

## **CHAPTER ONE**

### **COST AND MANAGEMENT ACCOUNTING**

#### **1.1 INTRODUCTION**

**Management accounting** can be defined as the process of identification, measurement, accumulation, analysis, preparation, interpretation, and communication of financial as well as non-financial information used by management to plan, evaluate, control within the organization and to assure appropriate use and accountability for its resources. In other words, Management accounting is application of professional knowledge and skill in the preparation and presentation of financial information in such a way as to assist management in decision making and in the planning and control of operations of the entity. The objective of management accounting is to provide information to the management for decision making purposes.

The management accountant is expected to provide timely, accurate information-including budgets, standard costs, variance analysis, support day-to-day operating decisions, and analyses of expenditures. The management accounting consists of accounting techniques and procedures of gathering and reporting financial, production, and distribution data in order to meet management's information needs.

On the other side, Cost Accounting implies that is an expanded phase of financial accounting which provides management promptly with the cost of producing and/or selling each product and rendering a particular service. Objective of *cost accounting* is computation of cost per unit. In general, the main users of cost & management accounting are the decision makers and the managers of the entity/organization for which all this exercise is undertaken.

#### **1.2 USES OF COST AND MANAGEMENT ACCOUNTING**

- ✚ It determines total cost of production and cost of sales
- ✚ It determines appropriate selling price

- ✚ It discloses the profitable products, areas and activity/capacity levels
- ✚ It is used to decide whether to manufacture or purchase for outside
- ✚ It helps in planning and controlling the cost of production

### **1.3 THE ROLE OF MANAGEMENT ACCOUNTING**

Management accounting measures and reports financial information as well as other type information that assists managers in fulfilling the goals of the organization. The followings are some of the purposes of management accounting.

- ✚ Formulating over all strategies and long range plans
- ✚ Resource allocation decision such as product and customer emphasis pricing.
- ✚ Cost planning and cost control of operations and activities.
- ✚ Performance measurement and evaluation.

### **1.4 FINANCIAL AND MANAGEMENT ACCOUNTING**

Financial accounting includes all the principles that regulate the accounting for and reporting for financial information that must be disclosed to people outside the company, to stockholders, bankers, creditors, and brokers. In contrast, management accounting exists primarily for the benefit of those inside the company, the people who are responsible for its operations. Many of the procedures and principles that stem from financial accounting also apply to management accounting. Depreciation techniques, cash collection and disbursement procedures, inventory valuation methods, and the recognition of what is an asset or a liability are all essential to the study of management accounting. But, because their output is communicated to different audiences for different reasons, financial accountants and

management accountants follow different rules. The rules of management accounting are somewhat less defined and place fewer restrictions on the accountant's day-to-day activities.

**Table 1.1: COMPARISON OF FINANCIAL AND MANAGEMENT ACCOUNTING**

| <b><i>S.<br/>n<br/>o</i></b> | <b><i>Areas of<br/>Comparison</i></b> | <b><i>Financial Accounting</i></b>                   | <b><i>Management Accounting</i></b>                                                                    |
|------------------------------|---------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 1                            | Primary users of information          | Persons and organization outside the business entity | Various levels of internal management                                                                  |
| 2                            | Types of accounting systems           | Double entry system                                  | Not restricted to double entry system; any useful system can be used                                   |
| 3                            | Restrictive guidelines                | Adherence to GAAP                                    | No formal guidelines or restrictions, only criterion is useful                                         |
| 4                            | Units of measurement                  | Historical (past) dollars                            | Any useful monetary (historical and future) or physical measure such as machine hours, labor hours etc |

|   |                          |                                           |                                                                                                        |
|---|--------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 5 | Focal point for analysis | Business entity as a whole                | Various segments of a business entity.                                                                 |
| 6 | Frequency of reporting   | Periodical on a regular basis             | Whenever needed; may not be on a regular basis                                                         |
| 7 | Degree of objectivity    | Demands objectivity; historical in nature | Heavily subjective for planning purposes, but objective data are used when relevant; future in nature. |

### 1.5 ORGANIZATION STRUCTURE AND THE MANAGEMENT ACCOUNTANT

The management accountant provides a staff function which gives advice and assistance to line managers. The accounting or finance department in an organization is lead by a finance officer. A finance officer is a senior officer empowered with overseeing the financial operations of an organization. If the organization is large, the finance officer can be supported by a controller and treasurer. A controller is responsible for preparing the information and report used in both managerial

**Table1.2: Responsibilities of controller and treasurer**

| <b>Controller</b>                                           | <b>Treasurer</b>                                        |
|-------------------------------------------------------------|---------------------------------------------------------|
| Supervise the accounting department                         | Identify capital needs and search for a source          |
| Prepare financial statement both for insiders and outsiders | Manages investment                                      |
| Cost accounting                                             | Responsible for credit policy and collection of account |
| Budgeting and variance analysis                             | Short term financing                                    |

|                 |                                          |
|-----------------|------------------------------------------|
|                 |                                          |
| Tax planning    | Maintain custody of cash and other asset |
| Data processing |                                          |

### 1.6 Functions of management accountant

Management accountant performs three functions

1. **Score keeping**- accumulating data and reporting reliable result to all levels of the management
  - ✚ Recording sales, purchase and payroll system
  - ✚ Preparing financial report
  - ✚ Preparing depreciation schedule
2. **Attention directing** -making visible both opportunities and problems on which managers need to focus.
  - ✚ highlighting rapidly growing market
  - ✚ Variance analysis and interpretation
  - ✚ Explaining performance report
3. **Problem solving**- comparing analysis to identify the best alternatives in relation to the organizations objectives
  - ✚ Make or buy decision
  - ✚ Add or drop decision
  - ✚ Sell at split of or process further decision

## **CHAPTER TWO**

### **COST TERMINOLOGY AND CLSSIFICATION**

#### **2.1 Cost terminologies**

Many accounting reports contain several cost terminologies. A good understanding of the different cost terminology is essential at least for the following two reasons.

- It enables accounting information users to best use the information provided.
- Uses of common terminology avoids confusion and misunderstanding

The following are some of the terms used in cost accounting

**Costs, Expenses and losses:** Accountants usually define cost as resource sacrificed or forgone to achieve a specific objective. It refers to an outlay or expenditure of money to acquire goods and services in the course of generating revenue. For instance purchase of raw material represents a cost as the raw material is used to produce finished goods that generate revenue when sold.

However some disbursements are not costs. For example, the payment of dividend is disbursement but it does not help to generate revenue, hence it is not a cost.

All costs initially represent an asset. As the asset is used in generating revenue, the amount consumed becomes an expense. Therefore expense is an expired cost. The cost of asset used should then be recognized as expense to properly match revenue and expense in the process of determining the income of the organization over a given period. For instance, insurance premium paid in advance to serve the coming period are initially recognized as asset, but as time passes on, the asset is continually converted into an expense. Another example may be a motor vehicle bought for use for the coming five years is an asset when initially purchased. However, as the asset is used up in the process of generating revenue, the cost gradually becomes an expense. Thus, expense are expired costs or costs used up in the course of generating revenue.

Some times a firm may incur a cost that produces neither immediate nor future benefit. This is called a loss. For example damage caused by fire or flood on property held is a loss.

**Cost object:** is anything for which a separate measurement of cost is desired. In manufacturing company, the cost object is the unit of finished goods produced.

**Cost accumulation and cost assignment:** A costing system typically account for costs in two basic stages, accumulation followed by assignment. Cost accumulation is the collection of cost data in some organized means of accounting system and cost assignment is a general term that encompass both (1) tracing accumulated cost that have direct relationship to the cost object and (2) allocating accumulated costs that have an indirect relationship to a cost object. For example a publisher that purchase paper rolls for printing magazines collect the cost of paper bought and used in any one month to obtain the total monthly cost of paper used. Beyond accumulating costs ,the cost accountant assign cost to the different magazines the publisher publish to help decision making

**Cost driver:** is any factor that affects total cost. That is a change in the cost driver will cause a change in the level of the cost of a related cost object.

Example

- Mile driven for transport cost
- Length of time of call for telephone cost
- Meter cub of water consumed for water cost
- Unite sold for cost of goods sold

**Cost management:** is the set of actions that a manager takes to satisfy customers while continuously reducing and controlling cost. Cost reduction efforts frequently focus on two key areas

- Doing only value added activities, that is, those activities that customers perceive as adding value to the product or service they purchase

- Efficiently managing the use of the cost drivers in the value added activities.

## **2.2 Classification of cost**

Cost may be classified in different ways from different point of view. The same cost may be included in several or in all of the following classification.

### **1. Time period point of view**

From time period point of view cost are classified in to historical cost and budgeted cost. Historical cost are costs incurred in the past period where as Budgeted costs are costs expected to be incurred in the future period. For example, the 8000 birr cost of a computer acquired in 2005 is a historical cost in the financial statement of 2006. However the 10,000 birr cost to acquire a new computer in 2007 to replace the existing one is a future cost.

### **2. Management function point of view**

From management function point of view costs are classified in to:

- **Manufacturing cost:** includes costs from the acquisition of raw material through production until the product can be turned over to the marketing division to be sold( material, labor & manufacturing overhead costs)
- **Selling cost:** are costs associated with marketing and selling a product. They include all costs incurred by the marketing division from the time the manufacturing process is completed until the product is delivered to customers. These costs include advertising, promotion, transport and warehouse cost.
- **Administrative cost:** are costs associated with the management of the Company and include expenditures for accounting, legal and administrative activity.

### **3. Business function ( value chain)point of view**

Value chain refers to the sequence of business functions in which usefulness is added to the product or service of a company

From business function point of view cost is classified as follows

- Research and development cost
- Product design cost
- Production cost
- Marketing cost
- Distribution cost
- Customer service cost

#### 4. **Generally accepted accounting treatment point of view**

The alternatives in accounting for cost are to expense it or to capitalize it.

