## CHAPTER 2
Basic Cost Management Concepts and Accounting for Mass Customization Operations

### EXERCISE 2-29 (25 MINUTES)

1. **ALEXANDRIA ALUMINUM COMPANY**  
   **SCHEDULE OF COST OF GOODS MANUFACTURED**  
   **FOR THE YEAR ENDED DECEMBER 31, 20X1**

   **Direct material:**
   - Raw-material inventory, January 1 ......................................... $ 60,000
   - Add: Purchases of raw material .............................................. 250,000
   - Raw material available for use ................................................ $310,000
   - Deduct: Raw-material inventory, December 31 ..................... 70,000
   - Raw material used .................................................................... $240,000

   **Direct labor** ..................................................................................... 400,000

   **Manufacturing overhead:**
   - Indirect material ........................................................................ $ 10,000
   - Indirect labor ............................................................................. 25,000
   - Depreciation on plant and equipment .................................... 100,000
   - Utilities ....................................................................................... 25,000
   - Other .......................................................................................... 30,000
   - Total manufacturing overhead ................................................ 190,000

   **Total manufacturing costs ............................................................ $830,000**

   **Add: Work-in-process inventory, January 1 ............................... 120,000**

   **Subtotal ........................................................................................... $950,000**

   **Deduct: Work-in-process inventory, December 31 .................... 115,000**

   **Cost of goods manufactured ........................................................ $835,000**

2. **ALEXANDRIA ALUMINUM COMPANY**  
   **SCHEDULE OF COST OF GOODS SOLD**  
   **FOR THE YEAR ENDED DECEMBER 31, 20X1**

   **Finished-goods inventory, January 1 ...................................................... $150,000**
   **Add: Cost of goods manufactured .............................................. 835,000**
   **Cost of goods available for sale ........................................................ $985,000**
   **Deduct: Finished-goods inventory, December 31 ............................. 165,000**
   **Cost of goods sold ........................................................................... $820,000**
EXERCISE 2-29 (CONTINUED)

3. **ALEXANDRIA ALUMINUM COMPANY**
   **INCOME STATEMENT**
   **FOR THE YEAR ENDED DECEMBER 31, 20X1**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales revenue</td>
<td>$1,105,000</td>
</tr>
<tr>
<td>Less: Cost of goods sold</td>
<td>820,000</td>
</tr>
<tr>
<td>Gross margin</td>
<td>$285,000</td>
</tr>
<tr>
<td>Selling and administrative expenses</td>
<td>110,000</td>
</tr>
<tr>
<td>Income before taxes</td>
<td>$175,000</td>
</tr>
<tr>
<td>Income tax expense</td>
<td>70,000</td>
</tr>
<tr>
<td>Net income</td>
<td>$105,000</td>
</tr>
</tbody>
</table>

4. In the electronic version of the solutions manual, press the CTRL key and click on the following link: [Build a Spreadsheet 02-29.xls](#)

EXERCISE 2-31 (15 MINUTES)

1. Phone bill, January: $100 + ($0.25 \times 6,000) $1,600
   Phone bill, February: $100 + ($0.25 \times 5,000) $1,350

2. Cost per call, January: $1,600/6,000 $0.267 (rounded)
   Cost per call, February: $1,350/5,000 $0.27

3. Fixed component, January $100
   Variable component, January: $0.25 \times 6,000 1,500
   Total $1,600

4. Since each phone call costs $0.25, the marginal cost of making the 6,001st call is $0.25.

5. The average cost of a phone call in January (rounded) is $0.267 ($1,600/6,000).

EXERCISE 2-34 (5 MINUTES)

1. The $14,000 is the **opportunity cost** associated with using the computer in the Department of Education for work in the governor’s office.

2. The $14,000 leasing cost should be assigned to the governor’s office. It was incurred as a result of activity in that office.
EXERCISE 2-35 (10 MINUTES)

1. Your decision to see the game really cost you $100, the amount forgone when you refused to sell the ticket. A convenient way to think about this is as follows: You could have sold the ticket for $100, thereby resulting in a profit on the deal of $40 ($100 sales proceeds minus $60 out-of-pocket purchase cost). Instead, you went to the game, which left you relieved of your $60 out-of-pocket cost. The difference between the $60 reduction in your wealth and the $40 profit you could have had is $100. Thus, $100 is the true cost of going to the game.

2. The $100 is an opportunity cost. At the time you made the decision to attend the game, the $60 you actually had paid for the ticket is a sunk cost. It is not relevant to any future decision.

EXERCISE 2-36 (15 MINUTES)

1. The marginal cost would include any food and beverages consumed by the passenger and perhaps an imperceptible increase in fuel costs.

