and management of the operation.

3-22 A non-profit organization would assign overhead costs as part of the cost of services delivered. At a non-profit organization, such costs would include the support costs required to be able to deliver the services that are included in their mission. These can include such items as supervision, transportation, security, and governmental reporting.

# 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. |  |
|  |  |  |
|  | (a) | At 200,000 chicken volume: |
|  |  |  |
|  |  |  |
|  |  |  |
|  | (b) | At 300,000 chicken volume: |
|  |  |  |
|  |  |  |
|  |  |  |
|  | (c) | At 400,000 chicken volume: |
|  |  |  |
|  |  |  |

## 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 (40 x $17)  |  | 680 |
|  |  Manufacturing Overhead (40 x ($5)  |  | 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 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  | $325,000 |
|  | Deduct: Raw-material inventory, January 31  |  124,000 |
|  | Raw material used in January  | $201,000 |
|  | Direct labor  |  300,000 |
|  | Total prime costs incurred in January  | $501,000 |
|  |  |  |
| 2. | Total prime cost incurred in January  | $501,000 |
|  | Applied manufacturing overhead (60% × $300,000)  |  180,000 |
|  | Total manufacturing cost for January  | $681,000 |

## Exercise 3-27 (continued)

|  |  |  |
| --- | --- | --- |
| 3. | Total manufacturing cost for January  | $681,000 |
|  | Add: Work-in-process inventory, January 1  |  235,000 |
|  | Subtotal  | $916,000 |
|  | Deduct: Work-in-process inventory, January 31  |  251,000 |
|  | Cost of goods manufactured  | $665,000 |

|  |  |  |
| --- | --- | --- |
| 4. | Finished-goods inventory, January 1  | $125,000 |
|  | Add: Cost of goods manufactured  |  665,000 |
|  | Cost of goods available for sale  | $790,000 |
|  | Deduct: Finished-goods inventory, January 31  |  117,000 |
|  | Cost of goods sold  | $673,000 |
|  |  |
|  | 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  |  175,000 |
|  | Overapplied overhead as of January 31  | $ 5,000 |
|  |  |
|  | 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)

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Applied manufacturing overhead | = | total manufacturing costs30% |
|  |  | = | $2,500,00030% |
|  |  | = | $750,000 |
|  |  |  |  |
|  | Applied manufacturing overhead | = | direct-labor cost80% |
|  |  |  |  |
|  | Direct-labor cost | = | applied manufacturing overhead80% |
|  |  | = | $750,000.8 |
|  |  | = | $937,500 |

|  |  |  |  |
| --- | --- | --- | --- |
| 2. | Direct-material cost | = | total manufacturing cost |
|  |  |  | – direct labor cost |
|  |  |  | – applied manufacturing overhead |
|  |  | = | $2,500,000 – $937,500 – $750,000 |
|  |  | = | $812,500 |
|  |  |
| 3. | Let *X* denote work-in-process inventory on December 31. |
|  |  |  |  |  |  |  |
| Total |  | work-in-process |  | work-in-process |  | cost of |
| manufacturing | + | inventory, | – | inventory, | = | goods |
| cost |  | Jan.1 |  | Dec. 31 |  | manufactured |
|  |  |  |  |  |  |  |
| $2,500,000 | + | .75*X* | – | *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  | TB78 | Description | teddy bears |  |
|  |  |  |  |  |  |  |
|  | Date Started  | 4/1 | Date Completed | 4/15 |  |
|  |  |  |  |  |  |  |
|  |  |  | Number of Units Completed | 1,000 |  |
|  |  |  |  |  |  |  |
|  | 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 MaterialTotal Direct LaborTotal Manufacturing Overhead |  $  470 6,000 1,000 |  |
|  | Total Cost |  $7,470 |  |
|  | Unit Cost |  $ 7.47 |  |
|  |  |  |  |
|  | Shipping Summary |  |
|  | Date | Units Shipped | Units RemainingIn 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 CompanySchedule of Cost of Goods ManufacturedFor the Year Ended December 31, 20x1 |
|  |
|  |
|  | Direct material: |  |  |
|  |  Raw-material inventory, January 1  | $ 30,000 |  |
|  |  Add: Purchases of raw material  |  278,000 |  |
|  |  Raw material available for use  | $308,000 |  |
|  |  Deduct: Raw-material inventory, December 31  |   33,000 |  |
|  |  Raw material used  |  | $275,000  |
|  | Direct labor  |  | 120,000 |
|  | Manufacturing overhead |  |  252,000 | \* |
|  | Total manufacturing costs  |  | $647,000 |
|  | Add: Work-in-process inventory, January 1  |  |   39,000 |
|  | Subtotal  |  | $686,000 |
|  | Deduct: Work-in-process inventory, December 31  |  |   42,900 |
|  | Cost of goods manufactured  |  | $643,100 |