- Costs that are expensed in the period in which they are incurred are called *non capitalized costs or periodic cost*. These costs possess no future benefit and are generally associated with a non-manufacturing area such as advertising, distribution, sales commission etc.
- Capitalized costs are costs incurred to manufacture a *product (product cost)* or to acquire long term assets. These costs are recorded as an asset at the beginning and expensed periodically.

#### 5. **Cost assignment point of view.**

From this point of view costs are classified as direct cost and Indirect cost.

**Direct costs** are costs that are directly traceable to the product.

Example:

- ✓ direct material cost
- ✓ Direct labor cost

**Indirect cost** (manufacturing overhead or factory overhead): are costs which are not directly traceable to the product but allocated to it using some criteria. Example:

- ✓ Cost of electricity
- ✓ Depreciation of equipment
- ✓ Indirect labor
- ✓ Indirect material
- ✓ Cost of different utilities
- ✓ Cost of repair and maintenance
- ✓ Insurance for the plant

## **6. Decision making point of view**

A decision involves making a choice among alternative courses of actions.

From decision making point of view costs are divided as relevant and irrelevant costs.

Relevant cost is useful for decision making where as irrelevant costs are not useful for decision making. Relevant cost is usually future cost which change among alternative courses of actions, and irrelevant cost is past or sunk cost which was already incurred.

## **7. Management influence point of view**

Management influence refers to the ability of a manager to control a particular cost.

A cost which is under the control of a given manager is controllable cost where as a cost which is beyond the control of a given manager is uncontrollable.

Controllability of a cost depends on the level of management and time period. All costs are controllable by someone at some level in the organization if the time period is longer enough.

## **8. Cost behavior point of view**

From their behavior point of view, costs are divided into fixed cost and Variable cost

Fixed cost is a cost which remains constant within a given relevant range regardless of change in output level, whereas variable cost is a cost which changes when units produced change. Usually, material and labor cost are variable without put, whereas some manufacturing overhead cost such as depreciation are fixed in nature regardless of change in output.

Total cost is sum of variable cost and fixed cost ( $TC = VC + FC$ )

$$\text{Average cost} = \frac{\text{Total cost}}{\text{No. units produced}}$$

**Example 1:** Student association has hired a musical group for graduation party. The fixed cost of hiring a band for the party is birr 4000. The hall in which the graduation ceremony is celebrated can afford up to 2000 attendees. It has been determined that the cost of refreshment consumed by each person attending the party will be birr 8.

Required: a) Fill the following table using the information provided.

| No of attendees | Total fixed cost | Average fixed cost | Total Variable cost | Total cost | Total average cost |  |
|-----------------|------------------|--------------------|---------------------|------------|--------------------|--|
| 500             |                  |                    |                     |            |                    |  |
| 1000            |                  |                    |                     |            |                    |  |
| 1500            |                  |                    |                     |            |                    |  |
| 2000            |                  |                    |                     |            |                    |  |

b) Draw the graph of FC, VC and TC

c) Draw the graph of Average FC, Average VC and Average TC

d) What happen to the fixed cost if the number of attendee is 3000?

## 9. Commitment to cost expenditure

Commitment to a cost expenditure focused on fixed cost as opposed to variable cost and budgeted cost as opposed to historical cost. Budgeted fixed cost can be classified as committed cost and discretionary cost.

- **Committed cost:** is one that is an inevitable consequence of a previous commitment. For example Property tax on ware house budgeted for the coming year is an example of commitment cost because it results from decision to construct the ware house last time.
- **Discretionary cost (programmed or managed cost):** is one in which the amount or time of incurrence is a matter of choice.

These are non recurring costs for which a finale commitment has not yet been made and that can be postponed to future period or canceled entirely.

## 10. Other cost classification

- **Marginal cost:** is cost incurred to manufacture one more product.
- **Out of pocket cost:** is cash expenditure associated with a particular decision alternative.
- **Opportunity cost:** is the cost of an opportunity for gone when one course of action is chosen over another. Opportunity cost is not an out of pocket cost but represents an opportunity associated with each of the alternatives that are rejected.

## 2.3 Manufacturing cost

There are three types of inventories in manufacturing .These are

- **Direct material inventory:** are raw materials in stock and waiting to be used in manufacturing process.
- **Work in process inventory:** are goods partially processed but not yet completed .They are also called work in progress (WIP).

- **Finished goods inventory:** are goods fully completed but not yet sold.

In manufacturing enterprises production costs are grouped in to three categories.

- **Direct material costs:** are costs of raw material that can be physically identified with or traced to the finished product .It is distinguished from indirect material by the ability to identify it economically with a finished product and is included as an element of indirect material cost. For example cost of paper used in printing newspaper is direct material cost for the newspaper ,however, paper used in beer factory to stamp around a bottle of beer is probably be classified as indirect material cost because it is significant part of the finished product ( Bottles of beers).
- **Direct labor cost :** includes The cost of employee who work directly on the product and whose efforts can economically be traced to particular unit of finished product
- **Manufacturing overhead (factory over head or indirect manufacturing cost):** are all manufacturing costs that cannot be individually traced to the finished product but allocated to it using some criteria. Example:
  - ✓ Indirect material( Nail, sand paper, screw, glue)
  - ✓ Indirect labor(supervisors salary)
  - ✓ Electricity and utilities
  - ✓ Plant rent
  - ✓ Plant insurance
  - ✓ Depreciation
  - ✓ Salary of plant manager

Prime cost and conversion costs are two other terms used to describe production cost.

- **Prime cost:** are the most important or significant costs traceable to unit of finished product. They include direct material and direct labor cost.

**Prime cost = Direct material cost + Direct labor cost**

- **Conversion costs** are those required to convert raw material in to finished product and consists of **direct labor** and **manufacturing and manufacturing overhead** cost.

**Conversion cost = Direct labor cost + Manufacturing overhead cost**

## 2.4 Financial statement for manufacturing company

In order to prepare financial statement for manufacturing company, the following schedules are necessary

### **Schedule1: cost of direct material used**

|                                     |               |
|-------------------------------------|---------------|
| Beginning direct material inventory | XX            |
| Purchase in The month               | <u>XX</u>     |
| Direct material available for use   | XX            |
| Ending direct material inventory    | ( <u>XX</u> ) |
| Direct material cost used           | <u>XX</u>     |

### **Schedule 2: cost of goods manufactured**

|                                       |           |
|---------------------------------------|-----------|
| Direct material used cost-----        | XX        |
| Direct labor cost -----               | XX        |
| Manufacturing overhead cost -----     | <u>XX</u> |
| Cost incurred in current period ----- | XX        |

|                                      |           |
|--------------------------------------|-----------|
| Add: Work in process beginning ----- | <u>XX</u> |
| Total cost incurred to date -----    | XX        |
| Less: work in process ending -----   | <u>XX</u> |
| Cost of goods manufactured -----     | <u>XX</u> |

### Schedule 3: cost of goods sold

|                                        |           |
|----------------------------------------|-----------|
| Finished goods beginning -----         | XX        |
| Cost of goods manufactured -----       | <u>XX</u> |
| Cost of goods available for sale ----- | XX        |
| Less: Finished goods ending -----      | <u>XX</u> |
| Cost of goods sold -----               | <u>XX</u> |

### Schedule 4: Income statement for manufacturing company

|                    |             |
|--------------------|-------------|
| Revenues           | XX          |
| Cost of goods sold | <u>XX</u>   |
| Gross profit       | XX          |
| Operating expense  | <u>(XX)</u> |
| Operating income   | <u>XX</u>   |

**Example2:** Consider the following account balance for ABC manufacturing company in the year 2004.

|                             | <u>Beginning Balance</u> | <u>End Balance</u> |
|-----------------------------|--------------------------|--------------------|
| Direct material inventory   | \$22,000                 | \$26,000           |
| WIP inventory               | 21,000                   | 20,000             |
| Finished goods inventory    | 18,000                   | 23,000             |
| Purchase of direct material |                          | 75,000             |
| Direct labor cost           |                          | 25,000             |
| Indirect labor cost         |                          | 15,000             |
| <b>16</b>                   |                          | <b>2015</b>        |

|                                                   |        |
|---------------------------------------------------|--------|
| Plant insurance                                   | 4,000  |
| Insurance- administrative                         | 5,000  |
| Depreciation - plant building and equipment       | 9,000  |
| Depreciation - administrative building            | 3,000  |
| Repair and maintenance - factory equipment        | 4,000  |
| Marketing, distribution and customer service cost | 93,000 |
| General and administrative cost                   | 29,000 |

Required

- Calculate cost of direct material used
- Calculate cost of goods manufactured
- Calculate cost of goods sold
- If revenue for the year is \$300, 000, prepare income statement for the Company.

**Example 3:** A fire destroyed XYZ manufacturing company completely on January 29, 2004. Fortunately certain accounting records were kept in another building. It revealed the following for the period from January 1, 2004 to January 29, 2004.

|                                 |                               |
|---------------------------------|-------------------------------|
| Direct material purchased       | \$160,000                     |
| WIP January 1                   | 34,000                        |
| Direct material January 1, 2004 | 16,000                        |
| Finished goods January 1, 2004  | 30,000                        |
| <b>MOH cost</b>                 | <b>40% of conversion cost</b> |
| Revenue                         | 500,000                       |
| Direct labor cost               | 180,000                       |
| <b>Prime cost</b>               | <b>294,000</b>                |

|                                  |         |
|----------------------------------|---------|
| Gross profit based on sales      | 20%     |
| Cost of goods available for sale | 450,000 |

#### Requirements

- Direct material destroyed
- Cost of goods manufactured
- Finished goods destroyed
- WIP destroyed

#### Assignment

**Problem 1:** The cost department of Randall manufacturing company collected the following cost data for financial statement presentation for the year ended on December 31, 2005.

| Inventories             | January 1, 2005 | December 31, 2005 |
|-------------------------|-----------------|-------------------|
| Direct material         | \$34,500        | \$49,300          |
| Work in process         | \$ 81,500       | \$42,000          |
| Units of Finished goods | 300 unit        | 420 units         |
| Cost of Finished goods  | \$48,600        | ?                 |

Additional information.