2. In most cases, only the cost of the food and beverage consumed by the customer would be a marginal cost. It is unlikely that the restaurant would need to employ additional service personnel, dishwashers, and so on.

3. The marginal cost of a flight would include the aircraft fuel, wages of the flight crew and airport maintenance personnel, and the food and beverages consumed by the passengers and crew.

4. The marginal cost would include the additional wages or commissions earned by the branch bank employees and the additional electricity used for light, heat, and computer equipment.

5. The marginal cost of the skis would include the direct material. It is unlikely that labor and other costs would change with the addition of only one more product unit.
SOLUTIONS TO PROBLEMS

PROBLEM 2-37 (20 MINUTES)

1. 1. Income statement
   2. Balance sheet
   3. Income statement
   4. Income statement
   5. Cost-of-goods-manufactured schedule
   6. Income statement
   7. Cost-of-goods-manufactured schedule
   8. Cost of-goods-manufactured schedule
   10. Income statement
   11. Income statement

2. The asset that differs among these businesses is inventory. Service businesses typically carry no (or very little) inventory. Retailers and wholesalers normally stock considerable inventory. Manufacturers also carry significant inventories, typically subdivided into three categories: raw material, work in process, and finished goods.

3. The income statements of service business normally have separate sections for operating revenues, operating expenses, and other income (expenses). In contrast, those of retailers, wholesalers, and manufacturers disclose sales revenue, followed immediately by cost of goods sold and gross margin. Operating expenses are listed next followed by other income (expenses).

4. The basic difference falls in the area of inventory. Traditional manufacturers produce finished goods, which are then placed in warehouses awaiting sale. In contrast, with a direct-sales, mass-customization firm, the receipt of a sales order triggers the manufacturing process as well as the purchasing system, the latter to acquire needed raw materials. Finished-goods and raw-material inventories (along with work in process) of mass-customizers are, therefore, much lower than the inventories carried by traditional firms.

PROBLEM 2-40 (25 MINUTES)

1. Fixed manufacturing overhead per unit:
   $600,000 ÷ 24,000 units produced = $25

   Average unit manufacturing cost:
   Direct material.................................. $ 20
Chapter 02 - Basic Cost Management Concepts and Accounting for Mass Customization Operations

Direct labor ................................................. 37
Variable manufacturing overhead. 48
Fixed manufacturing overhead........ 25
Average unit cost......................... $130

Production................................. 24,000 units
Sales................................................. 20,000 units
Ending finished-goods inventory... 4,000 units

Cost of December 31 finished-goods inventory:
4,000 units x $130 = $520,000

2. Net income:
Sales revenue (20,000 units x $185) .......... $3,700,000
Cost of goods sold (20,000 units x $130) .... 2,600,000
Gross margin................................................ $1,100,000
Selling and administrative expenses......... 860,000
Income before taxes................................. $ 240,000
Income tax expense ($240,000 x 30%) ...... 72,000
Net income.............................................. $ 168,000

3. (a) No change. Direct labor is a variable cost, and the cost per unit will remain constant.

(b) No change. Despite the decrease in the number of units produced, this is a fixed cost, which remains the same in total.

(c) No change. Selling and administrative costs move more closely with changes in sales than with units produced. Additionally, this is a fixed cost.

(d) Increase. The average unit cost of production will change because of the per-unit fixed manufacturing overhead. A reduced production volume will be divided into the fixed dollar amount, which increases the cost per unit.

PROBLEM 2-42 (25 MINUTES)

1. a. Total prime costs:

Direct material ................................................................. $ 2,100,000
Direct labor:
Wages................................................................. 485,000
Fringe benefits ................................................. 95,000
Total prime costs ................................................................. $ 2,680,000

b. Total manufacturing overhead:

Depreciation on factory building .............................................. $ 115,000
Indirect labor: wages ............................................................... 140,000
Production supervisor's salary ...............................................  45,000
Service department costs ........................................................ 100,000
Indirect labor: fringe benefits ..................................................  30,000
Fringe benefits for production supervisor ...............................  9,000
Total overtime premiums paid ..................................................  55,000
Cost of idle time: production employees ................................  40,000
Total manufacturing overhead ................................................ $ 534,000

c. Total conversion costs:

Direct labor ($485,000 + $95,000) ............................................ $ 580,000
Manufacturing overhead ..........................................................  534,000
Total conversion costs ............................................................ $1,114,000

d. Total product costs:

Direct material .......................................................................... $2,100,000
Direct labor ...............................................................................  580,000
Manufacturing overhead ............................................................  534,000
Total product costs ................................................................. $3,214,000

e. Total period costs:

Advertising expense ............................................................... $  99,000
Administrative costs ...............................................................  150,000
Rental of office space for sales personnel ...............................  15,000
Sales commissions ..................................................................  5,000
Product promotion costs ...........................................................  10,000
Total period costs ................................................................. $ 279,000

2. The $15,000 in rental cost for sales office space rental is an opportunity cost. It measures the opportunity cost of using the former sales office space for raw-material storage.
**PROBLEM 2-43 (35 MINUTES)**

1. **SAN FERNANDO FASHIONS COMPANY**  
   **SCHEDULE OF COST OF GOODS MANUFACTURED**  
   **FOR THE YEAR ENDED DECEMBER 31, 20x2**

   **Direct material:**
   - Raw-material inventory, January 1 ............................................ $ 40,000
   - Add: Purchases of raw material ................................................. 180,000
   - Raw material available for use ................................................... $220,000
   - Deduct: Raw-material inventory, December 31 ........................ 25,000
   - Raw material used ....................................................................... $195,000

   **Direct labor** ....................................................................................... 200,000

   **Manufacturing overhead:**
   - Indirect material ........................................................................... $ 10,000
   - Indirect labor ................................................................................ 15,000
   - Utilities: plant ............................................................................... 40,000
   - Depreciation: plant and equipment ............................................ 60,000
   - Other .............................................................................................. 80,000
   - Total manufacturing overhead ................................................... 205,000

   **Total manufacturing costs .............................................................. $600,000
   - Add: Work-in-process inventory, January 1 .................................. 40,000
   - Subtotal ............................................................................................. 640,000
   - Deduct: Work-in-process inventory, December 31 ...................... 30,000
   - Cost of goods manufactured .......................................................... $610,000

2. **SAN FERNANDO FASHIONS COMPANY**  
   **SCHEDULE OF COST OF GOODS SOLD**  
   **FOR THE YEAR ENDED DECEMBER 31, 20x2**

   **Finished goods inventory, January 1 .................................................. $ 20,000
   - Add: Cost of goods manufactured .................................................. 610,000
   - Cost of goods available for sale ........................................................ $630,000
   - Deduct: Finished-goods inventory, December 31 ........................... 50,000
   - Cost of goods sold ......................................................................... $580,000
PROBLEM 2-43 (CONTINUED)

3. SAN FERNANDO FASHIONS COMPANY
INCOME STATEMENT
FOR THE YEAR ENDED DECEMBER 31, 20X2

Sales revenue ..................................................................................................... $950,000
Less: Cost of goods sold .............................................................................. 580,000
Gross margin ................................................................................................... $370,000
Selling and administrative expenses .............................................................. 150,000
Income before taxes ...................................................................................... $220,000
Income tax expense ....................................................................................... 90,000
Net income .................................................................................................... $130,000

4. OMIT

Problem 2-44 (15 minutes)

1. Regular hours: 40 × $12 ........................................................................ 480
   Overtime hours: 8 × $16 .......................................................................... 128
   Total cost of wages ................................................................................ 608

2. a. Direct labor: 38 × $12 ........................................................................ 456
    b. Manufacturing overhead (idle time): 1 × $12 .................................. 12
    c. Manufacturing overhead (overtime premium): 8 × ($16 – $12) ........ 32
    d. Manufacturing overhead (indirect labor): 9 × $12 ............................. 108
   Total cost of wages ................................................................................ 608

PROBLEM 2-45 (20 MINUTES)

1. a, d, g, i

2. a, d, g, j

3. b, f

4. b, d, g, k

5. a, d, g, k
PROBLEM 2-45 (CONTINUED)

6. a, d, g, j
7. b, c, f
8. b, d, g, k
9. b, c and d*, e and f and g*, k*
   *The building is used for several purposes.
10. b, c, f
11. b, c, h
12. b, c, f
13. b, c, e
14. b, c and d**, e and f and g**, k**
   **The building that the furnace heats is used for several purposes.
15. b, d, g, k

PROBLEM 2-49 (10 MINUTES)

<table>
<thead>
<tr>
<th>Cost Item Number</th>
<th>Direct or Indirect</th>
<th>Partially Controllable by Department Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>indirect</td>
<td>no</td>
</tr>
<tr>
<td>2.</td>
<td>indirect</td>
<td>no</td>
</tr>
<tr>
<td>3.</td>
<td>direct</td>
<td>yes</td>
</tr>
<tr>
<td>4.</td>
<td>direct</td>
<td>no</td>
</tr>
<tr>
<td>5.</td>
<td>direct</td>
<td>yes</td>
</tr>
</tbody>
</table>
PROBLEM 2-51 (15 MINUTES)