\*Applied manufacturing overhead is $252,000 ($120,000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  |  643,100 |
|  | Cost of goods available for sale  | $685,100 |
|  | Deduct: Finished-goods inventory, December 31  |   46,200 |
|  | Cost of goods sold  | $638,900 |

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|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Raw-Material Inventory |  | Work-in-Process Inventory |
|  | 227,000 |  |  |  18,000 |  |
|  |  |  | 174,000 |  |  |  DM 174,000 |  |
|  |  53,000 |  |  | DL 324,000 |  |
|  |  |  |  | MOH 180,000 |  |
|  | Wages Payable |  |  |  | 120,000 |  |
|  |  | 324,000 |  | 576,000 |  |
|  |  |  |  |  |  |
|  | Manufacturing Overhead |  | Finished-Goods Inventory |
|  |  | 180,000 |  |  30,000 |  |
|  |  |  |  | 120,000 |  |
|  | Sales Revenue |  |  |  | 132,000 |  |
|  |  | 195,000 |  |  18,000 |  |
|  |  |  |  |  |  |
|  | Accounts Receivable |  | Cost of Goods Sold |
|  | 195,000 |  |  | 132,000 |  |

|  |  |
| --- | --- |
| 2. | Reimel Furniture Company, Inc.Partial Balance Sheetas 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 Statementfor the Year Ended December 31, 20x2 |
|  |
|  |
|  | Sales revenue  |  | $195,000 |
|  | Less: Cost of goods sold  |  |  132,000 |
|  | Gross margin  |  | $ 63,000 |

## Exercise 3-32 (20 minutes)

|  |  |  |
| --- | --- | --- |
| 1. | Raw material: |  |
|  |  |  |
|  | Beginning inventory | $ 71,000 |
|  | Add: Purchases |       ? |
|  | Deduct: Raw material used |  326,000 |
|  | Ending inventory | $ 81,000 |
|  |  |  |
|  | Therefore, purchases for the year were | $336,000 |
|  |  |  |
| 2. | Direct labor: |  |
|  |  |  |
|  | Total manufacturing cost | $686,000 |
|  | Deduct: Direct material |  326,000 |
|  | Direct labor and manufacturing overhead |  360,000 |
|  |  |  |  |
|  | Direct labor + manufacturing overhead | = | $360,000 |
|  | Direct labor + (60%) (direct labor) | = | $360,000 |
|  |  (160%) (direct labor) | = | $360,000 |
|  |  |  |  |
|  | Direct labor | = | $360,000 |
|  | 1.6    |
|  |  |  |  |
|  | Direct labor | = | $225,000 |
|  |  |  |  |
| 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  |  | $ 30,000 |
|  |  |  |  |
|  | 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 |  | 736,000 |
|  | Cost of goods available for sale |  | $826,000 |
|  | Deduct: Cost of goods sold |  |       ? |
|  | Finished goods, ending inventory |  | $110,000 |
|  |  |  |  |
|  | Therefore, cost of goods sold was |  | $716,000 |

## Exercise 3-33 (20 minutes)

Calculation of proration amounts:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | Calculation of |
| Account | Amount | Percentage | Percentage |
| Work in Process | $ 35,250 |  25% | 35,250  $141,000 |
| Finished Goods |   49,350 |  35% | 49,350  $141,000 |
| Cost of Goods Sold |   56,400 |  40% | 56,400  $141,000 |
| Total | $141,000 | 100% |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Underapplied |  |  | Amount Added |
| Account | Overhead | x | Percentage | 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. |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 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  |   94,000 |  |
|  |  Indirect material available for use  | $142,000 |  |
|  |  Deduct: Ending inventory, December 31  |   63,000 |  |
|  |  Indirect material used  |  |   79,000 |
|  | Actual manufacturing overhead  |  | $1,002,000 |
|  |  |  |  |  |  |  |  |
|  |  |  | actual |  | applied |  |  |
|  | Overapplied | = | manufacturing | – | manufacturing |  |  |
|  | overhead |  | overhead |  | 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 |