- Sales during the year are 3,880 units at \$220 per unit
- Direct material purchased ----- \$364,000
- Prime cost ----- \$511,700
- MOH cost ----- 48% of conversion cost
- Operating expense ----- 50% of gross profit
- All units in the ending finished goods inventory are from current period production.

#### Requirements:

Compute the following based on the above information.

- Cost of direct material used

2. Units of goods manufactured
3. Cost of goods manufactured
4. Cost of goods sold
5. Operating income

**Problem 2:** The following selected data are for ABC plastic company for the month of January 2004.

|                                              |           |
|----------------------------------------------|-----------|
| Work in process inventory January 1, 2004    | \$200.000 |
| Direct material inventory January 1, 2004    | 90,000    |
| Direct material purchased in January         | 360,000   |
| Direct material used in January              | 375,000   |
| Variable manufacturing overhead cost         | 250,000   |
| Total manufacturing overhead cost            | 480,000   |
| Total manufacturing cost incurred in January | 1,600.000 |
| Cost of goods manufactured                   | 1,650,000 |
| Cost of goods sold in January                | 1,700,000 |
| Finished goods inventory January 1, 2004     | 125,000   |
| Gross profit for January                     | 150,000   |
| Operating income for January                 | 50,000    |

**Requirements:** For the month of January calculate the following

- a) Direct material inventory on January 31, 2004
- b) Fixed manufacturing overhead cost for January
- c) Direct manufacturing labor cost for January
- d) Work in process inventory on January 31, 2004
- e) Goods available for sale in January
- f) Finished goods inventory January 31, 2004
- g) Sales revenue
- h) Operating expenses
- i) Prime cost

j) Conversion cost

**Problem 3:** Ato Alemu was graduated from Teferi Mekonnen School ten years ago. He was working in ABC Company for the last seven years under different positions. 15 months ago he started his own furniture factory called **JIMER office and House hold furniture**. After 3 months since he started operation, he learnt that maintaining an accounting record is essential. He thought he know how to establish an accounting system, maintain an accounting record and prepare financial statements by virtue of his high school book keeping. He prepared the following income statement at the end of the current year sene30, 1998

JIMER Office and House hold furniture

Income statement

For the year ended sene 30, 1998

|                              |            |
|------------------------------|------------|
| Sales                        | Br.135,000 |
| Cost of goods sold           |            |
| Beginning inventory          |            |
| • Direct material            | 9,000      |
| • Work in process            | 3,000      |
| • Finished goods             | 12,000     |
| Direct material purchase     | 30,000     |
| Direct labor                 | 45,000     |
| Rent                         | 14,000     |
| Light, heat, and power       | 5,000      |
| Telephone                    | 1,500      |
| Depreciation                 | 4,000      |
| Indirect labor               | 6,000      |
| Marketing and administrative | 9,000      |

|                                  |         |
|----------------------------------|---------|
| Insurance                        | 8,000   |
| Miscellaneous MOH cost           | 2,000   |
| Miscellaneous marketing and adm. | 1,800   |
| Total                            | 143,100 |
| Net loss                         | 8,100   |

The following additional information is available

The ending inventory of direct material, work in process and finished goods is birr 3,000, 4,500 and 15,000 respectively. The following costs should be allocated

|                       | Manufacturing | periodic |
|-----------------------|---------------|----------|
| Rent                  | 60%           | 40%      |
| Light, heat and power | 70%           | 30%      |
| Telephone             | 70%           | 30%      |
| Insurance             | 60%           | 40%      |
| Depreciation          | 80%           | 20%      |

He worried why the loss comes; he doubted his capacity of accountancy, and asked you to help him prepare the income statement as new.

**Problem 4:** Supply the missing data for each of the following companies

|               | A           | B           | C | D           |
|---------------|-------------|-------------|---|-------------|
| Unit produced | 45,000 unit | 60,000 unit | K | 75,000 unit |

|                        |           |           |           |        |
|------------------------|-----------|-----------|-----------|--------|
| Total cost             | E         | \$450,000 | \$240,000 | N      |
| Fixed cost             | \$157,500 | H         | \$90,000  | O      |
| Fixed cost per unit    | F         | \$1.2     | \$9       | P      |
| Variable cost per unit | \$16.5    | I         | L         | \$11.1 |
| Total cost per unit    | G         | J         | M         | \$15.3 |

**Problem 5:** Supply the missing data for each company listed below:

|                            | W         | X       | Y       | Z       |
|----------------------------|-----------|---------|---------|---------|
| Sales                      | \$300,000 | D       | 390,000 | 660,000 |
| DM Beginning               | 27,000    | 30,000  | 21,000  | J       |
| DM purchased               | 42,000    | 45,000  | 48,000  | 63,000  |
| DM ending                  | A         | 24,000  | 27,000  | 24,000  |
| Direct labor               | 75,000    | E       | 51,000  | 95,500  |
| MOH cost                   | 60,000    | 54,000  | 76,500  | 95,500  |
| WIP beginning              | 57,000    | 18,000  | G       | 36,000  |
| WIP ending                 | 48,000    | 24,000  | 45,000  | 30,000  |
| FG beginning               | 60,000    | F       | 51,000  | 48,000  |
| FG ending                  | 69,000    | 33,000  | H       | 54,000  |
| Cost of goods manufactured | B         | 126,000 | 210,000 | K       |
| Cost of goods sold         | C         | 132,000 | I       | 300,000 |
| Gross margin               | 129,000   | 144,000 | 162,000 | L       |

**Problem 6:** Han plc is nine month old since established to manufacture different parts of a manual irrigation pump. The company owners failed to maintain a formal accounting record for the nine months of operation with the presumption that the volume of activity is small and can thus be effectively administered by them. Lately, they have discovered the importance of maintaining an accounting rescored. Assume that the firm hires you and your first duty is to prepare a six month income statement covering the period from January1, to june30. The company management is capable of supplying actual data on some items but the rest are estimates. You are given the following actual data.

1 Sales for the first six month is Br.240, 000

2. Inventory january1.

Direct material ----- 12,000

Work in process ----- 8,800

Finished goods ----- 28,500

3. The gross margin is fairly estimated at 40% of sales, and direct labor is estimated to be one third of conversion cost and one fourth of prime cost.

4. The period cost is totally estimated at 54,000 and marketing cost is estimated to be 40%.

5. A physical count of all inventories made as of june30 reveals the following.

Direct material ----- 9,000

Work in process ----- 7,500

Finished goods ----- 52,000

Required

1. Calculate the cost of goods sold
2. Calculate the cost goods manufactured
3. Calculate the direct labor cost
4. Calculate the direct material cost

5. Calculate the direct MOH cost

## **CHAPTER THREE**

### **MANUFACTURING OVERHEAD COST ALLOCATIONS**

#### **3.1 Introduction**

Costs that are related to a particular cost object but cannot traced to it in an economically feasible way are called manufacturing overhead cost or indirect cost. The term cost allocation describes assigning indirect cost to the chosen cost object.

Purposes of cost allocation

- To provide information for economic decision
  - o Pricing decision
  - o Make or buy decision
- To motivate managers and employees
- To justify cost or compute reimbursement
- To measure income and asset for reporting

The allocation of one particular cost need not satisfy all purposes simultaneously. Different costs are appropriate for different purpose

#### **3.2 Criteria for guiding cost allocation decisions**

##### **1. Cause and effect criteria**

Using this criterion, managers identify the variable that causes a resource to be consumed. For example managers may use hours of testing as a

variable when allocating the cost of quality test area to products? Cost allocation based on cause and effect criteria are likely to be the most credible to operating personnel

2. **Benefit received:** using this criteria manager identifies the beneficiary of the output of the cost object.

The cost of the cost object is allocated among the beneficiaries in proportion to the benefit each received. Consider corporate wide advertising programs that promote the general image of the corporation rather than any individual product. The cost of this program may be allocated on the basis of individual revenue; the higher the revenue, the higher the divisions allocated cost of the advertising program. The rationale behind this allocation is that division with higher revenue has apparently benefited from the advertising more than divisions with lower revenue and, therefore ought to be allocated more of the advertising costs.

3. **Fairness or equity:** This criterion is often cited in government contracts when cost allocations are the basis of establishing a price satisfactory to the government and its suppliers. Cost allocation here is viewed as a reasonable or fair means of establishing a selling price in the mind of the contract ring parties. For most allocation decision, fairness is difficult to achieve objective rather than an operational criterion.

4. **Ability to bear:** This criteria advocates allocating costs in proportion to the cost objects ability to bear cost allocated to income.

An example is the allocation of corporate executive salaries on the basis of division operating income. The presumption is that the more profitable division have a greater ability to absorb corporate headquarters cost

### **3.3 Allocating Cost from One Department to Another**

Most manufacturing business organizations have one or more production and service giving departments.

**Service (support) departments:** are departments which are not involved in the direct production of goods but which gives support to the production departments.

**Production (operating) departments:** are those which directly participate in the production of goods. The cost incurred in support departments should be collected and allocated to production departments. The cost incurred in production department and the cost allocated from other service departments is added together and finally allocated to products manufactured.

### **Allocating cost of one service department to two or more production departments**

There are two ways of allocating indirect cost from service giving department to other operating department

- **Single rate cost allocation method:** Collects all costs in one cost pool and allocate using a single cost allocation base. cost pool is a grouping of individual cost items
- **Dual rate cost allocation method:** In this method costs are first classified in to fixed and variable cost sub pools and different allocation rate for each sub pools is calculated. And then, the fixed cost is allocated using the budgeted allocation base and variable cost is allocated using the actual allocation base.