<table>
<thead>
<tr>
<th></th>
<th>Variable or</th>
<th>20×2 Forecast</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material</td>
<td>V</td>
<td>$3,600,000</td>
<td>$3,000,000 × 1.20</td>
</tr>
<tr>
<td>Direct labor</td>
<td>V</td>
<td>2,640,000</td>
<td>$2,200,000 × 1.20</td>
</tr>
<tr>
<td>Manufacturing overhead</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utilities (primarily electricity)</td>
<td>V</td>
<td>168,000</td>
<td>$140,000 × 1.20</td>
</tr>
<tr>
<td>Depreciation on plant and equipment</td>
<td>F</td>
<td>230,000</td>
<td>same</td>
</tr>
<tr>
<td>Insurance</td>
<td>F</td>
<td>160,000</td>
<td>same</td>
</tr>
<tr>
<td>Supervisory salaries</td>
<td>F</td>
<td>300,000</td>
<td>same</td>
</tr>
<tr>
<td>Property taxes</td>
<td>F</td>
<td>210,000</td>
<td>same</td>
</tr>
<tr>
<td>Selling costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td>F</td>
<td>195,000</td>
<td>same</td>
</tr>
<tr>
<td>Sales commissions</td>
<td>V</td>
<td>108,000</td>
<td>$90,000 × 1.20</td>
</tr>
<tr>
<td>Administrative costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries of top management and staff</td>
<td>F</td>
<td>372,000</td>
<td>same</td>
</tr>
<tr>
<td>Office supplies</td>
<td>F</td>
<td>40,000</td>
<td>same</td>
</tr>
<tr>
<td>Depreciation on building</td>
<td>F</td>
<td>80,000</td>
<td>same</td>
</tr>
<tr>
<td>and equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PROBLEM 2-57 (25 MINUTES)

1. Output (0.75 liter bottles)

<table>
<thead>
<tr>
<th></th>
<th>Calculation</th>
<th>Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>$177,000/10,000</td>
<td>$17.70</td>
</tr>
<tr>
<td>15,000</td>
<td>$195,500/15,000</td>
<td>$13.03 (rounded)</td>
</tr>
<tr>
<td>20,000</td>
<td>$214,000/20,000</td>
<td>$10.70</td>
</tr>
</tbody>
</table>

The unit cost is minimized at a sales volume of 20,000 bottles.

2. Output (0.75 liter bottles)

<table>
<thead>
<tr>
<th>Output</th>
<th>Sales Revenue</th>
<th>Total Costs</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td>10,000</td>
<td>$180,000</td>
<td>$177,000</td>
<td>$ 3,000</td>
</tr>
<tr>
<td>15,000</td>
<td>$225,000</td>
<td>195,500</td>
<td>29,500</td>
</tr>
<tr>
<td>20,000</td>
<td>$240,000</td>
<td>214,000</td>
<td>26,000</td>
</tr>
</tbody>
</table>

Profit is maximized at a production level of 15,000 bottles of wine.

3. The 15,000-bottle level is best for the company, since it maximizes profit.
4. The unit cost decreases as output increases, because the fixed cost per unit declines as production and sales increase.

A lower price is required to motivate consumers to purchase a larger amount of wine.

Problem 2-58 (15 minutes)

1. If the company buys 30,000 units of Part MR24, at a price of $X per unit, its total cost will be:

   \[(30,000 \times X) + 60,000\]

   If the company manufactures the parts, its total cost will be:

   \[(30,000 \times 11) + 150,000\]

   By equating these two expressions for total cost, we can solve for the price, \(X\), at which the total cost is the same under the two alternatives:

   \[30,000X + 60,000 = (30,000)(11) + 150,000\]

   \[30,000X = 420,000\]

   \[X = 14\]

   Thus the firm will realize a net benefit by purchasing Part MR24 if the outside supplier charges a price less than $14.

2. If the firm buys \(Y\) units of Part MR24 at a price of $12.875 per unit, the total cost will be:

   \[$(12.875 \times Y) + 60,000\]

   If the company manufactures \(Y\) units of Part MR24, the total cost will be:

   \[$(11 \times Y) + 150,000\]

   If we equate these expressions, we can solve for the number of parts, \(Y\), at which the firm will be indifferent between making and buying Part MR24.

   \[12.875Y + 60,000 = 11Y + 150,000\]

   \[1.875Y = 90,000\]

   \[Y = 48,000\]

   Thus, the company will be indifferent between the two alternatives if it requires 48,000 units of Part MR24 each month.