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EXERCISE 3-35 (20 MINUTES)

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. |  | Predetermined overhead rate | = |  |
|  |  |  |
|  | (a) |  | = | $36.40 per machine hour |
|  |  |  |  |  |
|  | (b) |  | = | $18.20 per direct-labor hour |
|  |  |  |  |  |
|  | (c) |  | = | $1.30 per direct-labor dollar or 130%of direct-labor cost |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2. | Actualmanufacturingoverhead | – | appliedmanufacturingoverhead | = |  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*)  |  9,600 *euros* |
| Total contract cost  | 19,100 *euros* |

## 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 | 6,000a |  |
|  Manufacturing Overhead |  | 6,000 |
|   |  |  |
| Work-in-Process Inventory: Assembly Department | 540b |  |
|  Manufacturing Overhead |  | 540 |
|   |  |  |
| Work-in-Process Inventory: Saddle Department | 3,200c |  |
|  Manufacturing Overhead |  | 3,200 |
|   |  |

## 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% × ($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 CompanySchedule of Cost of Goods ManufacturedFor the Year Ended December 31, 20x1 |
|  |
|  |
|  |  |
|  | Direct material: |
|  |  Raw-material inventory, 12/31/x0  | $10,100 |  |
|  |  Add: Purchases of raw material  |  39,000 |  |
|  |  Raw material available for use  | $49,100 |  |
|  |  Deduct: Raw-material inventory, 12/31/x1  |  11,000 |  |
|  |  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  |   3,100 |  |
|  |  Total actual manufacturing overhead  | $54,900 |  |
|  |  Add: Overapplied overhead\*  |   3,100 |  |
|  |  Overhead applied to work in process  |  |   58,000 |
|  | Total manufacturing costs  |  | $175,100 |
|  | Add: Work-in-process inventory, 12/31/x0  |  |   8,100 |
|  | Subtotal  |  | $183,200 |
|  | Deduct: Work-in-process inventory, 12/31/x1  |  |   8,300 |
|  | Cost of goods manufactured  |  | $174,900 |

\*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 CompanySchedule of Cost of Goods SoldFor 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  | $188,900 |
|  | 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)  | $170,400 |

\*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 CompanyIncome StatementFor the Year Ended December 31, 20x1 |
|  |
|  |
|  |  |  |  |
|  | Sales revenue  |  | $205,800 |
|  | Less: Cost of goods sold  |  |  170,400 |
|  | 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  |   4,000 |  |
|  |  Total  |  |  23,200 |
|  | Income before taxes  |  | $12,200 |
|  | Income tax expense  |  |   5,100 |
|  | Net income  |  | $ 7,100 |

## Problem 3-43 (20 minutes)

|  |  |
| --- | --- |
| 1. |  |

|  |  |
| --- | --- |
| 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$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.) |

|  |  |  |
| --- | --- | --- |
| Raw-Material Inventory |  | Accounts Payable |
| Bal. 1/1 | 21,000 |  |  |  |  | 2,500 | Bal. 1/1 |
|  | *135,000* | *120,000* |  |  | 136,500 | *135,000* |  |
| Bal. 12/31 | 36,000 |  |  |  |  | 1,000 | Bal. 12/31 |
|  |  |  |  |  |  |  |  |
| Work-in-Process Inventory |  | Finished-Goods Inventory |
| Bal. 1/1 | 17,000 |  |  | Bal. 1/1 | 12,000 |  |  |
| Direct material | *120,000* |  |  | Bal. 12/31 | *718,000*20,000 | *710,000* |  |
| Direct  labor | *150,000* | *718,000* |  |  |  |  |
| Mfg.  overhead | *450,000* |  |  |  |  |  |
| Bal. 12/31 | 19,000 |  |  | Cost of Goods Sold |
|  |  |  |  |  | 710,000 |  |
| Manufacturing Overhead |  |  |  |  |
|  | *452,500* | *450,000* |  | Sales Revenue |
|  |  |  |  | *810,000* |
| Wages Payable |  |  |
|  |  | 2,000 | Bal. 1/1 |  | Accounts Receivable |
|  | 147,000 | *150,000* |  |  | Bal. 1/1 | 11,000 |  |
|  |  | 5,000 | Bal. 12/31 |  |  | *810,000* | 806,000 |
|  |  | Bal. 12/31 | 15,000 |  |

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).