**Example 1:** A computer manufacturing company has two operating departments (micro computer division and peripheral equipment division) and one support giving division called central computer department. The central computer department gives computer and information services for both operating divisions. The following data apply to the coming budget year. Service provided by central computer division is expressed in terms of hours

Fixed cost in the central computer department ----- br.300, 000  
per year

Budgeted variable cost per hour ----- br.200

Budgeted usage in hour

- Microcomputer division----- 800 hour
- Peripheral division ----- 400 hour
- Total -----1200hours

Assume the micro computer division actually uses 900 hours and the equipment peripheral division uses 300 during the year.

Allocate the cost of central computer department to the two operating department

- a) Using single rate method
- b) Using dual rate method

**Example 2:** Allocate only the fixed cost in example one above (br.300, 000) using the actual hours used given below

- A. 800 hrs by computer division and 400 hrs by peripheral equipment division
- B. 800 hrs by computer division and 700 hrs by peripheral equipment division
- C. 800 hrs by computer division and 200 hrs by peripheral equipment division

### **3.4 Allocating cost of two or more support giving department to production departments**

Allocation of cost of support departments create special problem when they provide reciprocal support to each other as well as to operating departments

There are three methods of allocating the cost of two or more service department to production departments

#### **1. Direct method**

- Is the most widely used method because of its simplicity
- This method allocates each service department cost directly to the operating departments. Ignores the inter service department cost allocation.

## 2. Step down allocation method

- Allows for partial recognition of the service rendered by support department to other departments
- Under this method, once a support department cost has been allocated to another support department, no reciprocal support department cost allocation the first one.

## 3. Reciprocal allocation method:

- Allocates cost by explicitly including the mutual service provided among all service department
- This method enables us to incorporate inter department relation fully in to support department cost allocation.
- Theoretically this method is the best method to allocate cost
- It can be repeated distribution method and linear equation method.

**Example 3:** An engine manufacturing company has two operating departments and two support departments

| <u>Support department</u> | <u>Operating department</u> |
|---------------------------|-----------------------------|
| Plant maintenance (PM)    | Machining (M)               |
| Information system (IS)   | Assembly (A)                |

Costs are accumulated in each department for planning and control purpose. For inventory costing, however, the support department cost must be allocated to the operating departments. The data for our example is given below

|                   | <u>Support department</u> | <u>Operating department</u>              |
|-------------------|---------------------------|------------------------------------------|
|                   | <u>PM</u>                 | <u>IS</u> <u>M</u>                       |
| <u>A</u>          |                           |                                          |
| Budgeted MOH cost | \$600,000                 | \$116,000                      \$400,000 |
| \$200,000         |                           |                                          |
| Before allocation |                           |                                          |

Service provide by

|                      |   |         |         |
|----------------------|---|---------|---------|
| Plant maintenance hr | - | 1600hrs | 2400hrs |
| 4000hrs              |   |         |         |

|                       |        |   |         |
|-----------------------|--------|---|---------|
| Information system hr | 200hrs | - | 1600hrs |
| 200hrs                |        |   |         |

Requirements: Using the single rate, allocate the support department cost under each of the following methods

- a) Direct method
- b) Step down method
- c) Reciprocal method

**Example 4: East-African Bottling Company** has three service departments that support the production area. Outlined below is the budgeted support and production departments' spending for the upcoming year?

### **Budgeted Spending**

#### **Support Departments:**

|                      |             |
|----------------------|-------------|
| Receiving (R1) ----- | Br. 250,000 |
| Repair (R2) -----    | 450,000     |
| Tools (T) -----      | 100,000     |

#### **Production Departments:**

|                     |         |
|---------------------|---------|
| Assembly (A) -----  | 720,000 |
| Machining (M) ----- | 450,000 |
| Bottling (B) -----  | 120,000 |

Use of services by other departments follows:

#### **Usage proportions used by internal customers**

Support departments  
departments

Production

|               | Receiving | Repair | Tools | Assembly | Machining |
|---------------|-----------|--------|-------|----------|-----------|
| Bottling_     |           |        |       |          |           |
| Service to be |           |        |       |          |           |
| Provided by:  |           |        |       |          |           |
| Receiving     | -         | 0.40   | 0.10  | 0.20     | 0.20      |
| 0.10          |           |        |       |          |           |
| Repair        | 0.10      | -      | 0.15  | 0.20     | 0.30      |
| 0.25          |           |        |       |          |           |
| Tools         | 0.05      | 0.15   | -     | 0.30     | 0.30      |
| 0.20          |           |        |       |          |           |

**Required:**

- (1) Allocate support department costs to production departments using the following methods:
  - (a) Direct method
  - (b) Step-down/ Sequential method
  - (c) Reciprocal method
- (2) Present the total costs of each production department after the cost allocation under each of the above three methods

**Example 5: XYZ Company** has three service departments that support the production area. Outlined below is the budgeted support and production departments' spending for the upcoming year?

| Particulars                 | Production departments |        | Service departments |       |           |
|-----------------------------|------------------------|--------|---------------------|-------|-----------|
|                             | A                      | B      | Maintenance         | Power | Personnel |
| Overheads before allocation | 120000                 | 150000 | 20000               | 48000 | 40000     |
| Allocation basis:           |                        |        |                     |       |           |
| Maintenance hour            | 80                     | 20     | -                   | 40    | 20        |
| KWH consumed                | 4                      | 16     | 2                   | -     | 2         |
| No of employees             | 60                     | 30     | 30                  | 18    | -         |

**Required:**

- (1) Allocate support department costs to production departments using the following methods:
  - (a) Direct method
  - (b) Step-down/ Sequential method
  - (c) Reciprocal method (repeated distribution method)
- (2) Present the total costs of each production department after the cost allocation under each of the above three methods

**Example 5:** ABC Production Company manufactures components for radio and television satellites using two service departments and two production departments. The inter-departmental relationship and estimated overhead costs are given below.

| Particulars                 | Production departments |          | Service departments |            |
|-----------------------------|------------------------|----------|---------------------|------------|
|                             | Moulding               | Assembly | Maintenance         | Scheduling |
| Overheads before allocation | 378000                 | 276000   | 750000              | 400000     |
| Allocation basis:           |                        |          |                     |            |
| Maintenance                 | 40%                    | 50%      | -                   | 10%        |
| Scheduling                  | 50%                    | 30%      | 20%                 | -          |

**Required:**

- (1) Allocate support department costs to production departments using the following methods:
  - (a) Direct method
  - (b) Step-down/ Sequential method
  - (c) Reciprocal method (repeated distribution and linear equation methods)
- (2) Present the total costs of each production department after the cost allocation under each of the above three methods

### 1.5 Allocating common cost

Common costs are costs which are shared by two or more activities. Common cost are incurred for common purpose

There are two methods of allocating common costs. These are

- Stand alone method and
- Incremental method

**Example 5:** Almaz Abdi is a graduate of AA University in MA in Accounting and finance. She was invited by Mekele University for an interview. The round trip from Mekele to AA and back to AA costs Birr 400. A week before she left to Mekele, she was again invited by Bahir Dar University for another interview. The round trip from AA to Bahir Dar and back to AA costs Birr 240. Hence instead of making both journey separately, she wants to combine them. I.e. AA - Mekele- Bahir Dar-Addis Ababa .

This combined journey will cost Birr 300. This cost is a Common cost for both employers i.e. Mekele University and Bahir Dar University. Hence it has to be allocated to both universities.

Required: Allocate the 300 birr cost to the two universities using

1. Stand alone method
2. Incremental method first to Mekele and then to Bahir Dar
3. Incremental method first to Bahir Dar and then to Mekele

### Assignment

**Problem 1 : Rensselaar** Corporation is developing department overhead rates based on direct labor hours for its two production department. Etching and Finishing. The Etching department employees 20 people and the Finishing department employees 80 people. Each person in the two department works 2000 hours per year. The production related overhead cost for Etching department is budgeted at \$320,000 and \$480,000 for finishing department. Two service department, maintenance and computing directly support the two production departments. The service departments have budgeted cost of \$48,000 and \$250,000 respectively. The production department overhead rates cannot be determined until the service department costs are allocated. The following schedule reflects the use of the maintenance department and computing departments output by various department

|                    | Using departments |         |         |          |
|--------------------|-------------------|---------|---------|----------|
| Service department | Maintena          | Computi | Etching | Finishin |

|                     | nce     | ng   |         | g       |
|---------------------|---------|------|---------|---------|
| Maintenance (hours) | 0       | 1000 | 1000    | 8000    |
| Computing (minutes) | 240,000 | 0    | 840,000 | 120,000 |

Required: Calculate the overhead rates per direct labor for the Etching and Finishing department after allocating manufacturing overhead cost in the service departments using

1. Direct method
2. Step down method
3. Reciprocal method

**Problem 2:** Meridian Instrument Company manufactures construction machineries. The company has two production departments: Molding and Assembly. There are three service departments: Maintenance, personnel and computer Aided design (CAD). The usage of these service departments output and their budgeted cost during 2006 are as follows

|                                      | <b>Provider of service</b> |                 |           |  |
|--------------------------------------|----------------------------|-----------------|-----------|--|
| User department                      | personnel                  | Maintenan<br>ce | CAD       |  |
| Personnel                            | -                          | 500             | 500       |  |
| Maintenance                          | 500                        | -               | 1000      |  |
| CAD                                  | 500                        | 500             | -         |  |
| Molding                              | 4000                       | 3000            | 2000      |  |
| Assembly                             | 5000                       | 4000            | 1500      |  |
| Total                                | 10,000                     | 8,000           | 5,000     |  |
| Total budgeted cost in service dept. | \$250,000                  | \$230,000       | \$350,000 |  |

Requirements: Allocate service department cost to production department using

1. Direct method
2. Step down method
3. Reciprocal method

## **CHAPTER FOUR**

### **JOB ORDER COSTING SYSTEM**

#### **4.1 Introduction**

The first stage in cost accounting is to ascertain the cost of the product offered or the services provided. In order to do the same, it is necessary to follow a particular method of ascertaining the cost. The methods of costing are applied in various business units to ascertain the cost of product or service offered. Different methods of costing are required to be used in different types of businesses. For example, costing methods used in a manufacturing business will differ from the methods used in a business that is offering services. Even in a manufacturing business, some business units may have production in a continuous process, i.e. output of a process is an input of the subsequent process and so on, while in some businesses production is done according to the requirements of customers and hence each job is different from the other one. Different methods of costing are

used to suit these diverse requirements. These methods of costing are discussed in detail in this chapter.