1. 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

1. 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 |  830,000 |
| Total |  $5,554,000 |

 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………….. |  15,761,800 |
| Cost of goods available for sale……………... | $15,761,800 |
| Less: Finished-goods inventory, Dec. 31….. |  351,500 |
| Unadjusted cost of goods sold………………. | $15,410,300 |
| Less: Overapplied overhead…………………. |  101,000 |
| Cost of goods sold……………………………... | $15,309,300 |

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 | PercentTraceable | TraceableCost |
|  |  |  |  |
| 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…………… |  100,000 |  50 |  50,000 |
| Total……………………………. | $3,200,000 |  | $2,500,000 |

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

1. Predetermined overhead rate = budgeted overhead ÷ traceable costs = $700,000 ÷ $2,500,000 = 28% of traceable costs
2. Target profit percentage = target profit ÷ total cost

 = $640,000 ÷ $3,200,000 = 20% of cost

PROBLEM 3-47 (CONTINUED)

1. 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………………. |  1,400 |
| Subtotal…………………………… | $50,000 |
| Overhead ($50,000 x 28%)…………. |  14,000 |
| Total cost…………………………. | $64,000 |
| Markup ($64,000 x 20%)……………. |  12,800 |
| Billing to Martin……………………… | $76,800 |

1. 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)………… |  3,600 | $ 56,000 |
| Assembly Department: |  |  |
| Direct material…………………………………… | $ 6,700 |  |
| Direct labor………………………………………. |  58,600 |  |
| Manufacturing overhead ($58,600 x 55%)….. |  32,230 |  97,530 |
| Total cost……………………………………………... |  | $153,530 |

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. |  |

|  |  |
| --- | --- |
| 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 CorporationSchedule of Cost of Goods ManufacturedFor the Year Ended December 31, 20x2 |
|  |
|  |
|  |  |  |  |
|  | Direct material: |  |  |
|  |  Raw material inventory, 12/31/x1  | $ 89,000 |  |
|  |  Add: Purchases of raw material  |  731,000 |  |
|  |  Raw material available for use  | $820,000 |  |
|  |  Deduct: Raw-material inventory, 12/31/x2  |   59,000 |  |
|  |  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  |   40,000 |  |
|  |  Total actual manufacturing overhead  | $580,000 |  |
|  |  Deduct: Underapplied overhead\*  |   2,500 |  |
|  |  Overhead applied to work in process  |  |    577,500 |
|  | Total manufacturing costs  |  | $1,812,500 |
|  | Add: Work-in-process inventory, 12/31/x1  |  |        -0- |
|  | Subtotal  |  | $1,812,500 |
|  | Deduct: Work-in-process inventory, 12/31/x2  |  |     40,000 |
|  | Cost of goods manufactured  |  | $1,772,500 |

\*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 CorporationSchedule of Cost of Goods SoldFor the Year Ended December 31, 20x2 |
|  |
|  |
|  |  |  |
|  | Finished-goods inventory, 12/31/x1  | $   35,000 |
|  | Add: cost of goods manufactured  |  1,772,500 |
|  | Cost of goods available for sale  | $1,807,500 |
|  | Deduct: Finished-goods inventory, 12/31/x2  |     40,000 |
|  | Cost of goods sold  | $1,767,500 |
|  | Add: Underapplied overhead\*  |      2,500 |
|  | Cost of goods sold (adjusted for underapplied overhead)  | $1,770,000 |

\*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 CorporationIncome StatementFor the Year Ended December 31, 20x2 |
|  |
|  |
|  |  |  |
|  | Sales revenue  | $2,105,000 |
|  | Less: Cost of goods sold  |  1,770,000 |
|  | Gross margin  | $ 335,000 |
|  | Selling and administrative expenses  |   269,000 |
|  | Income before taxes  | $   66,000 |
|  | Income tax expense  |     25,000 |
|  | Net income  | $   41,000 |

## 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](file:///C%3A%5CUSER%20FILES%5CHilton%20Text%5CHilton%20and%20Platt%2011e%5CSolMan%5CPrepped%20for%2011E%20from%209E%5CChapter03%5CBuild%20a%20Spreadsheet%20%2003-50.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 CompanySchedule of Cost of Goods ManufacturedFor the Month of March |
|  |
|  |
|  |  |  |  |
|  | Direct material: |  |  |
|  |  Raw-material inventory, March 1  | $ 17,000 |  |
|  |  Add: March purchases of raw material  |  113,000 |  |
|  |  Raw material available for use  | $130,000 |  |
|  |  Deduct: Raw-material inventory, March 31  |   26,000 |  |
|  |  Raw materials used  |  | $104,000 |
|  | Direct labor  |  | 160,000 | \* |
|  | Manufacturing overhead applied (50% of direct labor) |  |   80,000 |
|  | Total manufacturing costs  |  | $344,000 |
|  | Add: Work-in-process inventory, March 1  |  |   40,000 |
|  | Subtotal  |  | $384,000 |
|  | Deduct: Work-in-process inventory,  |  |  |
|  |  March 31 (90%$40,000)  |  |   36,000 |
|  | Cost of goods manufactured  |  | $348,000 | † |

\*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 CompanySchedule of Prime CostsFor the Month of March |
|  |
|  |
|  |  |  |
|  | Raw material: |  |
|  |  Beginning inventory  | $ 17,000 |
|  |  Add: Purchases  |  113,000 |
|  |  Raw material available for use  | $130,000 |
|  |  Deduct: Ending inventory  |   26,000 |
|  | Raw material used  | $104,000 |
|  | Direct labor  |  160,000 |
|  | Total prime costs  | $264,000 |

|  |  |
| --- | --- |
| 3. | Marco Polo Map CompanySchedule of Conversion CostsFor the Month of March |
|  |
|  |
|  |  |  |
|  | Direct labor  | $160,000 |
|  | Manufacturing overhead applied (50% of direct labor)  |   80,000 |
|  | Total conversion cost  | $240,000 |

## Problem 3-53 (30 minutes)

|  |  |
| --- | --- |
| 1. |  |
| 2. | Calculation of applied manufacturing overhead: |
|  | Applied manufacturing overhead = machine hrs. used x predetermined overhead rate $20,000 = 4,000 hrs. x $5 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 | Calculationof 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 | Job A79 only |   5,000 |  25.0% |  5,000  20,000 |
| Total |  | $20,000 | 100.0% |  |
|  |
| \*Machine hours used on jobpredetermined overhead rate. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Account | Underapplied Overhead | × | Percentage | Amount Addedto 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% |  1,500 |
|  Total |  |  |  | $6,000 |
|  |  |
| (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:

1. *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.**
1. *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 |
|  | 1st  | $4 per hour   | $100,000/25,000 |
|  | 2nd  | 5 per hour |  $80,000/16,000 |
|  | 3rd  | 4 per hour |  $50,000/12,500 |
|  | 4th  | 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  | \_\_\_\_ |  100 |
|  | Total cost  | $480 | $500 |
|  |  |  |  |
| 3. |  |  |  |
|  |  | January | April |
|  | Total cost  | $480 | $500 |
|  | Markup (10%)  |   48 |   50 |
|  | Price  | $528 | $550 |
|  |  |  |  |
| 4. |  |
|  |  |
|  |  |
| 5. |  |  |  |
|  |  | January | April |
|  | Direct material  | $100.00 | $100.00 |
|  | Direct labor  |  300.00 |  300.00 |
|  | Manufacturing overhead (20 hrs × $4.44)  |   88.80 |   88.80 |
|  | Total cost  | $488.80 | $488.80 |
|  |  |  |  |