### Building-Block Concepts of Costing Systems

*Cost object*—anything for which a measurement of costs is desired—for example, a product, such as an iMac computer, or a service, such as the cost of repairing an iMac computer.

2. *Direct costs of a cost object*—costs related to a particular cost object that can be traced to that cost object in an economically feasible (cost-effective) way—for example the cost of purchasing the main computer board or the cost of parts used to make an iMac computer.

3. *Indirect costs of a cost object*—costs related to a particular cost object that cannot be traced to that cost object in an economically feasible (cost-effective) way—for example, the costs of supervisors who oversee multiple products, one of which is the iMac, or the rent paid for the repair facility that repairs many different Apple computer products besides the iMac. Indirect costs are allocated to the cost object using a cost allocation method. Recall that *cost assignment* is a general term for assigning costs, whether direct or indirect, to a cost object. *Cost tracing* is a specific term for assigning direct costs; *cost allocation*

4. **Cost pool.** A **cost pool** is a grouping of individual indirect cost items. Cost pools can range from broad, such as all manufacturing-plant costs, to narrow, such as the costs of operating metal-cutting machines. Cost pools are often organized in conjunction with cost-allocation bases.

5. **Cost-allocation base.** How should a company allocate costs to operate metal-cutting machines among different products? One way to allocate costs is based on the number of machine-hours used to produce different products. The **cost-allocation base** (number of machine-hours) is a systematic way to link an indirect cost or group of indirect costs (operating costs of all metal-cutting machines) to cost objects (different products). For example, if indirect costs of operating metal-cutting machines is

\$500,000 based on running these machines for 10,000 hours, the cost allocation rate is  $\$500,000 \div 10,000 \text{ hours} = \$50 \text{ per machine-hour}$ , where machine-hours is the cost allocation base. If a product uses 800 machine-hours, it will be allocated \$40,000,  $\$50 \text{ per machine-hour} \times 800 \text{ machine-hours}$ . The ideal cost-allocation base is the cost driver of the indirect costs, because there is a cause-and-effect relationship between the cost allocation base and the indirect costs. A cost-allocation base can be either financial (such as direct labor costs) or nonfinancial (such as the number of machine-hours). When the cost object is a job, product, or customer, the cost-allocation base is also called a **cost-application base**.

## **Job Costing: Evaluation and Implementation**

### **Five-Step Decision-Making Process**

1. **Identify the problems and uncertainties.** The decision of whether and how much to bid for the WPP job depends on how management resolves two critical uncertainties: what it will cost to complete the job and the prices that its competitors are likely to bid.

2. **Obtain information.** Robinson's managers first evaluate whether doing the WPP job is consistent with the company's strategy. Do they want to do more of these kinds of jobs? Is this an attractive segment of the market? Will Robinson be able to develop a competitive advantage over its competitors and satisfy customers? Robinson's managers conclude that the WPP job fits well with the company's strategy.

Robinson's managers study the drawings and engineering specifications provided by WPP and decide on technical details of the machine. They compare the specifications of this machine to similar machines they have made in the past, identify competitors who might bid on the job, and gather information on what these bids might be.

3. **Make predictions about the future.** Robinson's managers estimate the cost of direct materials, direct manufacturing labor, and overhead for the WPP job. They also consider qualitative factors and risk factors and think through any biases they might have. For example, do engineers and

employees working on the WPP job have the necessary skills and technical competence? Would they find the experience valuable and challenging? How accurate are the cost estimates, and what is the likelihood of cost overruns? What biases do Robinson's managers have to be careful about?

**4. Make decisions by choosing among alternatives.** Robinson bids \$15,000 for the WPP job. This bid is based on a manufacturing cost estimate of \$10,000 and a markup of

50% over manufacturing cost. The \$15,000 price takes into account likely bids by competitors, the technical and business risks, and qualitative factors. Robinson's managers are very confident that they have obtained the best possible information in reaching their decision.

**5. Implement the decision, evaluate performance, and learn.** Robinson wins the bid for the WPP job. As Robinson works on the WPP job, it keeps careful track of all the costs it has incurred (which are detailed later in this chapter).

Time Period Used to Compute Indirect-Cost Rates

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

**1. The numerator reason (indirect-cost pool).**

The shorter the period, the greater the influence of seasonal patterns on the amount of costs. For example, if indirect-cost rates were calculated each month, costs of heating (included in the numerator) would be charged to production only during the winter months. An annual period incorporates the effects of all four seasons into a single, annual indirect-cost rate.

Levels of total indirect costs are also affected by non seasonal erratic costs. Examples of non seasonal erratic costs include costs incurred in a particular month that benefit operations during future months, such as costs of repairs and maintenance of equipment, and costs of vacation and holiday pay. If monthly indirect-cost rates were calculated, jobs done in a month with high, non seasonal erratic costs would be charged with these costs. Pooling all indirect costs together over the course of a full year and calculating a single

annual indirect-cost rate helps smooth some of the erratic bumps in costs associated with shorter periods.

## 2. **The denominator reason (quantity of the cost-allocation base).**

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

### **Normal Costing**

The difficulty of calculating actual indirect-cost rates on a weekly or monthly basis means managers cannot calculate the actual costs of jobs as they are completed.

However, managers, including those at Robinson, want a close approximation of the costs of various jobs regularly during the year, not just at the end of the fiscal year. Managers want to know manufacturing costs (and other costs, such as marketing costs) for ongoing uses, including pricing jobs, monitoring and managing costs, evaluating the success of the job, learning about what worked and what didn't, bidding on new jobs, and preparing interim financial statements. Because of the need for immediate access to job costs, few companies wait to allocate overhead costs until year-end when the actual manufacturing overhead is finally known. Instead, a *predetermined* or *budgeted* indirect-cost rate is calculated for each cost pool at the beginning of a fiscal year, and overhead costs are allocated to jobs as work progresses. For the numerator and denominator reasons already described, the **budgeted indirect-cost rate** for each cost pool is computed as follows:

Budgeted indirect cost rate =

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

Using budgeted indirect-cost rates gives rise to normal costing.

**Normal costing** is a costing system that (1) traces direct costs to a cost object by using the actual direct-cost rates times the actual quantities of the direct-cost inputs and

(2) Allocates indirect costs based on the *budgeted* indirect-cost rates times the actual quantities of the cost-allocation bases. This approach is commonly used by companies in the manufacturing, merchandising, and service sectors.

### **Actual Costing**

Both actual costing and normal costing trace direct costs to jobs in the same way because source documents identify the actual quantities and actual rates of direct materials and direct manufacturing labor for a job as the work is being done. The only difference between costing a job with normal costing and actual costing is that normal costing uses *budgeted* indirect-cost rates, whereas actual costing uses *actual* indirect-cost rates calculated annually at the end of the year.

Actual manufacturing overhead rate = Actual annual manufacturing overhead costs

Actual annual quantity of the cost -  
allocation base

Manufacturing overhead costs allocated to the job = Actual manufacturing overhead rate \* Actual quantity of direct manufacturing labor-hours

### **Actual Costing**

#### **Normal Costing**

**Direct Costs** *Actual direct-cost rates* \_  
*Actual direct-cost rates* \*

actual quantities of direct-cost inputs actual  
quantities of direct-cost inputs

**Indirect Costs** *Actual indirect-cost rates* \*  
*Budgeted indirect-cost rates* \*

actual quantities of cost-allocation bases actual  
quantities of cost-allocation bases

## 4.2 Methods of Costing

As mentioned in the above paragraph, the methods of costing are used to ascertain the cost of product or service offered by a business organization. There are two principle methods of costing. These methods are as follows

- ✚ Job Costing

- ✚ Process Costing

Other methods of costing are the variations of these two principle methods. The variations of these methods of costing are as follows.

- ✚ Job Costing: Batch Costing, Contract Costing, Multiple Costing.

- ✚ Process Costing: Unit or Single Output Costing, Operating Costing, Operation Costing

Companies frequently adopt one of the two costing systems to assign costs to products or services .

**Job order costing system**: is a type of cost system that provides for a separate record of the cost of each particular quantity of product that passes through the factory

Job order costing system is commonly used by companies with products that are unique and divisible. In this system, costs are assigned to a distinct unit, batch or lot of product or service. Job is a task for which resources are expended in bringing a distinct product or service to market.

**Job Costing**: This method of costing is used in Job Order Industries where the production is as per the requirements of the customer. In Job Order industries, the production is not on continuous basis; rather it is only when order from customers is received and that too as per the specifications of the customers. Consequently, each job can be different from the other one. Method used in such type of business organizations is the Job Costing or Job Order Costing. The objective of this method of costing is to work out the cost of each job by preparing the Job Cost Sheet. A job may be a product, unit, batch, sales order, project, contract, service, specific program or any other cost objective that is distinguishable clearly and unique in terms of

materials and other services used. The cost of completed job will be the materials used for the job, the direct labor employed for the same and the production overheads and other overheads if any charged to the job. The following are the features of job costing.