## Problem 3-55 (Continued)

|  |  |  |  |
| --- | --- | --- | --- |
| 6. | Total cost  | $488.80 |  |
|  | Markup (10%)  |   48.88 |  |
|  | Price  | $537.68 |  |
|  |  |  |  |

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: |
|  |  |
|  |  |
|  |   $5.05 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)  |   17,675 |
|  | Total cost  | $200,675 |
|  |  |  |
|  |  |  |
|  |  |
| 3. | Manufacturing overhead applied to job 79: |
|  |  |
|  | Direct-labor hourspredetermined overhead rate  2,000 hours$5.05 per hour |
|  |   $10,100 |

## Problem 3-56 (continued)

|  |  |
| --- | --- |
| 4. | Total manufacturing overhead applied during November: |
|  |  |
|  | Total direct-labor hourspredetermined overhead rate  8,500 hours$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  |   8,100 |
|  | Total  | $47,500 |
|  |  |
| 6. | Underapplied overhead for November: |
|  |  |
|  | Actual manufacturing overhead – applied manufacturing overhead |
|  |  $47,500 – $42,925 |
|  |  $4,575 underapplied |

## Problem 3-57 (75 minutes)

|  |  |
| --- | --- |
| 1. |  |
|  |  |
| 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)  |  16,800 |  |
|  |  | Total cost  | $34,050 |  |
|  |  |  |  |  |
|  | (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 |  | Accounts Payable |
| Bal | 10,000 |  |  |  |  |  | 13,000 | Bal |
|  |  | 1,200 | (f) |  |  |  | 5,000 | (a) |
|  |  | 2,400 | (h) |  |  |  | 4,000 | (b) |
|  |  | 8,000 | (j) |  |  |  | 2,100 | (g) |
|  |  | 1,000 | (l) |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| Accounts Receivable |  | Wages Payable |
| Bal. | 21,000 |  |  |  |  |  | 8,000 | Bal. |
| (n) | 26,600 |  |  |  |  |  | 47,000 | (d) |
|  |  |  |  |  |  |  |  |  |
|  |  | Accumulated Depreciation: |
| Prepaid Insurance |  | Buildings and Equipment |
| Bal. | 5,000 |  |  |  |  |  | 102,000 | Bal. |
|  |  | 3,100 | (i) |  |  |  | 12,000 | (e) |
|  |  |  |  |  |  |  | 4,000 | (k) |
|  |  |  |  |  |  |  |  |  |
| Manufacturing-Supplies Inventory |  | Manufacturing Overhead |
| Bal. | 500 |  |  |  | (c) | 100 | 35,700 | (d) |
|  |  | 100 | (c) |  | (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 |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | Selling and Administrative |
| Work-in-Process Inventory |  | 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  | $33,900 |
|  |  |  |  |  |
|  | (b) | Overapplied overhead | = |  |
|  |  |  | = | $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 CorporationSchedule of Cost of Goods ManufacturedFor the Month of March |
|  |
|  |
|  |  |  |  |
|  | Direct material: |  |  |
|  |  Raw-material inventory, March 1  | $149,000 |  |
|  |  Add: March purchases of raw material  |   9,000 |  |
|  |  Raw material available for use  | $158,000 |  |
|  |  Deduct: Raw-material inventory, March 31  |  146,750 |  |
|  |  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  |   3,100 |  |
|  |  Total actual manufacturing overhead  | $33,900 |  |
|  |  Add: overapplied overhead\*  |   1,800 |  |
|  |  Overhead applied to work in process  |  |  35,700 |
|  | Total manufacturing costs  |  | $ 80,950 |
|  | Add: Work-in-process inventory, March 1  |  |   91,000 |
|  | Subtotal  |  | $171,950 |
|  | Deduct: Work-in-process inventory, March 31  |  |  137,900 |
|  | Cost of goods manufactured†  |  | $34,050 |

\*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 CorporationSchedule of Cost of Goods SoldFor the Month of March |
|  |
|  |
|  |  |  |
|  | Finished-goods inventory, March 1  | $220,000 |
|  | Add: Cost of goods manufactured  |   34,050 |
|  | Cost of goods available for sale  | $254,050 |
|  | Deduct: Finished-goods inventory, March 31  |  237,025 |
|  | Cost of goods sold  | $ 17,025 |
|  | Deduct: Overapplied overhead\*  |   1,800 |
|  | Cost of goods sold (adjusted for overapplied overhead)  | $ 15,225 |

\*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 CorporationIncome StatementFor the Month of March |
|  |
|  |
|  |  |  |
|  | Sales revenue  | $26,600 |
|  | Less: Cost of goods sold  |  15,225 |
|  | Gross margin  | $11,375 |
|  | Selling and administrative expenses  |  13,000 |
|  | Income (loss)  | $ (1,625) |

## 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 to3/12 | 3-08 through 3-12 | 800 | $20 | $16,000 |  |
|  |  |  |  |  |  |  |
|  | Manufacturing Overhead |  |
|  | Date | Activity Base | Quantity | Application Rate | Cost |  |
|  | 3/8 to3/12 | Direct-labor hours | 800 | $21 | $16,800 |  |
|  |  |  |  |  |  |  |
|  | Cost Summary |  |
|  | Cost Item | Amount |  |
|  | Total direct materialTotal direct laborTotal manufacturing overhead |  $ 1,250 16,000 16,800 |  |
|  | Total cost |  $34,050 |  |
|  | Unit cost |  $448.03\* |  |
|  |  |  |  |
|  | Shipping Summary |  |
|  | Date | Units Shipped | Units RemainingIn 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 |  |  |  |  |  | 12,000 | Bal. 10/31 |
|  | 70,000 | 40,000 |  |  |  | 81,000 | 70,000 |  |
| Bal. 11/30 | 45,000 |  |  |  |  |  |  1,000 | Bal. 11/30 |
|  |  |  |  |  |  |  |  |  |
| Work-in-Process Inventory |  | Finished-Goods Inventory |
| Bal. 10/31 | 8,000 |  |  |  | Bal. 10/31 | 35,000 |  |  |
| Direct |  | 150,000 |  |  |  | 150,000 | 180,000 |  |
|  material | 40,000 |  |  |  | Bal. 11/30 | 5,000 |  |  |
| Direct |  |  |  |  |  |  |  |  |
|  labor | 80,000 |  |  |  | Cost of Goods Sold |
| Overhead | 60,000 |  |  |  |  | 180,000 |  |  |
| Bal. 11/30 | 38,000 |  |  |  |  |  |  |  |

|  |  |  |
| --- | --- | --- |
| Manufacturing Overhead |  | Sales Revenue |
|  | 60,000 | 60,000 |  |  |  |  | 216,000 |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |
| Wages Payable |  | Accounts Receivable |
|  |  |  1,000 | Bal. 10/31 |  | Bal. 10/31 | 8,000 |  |  |
|  | 79,500 | 80,000 |  |  |  | 216,000 | 205,000 |  |
|  |  |  1,500 | Bal. 11/30 |  | 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 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 4. | November 30 balance in work-in-process inventory | = | directmaterial | + | directlabor | + |  manufacturing overhead |
|  |  | = | $20,500 + (500)($20) + (500)($15\*) |
|  |  | = | $38,000 |
|  | \*Predetermined overhead rate | = |  |
|  |  | = |  |
|  |  | = | $15 per direct-labor hour |
|  |  |  |  |
|  | †Budgeted direct-labor hours  | = |  |
|  |  |
| 5. | Addition to work in processfor direct labor | = |  November credit to wages payable |
|  | November credit towages payable | = | ending balance + payments – beginning balance |
|  |  | = | $1,500 + $79,500 – $1,000 |
|  |  | = | $80,000 |

**Problem 3-59 (continued)**

|  |  |  |  |
| --- | --- | --- | --- |
| 6. | November applied overhead  | = | direct labor hourspredetermined overhead rate |
|  |  | = | 4,000\*$15 |
|  |  | = | $60,000 |
|  | Direct labor hours | = |  |
|  |  | = |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 7. | Cost of goods completed during November | = | beginning balance in work in process | + | additions during November | – | 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 | = | November 30 balance in raw-material inventory | + | direct material used | – | purchases |
|  |  | = | $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  |  200,000 |  200,000 |
|  | Total overhead  | $520,000 | $280,000 |
|  |  |  |  |
|  | Grand total of budgeted overhead (A + B): | $800,000 |
|  |  |  |  |
|  |  |
|  |  |  |
| 2. | Product prices: |  |
|  |  |  |  |
|  |  | BasicSystem | Advanced System |
|  | Total cost  | $1,100 | $1,500 |
|  | Markup, 10% of cost  |    110 |    150 |
|  | Price  | $1,210 | $1,650 |
|  |  |  |  |
| 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  | $520,000 | $280,000 |
|  |  |   20,000 |   20,000 |
|  |  |  |  |
|  |  | $26 per | $14 per |
|  |  | direct-labor | direct-labor |
|  |  | hour | hour |