- It is a specific order costing
- A job is carried out or a product is produced is produced to meet the specific requirements of the order
- Job costing enables a business to ascertain the cost of a job on the basis of which quotation for the job may be given.
- While computing the cost, direct costs are charged to the job directly as they are traceable to the job.
- Indirect expenses i.e. overheads are charged to the job on some suitable basis.
- Each job completed may be different from other jobs and hence it is difficult to have standardization of controls and therefore more detailed supervision and control is necessary.
- At the end of the accounting period, work in progress may or may not exist.

Examples of business that use job order costing includes:

- construction companies
- Furniture manufacturers
- printing firms
- Repair shops
- Service giving organization.
- Garages etc

#### **4.3 Methodology used in Job Costing**

As discussed above, the objective of job costing is to ascertain the cost of a job that is produced as per the requirements of the customers. Hence it is necessary to identify the costs associated with the job and present it in the

form of job cost sheet for showing various types of costs. Various costs are recorded in the following manner.

**Direct Material Costs:** Material used during the production process of a job and identified with the job is the direct material. The cost of such material consumed is the direct material cost. Direct material cost is identifiable with the job and is charged directly. The source document for ascertaining this cost is the material requisition slip from which the quantity of material consumed can be worked out. Cost of the same can be worked out according to any method of pricing of the issues like first in first out, last in first out or average method as per the policy of the organization. The actual material cost can be compared with standard cost to find out any variations between the two. However, as each job may be different from the other, standardization is difficult but efforts can be made for the same.

**Direct Labor Cost:** This cost is also identifiable with a particular job and can be worked out with the help of 'Job Time Tickets' which is a record of time spent by a worker on a particular job. The 'job time ticket' has the record of starting time and completion time of the job and the time required for the job can be worked out easily from the same. Calculation of wages can be done by multiplying the time spent by the hourly rate. Here also standards can be set for the time as well as the rate so that comparison between the standard cost and actual cost can be very useful.

**Direct Expenses:** Direct expenses are chargeable directly to the concerned job. The invoices or any other document can be marked with the number of job and thus the amount of direct expenses can be ascertained.

**Overheads:** This is really a challenging task as the overheads are all indirect expenses incurred for the job. Because of their nature, overheads cannot be identified with the job and so they are apportioned to a particular job on some suitable basis. Pre determined rates of absorption of overheads are generally used for charging the overheads. This is done on the basis of the budgeted data. If the predetermined rates are used, under/over

absorption of overheads is inevitable and hence rectification of the same becomes necessary.

**Work in Progress:** On the completion of a job, the total cost is worked out by adding the overhead expenses in the direct cost. In other word, the overheads are added to the prime cost. The cost sheet is then marked as 'completed' and proper entries are made in the finished goods ledger. If a job remains incomplete at the end of an accounting period, the total cost incurred on the same becomes the cost of work in progress. The work in progress at the end of the accounting period becomes the closing work in progress and the same becomes the opening work in progress at the beginning of the next accounting period. A separate account for work in progress is maintained.

General Approach to Job Costing

**Step 1: Identify the Job That Is the Chosen Cost Object.**

The cost object in the Robinson Company example is Job WPP 298, manufacturing a paper-making machine for Western Pulp and Paper (WPP) in 2011. Robinson's managers and management accountants gather information to cost jobs through source documents. A **source document** is an original record (such as a labor time card on which an employee's work hours are recorded) that supports journal entries in an accounting system. The main source document for Job WPP 298 is a job-cost record. A **job-cost record**, also called a **job-cost sheet**, records and accumulates all the costs assigned to a specific job, starting when work begins.

**Step 2: Identify the Direct Costs of the Job. Robinson identifies two direct-manufacturing cost categories: direct materials and direct manufacturing labor.**

Direct materials: On the basis of the engineering specifications and drawings provided by WPP, a manufacturing engineer orders materials from the storeroom. The order is placed using a basic source document called a materials-requisition record, which contains information about the cost of direct materials used on a specific job and in a specific department

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

### **Step 3: Select the Cost-Allocation Bases to Use for Allocating Indirect Costs to the Job.**

Indirect manufacturing costs are costs that are necessary to do a job but that cannot be traced to a specific job. It would be impossible to complete a job without incurring indirect costs such as supervision, manufacturing engineering, utilities, and repairs. Because these costs cannot be traced to a specific job, they must be allocated to all jobs in a systematic way. Different jobs require different quantities of indirect resources. The objective is to allocate the costs of indirect resources in a systematic way to their related jobs. Companies often use multiple cost-allocation bases to allocate indirect costs because different indirect costs have different cost drivers.

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

### **Step 5: Compute the Rate per Unit of Each Cost-Allocation Base Used to Allocate**

**Indirect Costs to the Job.** For each cost pool, the budgeted indirect-cost rate is calculated by dividing budgeted total indirect costs in the pool (determined in Step 4) by the budgeted total quantity of the cost-allocation base (determined in Step 3). Budgeted indirect cost rate =

Budgeted annual indirect costs

Budgeted annual quantity of the cost-  
allocation base

**Step 6: Compute the Indirect Costs Allocated to the Job.** The indirect costs of a job are calculated by multiplying the *actual* quantity of each different allocation base (one allocation base for each cost pool) associated with the job by the *budgeted* indirect cost rate of each allocation base (computed in Step 5).

**Step 7: Compute the Total Cost of the Job by Adding All Direct and Indirect Costs Assigned to the Job**

#### 4.4 Advantages of Job Costing

The following are the advantages of job costing.

- Accurate information is available regarding the cost of the job completed and the profits generated from the same.
- Proper records are maintained regarding the material, labor and overheads so that a costing system is built up
- Useful cost data is generated from the point of view of management for proper control and analysis.
- Performance analysis with other jobs is possible by comparing the data of various jobs. However it should be remembered that each job completed may be different from the other.
- If standard costing system is in use, the actual cost of job can be compared with the standard to find out any deviation between the two.
- Some jobs are priced on the basis of cost plus basis. In such cases, a profit margin is added in the cost of the job. In such situation, a customer will be willing to pay the price if the cost data is reliable. Job costing helps in maintaining this reliability and the data made available becomes credible.

#### 4.5 Limitations of Job Costing

Job costing suffers from certain limitations.

These are as follows.

- It is said that it is too time consuming and requires detailed record keeping. This makes the method more expensive.
- Record keeping for different jobs may prove complicated.
- Inefficiencies of the organization may be charged to a job though it may not be responsible for the same.

In spite of the above limitations, it can be said that job costing is an extremely useful method for computation of the cost of a job. The limitation of time consuming can be removed by computerization and this can also reduce the complexity of the record keeping.

#### 4.6 Source of documents for job order costing

Source documents are the original record that supports journal entries in accounting system. The key source document in job order costing system is job cost sheet (job cost record) this document records and accumulates all the cost (Direct material, direct labor and MOH cost) assigned to a specific job.

|                             |                  |
|-----------------------------|------------------|
| <b>Job order cost sheet</b> |                  |
| <b>Customer Name-----</b>   | <b>Job order</b> |
| <b>No.-----</b>             |                  |
| <b>Product-----</b>         | <b>Date</b>      |
| <b>started-----</b>         |                  |

| Quantity-----<br>----- |      |        |              |       |        | Date completed   |        |
|------------------------|------|--------|--------------|-------|--------|------------------|--------|
| Direct material        |      |        | Direct labor |       |        | Factory overhead |        |
| Date                   | Type | Amount | Date         | Hours | Amount | Date             | Amount |
|                        |      |        |              |       |        |                  |        |

Source documents also exist for individual items in a job

**Material requisition record:** is used to record material used on a specific job

| Material requisition record |             |          |           |            |
|-----------------------------|-------------|----------|-----------|------------|
| Record No.-----<br>-----    |             |          |           | Date       |
| Job No.-----                |             |          |           |            |
| number                      | description | Quantity | Unit cost | Total cost |
| 1                           | XX1         | 100      | \$4       | \$400      |
| 2                           | ZZ4         | 20       | 10        | 200        |
| 3                           | YY5         | 70       | 5         | 350        |

**Labor time record (Employee time ticket or time card):** is used to record the time labor used on a specific job

| Labor time Record        |              |               |             | Employee   |
|--------------------------|--------------|---------------|-------------|------------|
| No.-----                 |              |               |             |            |
| Record No. -----         |              | job No. ----- |             |            |
| Employee-----            |              |               |             |            |
| Classification code----- |              |               |             |            |
| Time started             | Time stopped | Hours worked  | Hourly rate | Total cost |
| 2:00                     | 6:00         | 4             | \$10        | \$40       |

|      |      |   |      |    |
|------|------|---|------|----|
| 2:30 | 5:30 | 3 | \$15 | 45 |
|------|------|---|------|----|

#### 4.7 Accounting procedures for job order costing

Job order costing system requires a subsidiary ledger for each job order and general ledger (controlling account) for the total amount. Entries in subsidiary ledger will be made frequently and summarized in control account in weekly or monthly interval.

Major Accounting procedures in job order costing system

- Receiving job order and purchase of raw materials
- Transferring raw material to work in process
- Recording labor to work in process.
- Recording actual manufacturing over head cost incurred
- Allocating manufacturing over head cost to work in process
- Transferring finished goods to work in process
- Transferring finished goods to customers.

Manufacturing over head cost is incurred for the benefit of all jobs produced during a period and can not be related to any particular job. As manufacturing over head costs are incurred, they are accumulated as manufacturing overhead control account.

Some manufacturing costs such as utility will not be known until the end of the period. Hence, rather than holding a finished good job until all costs can be attributed to it, it is necessary to develop a method of allocating manufacturing over head cost to the job completed. This is called normal costing .In normal costing direct material and direct labor costs are directly traced to the job completed but MOH cost is allocated to it using budgeted rate and actual allocation base.

To determine budgeted rate:

- Estimate manufacturing over head cost for the year.
- Choose allocation base such as labor hour, direct labor cost or machine hour.

- Estimate the allocation base for the year
- Calculate the budgeted rate using the formula

$$\text{Budgeted rate} = \frac{\text{Budgeted MOH cost}}{\text{Budgeted allocation base}}$$

#### Explanations of Transactions

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

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

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

Materials Control----- 89,000

Accounts Payable Control----- 89,000

Work-in-Process Control -----81,000

Manufacturing Overhead Control -----4,000

Materials Control -----85,000

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

Work-in-Process Control -----39,000

Manufacturing Overhead Control----- 15,000

Cash Control -----54,000

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

Manufacturing Overhead Control -----75,000

Cash Control -----57,000

Accumulated Depreciation Control -----  
18,000

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

Work-in-Process Control----- 80,000

Manufacturing Overhead Allocated----- 80,000

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

Overhead Control is, *in effect*, decreased (credited) via its contra account, Manufacturing Overhead Allocated. Recall that under normal costing, the budgeted manufacturing overhead rate of \$40 per direct manufacturing labor-hour is calculated at the beginning of the year on the basis of predictions of annual manufacturing overhead costs and the annual quantity of the cost-allocation base. Almost certainly, the overhead allocated will differ from the actual overhead incurred. In a later section, we discuss what to do with this difference.

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

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

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

Finished Goods Control -----188,800

Work-in-Process Control -----188,800

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

**Underallocated and Overallocated Direct Costs**

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

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

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

1. Manufacturing Overhead Control, the record of the actual costs in all the individual overhead categories (such as indirect materials, indirect manufacturing labor, supervision, engineering, utilities, and plant depreciation)
2. Manufacturing Overhead Allocated, the record of the manufacturing overhead allocated to individual jobs on the basis of the budgeted rate multiplied by actual direct manufacturing labor-hours

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

Underallocated (overallocated) indirect costs = Actual indirect costs incurred - Indirect costs allocated

The \$1,080,000 credit balance in Manufacturing Overhead Allocated results from multiplying the 27,000 actual direct manufacturing labor-hours worked on all jobs in 2011 by the budgeted rate of \$40 per direct manufacturing labor-hour.

The \$135,000 (\$1,215,000 - \$1,080,000) difference (a net debit) is an underallocated amount because actual manufacturing overhead costs are greater than the allocated amount. This difference arises from two reasons related to the computation of the \$40 budgeted hourly rate:

1. **Numerator reason (indirect-cost pool).** Actual manufacturing overhead costs of \$1,215,000 are greater than the budgeted amount of \$1,120,000.

2. **Denominator reason (quantity of allocation base).** Actual direct manufacturing laborhours of 27,000 are fewer than the budgeted 28,000 hours.

There are three main approaches to accounting for the \$135,000 underallocated manufacturing overhead caused by Robinson underestimating manufacturing overhead costs and overestimating the quantity of the cost-allocation base: (1) adjusted allocation-rate approach, (2) proration approach, and (3) write-off to cost of goods sold approach

#### Adjusted Allocation-Rate Approach

The **adjusted allocation-rate approach** restates all overhead entries in the general ledger and subsidiary ledgers using actual cost rates rather than budgeted cost rates.

First, the actual manufacturing overhead rate is computed at the end of the fiscal year.

Then, the manufacturing overhead costs allocated to every job during the year are recomputed using the actual manufacturing overhead rate (rather than the budgeted manufacturing overhead rate). Finally, end-of-year closing entries are made. The result is that at year-end, every job-cost record and finished goods record—as well as the ending Work-in-Process Control, Finished Goods Control, and Cost of Goods

Sold accounts—represent actual manufacturing overhead costs incurred.

The widespread adoption of computerized accounting systems has greatly reduced the cost of using the adjusted allocation-rate approach. In our Robinson example, the actual manufacturing overhead (\$1,215,000) exceeds the manufacturing overhead allocated (\$1,080,000) by 12.5%  $[(\$1,215,000 - \$1,080,000) \div \$1,080,000]$ . At year-end,

Robinson could increase the manufacturing overhead allocated to each job in 2011 by

12.5% using a single software command. The command would adjust both the subsidiary ledgers and the general ledger.

Consider the Western Pulp and Paper machine job, WPP 298. Under normal costing, the manufacturing overhead allocated to the job is \$3,520 (the budgeted rate of \$40 per direct manufacturing labor-hour \_ 88 hours). Increasing the manufacturing overhead allocated by 12.5%, or \$440 ( $\$3,520 \times 0.125$ ), means the adjusted amount of manufacturing overhead allocated to Job WPP 298 equals \$3,960 ( $\$3,520 + \$440$ ). Note from page 110 that using actual costing, manufacturing overhead allocated to this job is \$3,960 (the actual rate of \$45 per direct manufacturing labor-hour \_ 88 hours). Making this adjustment under normal costing for each job in the subsidiary ledgers ensures that all \$1,215,000 of manufacturing overhead is allocated to jobs.

The adjusted allocation-rate approach yields the benefits of both the *timeliness and convenience of normal costing during the year and the allocation of actual manufacturing overhead costs at year-end*. Each individual job-cost record and the end-of-year account balances for inventories and cost of goods sold are adjusted to actual costs. After-the-fact analysis of actual profitability of individual jobs provides managers with accurate and useful insights for future decisions about job pricing, which jobs to emphasize, and ways to manage job costs.

### Proration Approach

**Proration** spreads underallocated overhead or overallocated overhead among ending work-in-process inventory, finished goods inventory, and cost of goods sold. Materials inventory is not included in this proration, because no manufacturing overhead costs have been allocated to it. In our Robinson example, end-of-year proration is made to the ending balances in Work-in-Process Control, Finished Goods Control, and Cost of

Goods Sold. Assume the following actual results for Robinson Company in 2011:

Account                      Account Balance (Before Proration)  
 Allocated  
 Manufacturing

Overhead  
 Included in Each  
 Account Balance  
 (Before Proration)

|                                  |                  |
|----------------------------------|------------------|
| Work-in-process      control     | \$50,000         |
| 16,200                           |                  |
| Finished      goods      control | 75,000           |
| 31,320                           |                  |
| Cost of goods sold               | <u>2,375,000</u> |
| <u>\$1,032,480</u>               |                  |
| Total                            | \$2,500,000      |
| 1,080,000                        |                  |

How should Robinson prorate the underallocated \$135,000 of manufacturing overhead at the end of 2011? Robinson prorates underallocated or overallocated amounts on the basis of the total amount of manufacturing overhead allocated in 2011 (before proration) in the ending balances of Work-in-Process Control, Finished Goods Control, and Cost of Goods Sold. The \$135,000 underallocated overhead is prorated over the three affected accounts in proportion to the total amount of manufacturing overhead allocated (before proration) in column 2 of the following table, resulting in the ending balances (after proration) in column 5 at actual costs.

**Example 1:** The following budgeted data is given for XYZ Textile factory for the year 2004.

Estimated MOH cost ----- \$450,000

Estimated No of shirts produced ----- 200,000

Estimated Dm cost for the year ----- \$300,000

Estimated DL cost ----- \$900,000

Estimated DL hours ----- 300,000 hours

Estimated machine hours ----- 90,000 hours

Compute the predetermined MOH based on the following allocation base.

1. Physical out put method
2. Direct material cost base
3. Direct labor cost base
4. Direct labor hours base
5. Machine hours base

Assuming all information in above and the following additional information

Actual data for job201 is given below

Actual shirts completed for job 201 --- 2,000 shirts

Actual DM used ----- \$30,000

Actual DL cost ----- \$20,000

Actual Dl hours ----- 400 hours

Actual machine hours ----- 240 hours

Determine the total cost of Job 201 under each of the five bases of allocation

**Example 2:** A corporation uses job order cost system. The factory overhead rate estimated for the year 2001 was \$8 per DL hour; the inventory account had the following balances on December 31.

Raw material ----- \$7,000

WIP (job201) ----- 6,500

FG (Job 209) ----- 7,000

During December, The following events occurred

1. Material purchased on account \$18,000

2. Direct materials and factory supplies were issued as follows

- Job211 ----- \$4,500
- Job 212 ----- 5,300
- Job 213----- 6200
- Indirect material ----- 1800

3. The December direct labor cost were

- Job210 ----- 150 hrs@\$6per hour
- Job211 ----- 400 hrs@\$6per hour
- Job212 ----- 350 hrs@\$6per hour
- Job213 ----- 100 hrs@\$6per hour

4. Factory indirect labor for December was \$2,400

5. Other overhead cost incurred during December

- Utility paid in cash ----- \$2,500
- Factory depreciation ----- 1000
- Repair and maintenance ----- 500
- Total \$4,000

6. Job 210,211 and 212 were completed and transferred to FG

7. Job 209 and 211 were sold on account for 120% of cost

Required

1. Journalize the above transactions
2. Determine the under or over applied overhead

**Example 3:** Robinson manufacturing company uses a job order costing system. Its job order costing system has two direct costs (DM and DL) and one indirect cost category

On January 1, 2004, the following inventories are available

- Raw material ----- \$10,000
- WIP ----- \$5,000
- Finished goods ----- 15,000

Robinson budgeted the 2004 manufacturing overhead to be \$1,280,000 and the budget quantity of machine hours (allocation base) are 16,000 machine hours.

The following transaction occurs during the month of January

1. Purchase of material (direct and indirect), \$89,000 on account
2. Raw material sent to manufacturing plant floor is \$85,000 out of which \$4000 is indirect material
3. Manufacturing labor wages liability incurred is \$54,000 out of which \$15,000 is indirect
4. The actual machine hours used in the period were 1000 machine hours. The manufacturing over head is allocated using this actual machine hour.
5. Additional manufacturing over head cost incurred during the month is \$75,000. this cost consists of utility and repairs, \$23, 000, insurance expired \$2,000, depreciation expense \$50,000.
6. Cost of finished goods of eight individual jobs completed and transferred out is \$188,800.
7. Finished goods costing \$180,000 was sold for \$300,000 on cash.