## Problem 3-60 (Continued)

|  |  |  |  |
| --- | --- | --- | --- |
| 4. | New product costs: |  |  |
|  |  |  |  |
|  |  | Basic | Advanced |
|  |  | System | 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  | \_ \_\_\_\_ |    70 |
|  | Total | $1,040 | $1,560 |
|  |  |  |  |
| 5. | New product prices: |  |  |
|  |  |  |  |
|  |  | Basic | Advanced |
|  |  | System | System |
|  | Total cost  | $1,040 | $1,560 |
|  | Markup, 10% of cost  |    104 |    156 |
|  | Price  | $1,144 | $1,716 |
|  |  |  |  |

## 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\*) |  97,500 |  509,000 |
|  | Work-in-process inventory, 12/31  |  | $759,000 |
|  |  |  |  |
|  |  |
|  |  |
| 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  | 15,000 |
|  | Units available  | 34,400 |
|  | Deduct: Units shipped in December  | 21,000 |
|  | Finished-goods inventory, 12/31  | 13,400 |

## 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) |  22,000 |   79,000 |
|  | Total cost  |  | $510,000 |
|  |  |  |  |
| Unit cost =  =  = $34 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  |  49,900 |
|  | Total  | 879,900 |
|  |  |  |
|  | Applied manufacturing overhead = 879,900 machine hours × $5 = $4,399,500Actual manufacturing overhead: |
|  | January through November  | $4,140,000 |
|  | December  |  252,000 |
|  | Total  | $4,392,000 |
|  |  |  |
|  | 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: |
|  |  |
|  | Machine hourspredetermined overhead rate | = | overhead applied |
|  |  |  |  |
|  | 73,000$15 | = | $1,095,000 |

|  |  |
| --- | --- |
| 3. | The manufacturing overhead applied in December is calculated as follows: |
|  |  |  |  |
|  | Machine hourspredetermined overhead rate | = | overhead applied |
|  |  |  |  |
|  | 6,000$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  | $   11,000 |

## 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)  |  15,000 |
|  |  Total finished-goods inventory  | $86,000 |
|  |  |

|  |  |
| --- | --- |
| 6. | FiberCom’s Schedule of Cost of Goods Manufactured for the year just completed is constructed as follows: |
|  | FiberCom CompanySchedule of Cost of Goods ManufacturedFor the Year Ended December 31 |
|  |
|  |
|  | Direct material: |
|  |  Raw-material inventory, 1/1  |  | $  105,000 |
|  |  Raw-material purchases ($965,000 + $98,000)  |  |  1,063,000 |
|  |  Raw material available for use  |  | $1,168,000 |
|  |  Deduct: Indirect material used ($125,000 + $9,000)  | $134,000 |  |
|  |  Raw-material inventory 12/31  |   85,000 |   219,000 |
|  |  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)  |  420,000 |  |
|  |  Total actual manufacturing overhead  |  | 1,196,000 |
|  |  Deduct: Underapplied overhead  |  |    11,000 |
|  | Overhead applied to work in process  |  | $1,185,000 |
|  | Total manufacturing costs  |  | $3,059,000 |
|  | Add: Work-in-process inventory, 1/1  |  |    60,000 |
|  | Subtotal  |  | $3,119,000 |
|  | Deduct: Work-in-process inventory, 12/31\*  |  |   150,200 |
|  | Cost of goods manufactured  |  | $2,968,800 |
|  |  |  |  |
|  | \*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  | \_\_\_\_\_\_ | $12,000 |   12,000 |
|  |  Total  | $95,400 | $54,800 | $150,200 |