**Required:**

- a) Journalize the above transactions
- b) Post using T-account
- c) Compute the under or over applied MOH cost
- d) Close the amount using direct write off to cost of goods sold

#### **4.4 Under and over applied manufacturing over head cost**

Manufacturing over head cost that is applied to the job produced during the year using predetermined over head rate are recorded in manufacturing

over head applied account. Actual manufacturing over head cost incurred in a period are recorded in manufacturing over head control account

Generally, the amount recorded in manufacturing overhead applied during the year will differ from the amount recorded in manufacturing over head control account.

This means that manufacturing over head will be either under applied or over applied

If manufacturing overhead applied account is greater than manufacturing overhead control account it is said to be over applied

If manufacturing overhead applied account is less than manufacturing overhead control account it is said to be under applied

There are four methods to adjust for under or over applied manufacturing over head cost

- Adjusted allocation rate approach: In this approach you restate all entries in The ledger by using actual cost rates rather than budgeted rates
- Close to cost of goods sold account
- Prorate to total end balance of finished goods, work in process and cost of goods sold.
- Prorate to manufacturing over head cost amount allocated in The end balance of finished goods, work in process and cost of goods sold

**Example 4:** ABC Company uses normal costing with single manufacturing overhead cost pool and machine hours as the cost allocation base .the followings data are for 2004.

- Budgeted manufacturing overhead ----- \$4,800,000
- Overhead allocation base ----- machine hours
- Budgeted machine hours ----- 80,000
- Actual manufacturing over head incurred ----- \$4,900,000

- Actual machine hours -----75,000

Machine hour's data and the ending balance (before peroration of under or over applied MOH cost) are as follows.

|                    | Actual machine hours | End of |
|--------------------|----------------------|--------|
| year balance       |                      |        |
| Cost of goods sold |                      | 60,000 |
| \$8,000,000        |                      |        |
| Finished goods     |                      | 11,000 |
| 1,250,000          |                      |        |
| Work in process    |                      | 4,000  |
| 750,000            |                      |        |

#### Required

1. Compute the budgeted manufacturing overhead rate for 2004.
2. Compute the under or over applied MOH cost
3. Close the amount using
  - a) Direct write of to cost of goods sold
  - b) Prorate based on ending balance of WIP, CGS and FG
  - c) Prorate based on the allocated MOH cost amount in the ending balance of WIP, CGS and FG

#### Assignment

**Problem 1:** Medford incorporated provided the following data for January 2004.

#### Materials and supplies

|                           |          |
|---------------------------|----------|
| Inventory, January1 ----- | \$10,000 |
| Purchase on account ----- | 30,000   |

#### Labor

|                                            |         |
|--------------------------------------------|---------|
| Accrued January 1-----                     | \$3,000 |
| Paid during January (ignore payroll taxes) | 25,000  |

### Factory over head costs

|                                       |        |
|---------------------------------------|--------|
| Supplies (issued from material) ----- | 1,500  |
| Indirect labor -----                  | 3,500  |
| Depreciation -----                    | 1,000  |
| Other factory overhead cost -----     | 14,200 |

|                          | Job1    | Job2  | Job3  | Total   |
|--------------------------|---------|-------|-------|---------|
| WIP January 1            | \$1,000 |       |       | \$1,000 |
| Job costs during January |         |       |       |         |
| Direct material          | 4,000   | 6,000 | 5,000 | 15,000  |
| Direct labor             | 4,000   | 8,000 | 7,000 | 20,000  |
| Applied factory overhead | 5,000   | 8,000 | 7,000 | 20,000  |

- Job1 was started in December, finished during January and sold to customer for \$21,000 cash in January
- Job2 is started in January and not yet finished.
- Job3 is started in January, finished during January and now is in the finished goods warehouse awaiting sale

Required:

1. Journalize the above transactions using subsidiary ledger and controlling account
2. Calculate the under or over applied MOH cost

**Problem 2:** XYZ Company uses a job order costing system. Its job costing system has two direct cost categories (Direct material and Direct labor) and one indirect cost category ( MOH cost allocated at budgeted rate of \$60 per machine hour in 2004)

The following transaction occurred in January 2004.

- a) Purchase of raw material on account for \$300,000.
- b) Direct material of \$280,000 and indirect material of \$20,000 was used in the production process.

- c) Direct labor cost of \$180,000 and indirect of \$60,000 was incurred in the month.
- d) The actual machine hours used to complete the job was 4,200 machine hours. The MOH cost is allocated using this actual machine hour.
- e) Miscellaneous MOH cost actually incurred by department were \$160,000
- f) Cost of finished goods completed and transferred out was \$588,000
- g) Finished goods costing \$584,000 was sold for \$800,000 on cash

### **Requirements**

1. Journalize the transactions for the month of January 2004, identifying each by letter
2. Calculate the under or over applied MOH cost
3. Give the year end adjusting entry closing the over or under applied MOH cost to cost of goods sold.
4. If the year end balance of before proration for three accounts is given below

- Cost of goods sold----- \$584,000
- Work in process ----- 6,000
- Finished goods ----- 10,000

Prorate the over or under applied MOH cost to the three accounts based on their end balance and give the adjusting entry.

## **CHAPTER 5**

### **PROCESS COSTING SYSTEM**

#### **5.1 Introduction**

In one of the previous chapters we have discussed some of the methods of costing like, Job, Batch, and Contract costing. The methods of costing basically aim at finding out the cost of a product or service, which is offered

by the organization. Process Costing is also a method of costing which is used in those industries where the production is in continuous process, i.e. the output of one process becomes the input of the subsequent process and so on. Examples of such industries are, paint works, chemical plants, food manufacturing, oil refining, paper mill, textile mills, sugar factories, fruit canning, dairy and so on. In such industries, the input is put in the first process and the output of each process becomes the input of the subsequent process till the final product emerges from the last process. This method is employed where it is not possible to trace the items of prime cost [which consists of all direct costs] to a particular order because its identity is lost in the continuous production. Thus it is not possible to compute the cost of say,

200 liters of oil or 200 kg of sugar produced as thousands of liters of oil or thousands of kg of sugar is manufactured at the same time. We can get the cost per liter or kg by dividing the total cost by the total production produced during that period. The features and intricacies of process costing are discussed in the subsequent paragraphs.

## **5.2 Features of Process Costing**

We have discussed in the previous paragraph that process costing is employed in continuous production industries where the flow of production is in a sequence and the output of one process becomes the input of the subsequent one. The objective of process costing is to find out the cost of each process by identifying the direct costs with the particular process and apportioning the indirect costs i.e. overheads to each process on some suitable basis. The units coming out the process as the finished output are uniform in all the respects and hence the cost per unit is computed by dividing the total cost by the total production units. In case, some units are incomplete at the end of a particular period, equivalent units are worked out of such incomplete units and then the cost per unit is computed. The features of process costing are:

1. The production is in continuous flow and is uniform. All units coming out as finished products are uniform with each other in all respects.
2. The product is manufactured in a continuous flow and hence individual units lose their identity.
3. The unit cost is obtained by dividing the total cost for a particular period by the total output. This is the average cost of the product units.
4. Cost per process is ascertained and cost of each process is transferred to the subsequent process until the finished product emerges.
5. In a particular process normal and abnormal losses emerge. Normal loss is a loss, which is inevitable in any process and thus cannot be avoided or controlled. Any loss, which, is over and above, the normal loss is called as abnormal loss and is to be accounted for separately. For example, if 1000 units are put in Process 1 and it is anticipated that there will be a normal loss of 1% in the process, the output expected is  $1,000 - 1\% \text{ of } 1,000$  that is 990. If actual production is 980, there is an abnormal loss of 10 units. On the other hand if the production is 995, there is an abnormal gain of 5 units. Abnormal gain and abnormal loss are to be accounted for in the process cost accounts.
6. Sometimes each process may be treated as profit center and so while transferring the cost from one process to another, a percentage of profit is added in the cost of that process. This is known as inter process profit and needs to be accounted for in the process cost accounts.
7. Though the cost per unit is computed by dividing the total cost by the number of units, there can be a problem on incomplete units at the end of a particular accounting period. In such cases equivalent units have to be worked out for computing the cost per unit.

### **5.3 Preparing Process Cost Accounts**

1) As explained above, the objective of process costing is to work out the cost of each process, transfer the same to the subsequent process and finally ascertain the total cost of production. Therefore it is necessary to charge various costs to each process. For this, the factory is divided into distinct processes or operations and an account is kept of each process to which all the costs are debited. The following are the various elements of cost, which are shown in the process accounts.

**Materials:** Raw materials required for each process is drawn from stores against material requisitions. Proper procedure like preparing and authorizing the requisition, pricing of the issues, return of materials to the stores, transfer of material from one process to another should be followed while issuing the materials. Cost of materials consumed should be computed as per the method employed for pricing of the issues and the cost should be debited to the process account.

**Labor:** Wages paid to workers and supervisory staff should be charged to the particular process if they can be identified with it. If workers work on two or more processes, proper allocation should be made according to some basis like time spent on each process.

**Direct Expenses:** If expenses are identifiable with a particular process, they should be charged to that process. For example, cost of electricity, depreciation may be charged directly to a process if they are identifiable with it.

**Overheads:** By nature, overheads are indirect expenses and hence cannot be identified with a particular process. These expenses can be apportioned on some suitable basis and charged to the process.

2) **Important aspects an Process Accounts:** While preparing process cost accounts, some important aspects are to be taken into consideration. These aspects are given below.

**Normal Loss:** Normal loss is a loss, which is inevitable in any process. Thus if the input is 100, the output may be 95 if the normal loss is

anticipated as 5%. Accounting treatment of normal loss is explained and illustrated in the subsequent paragraphs.

**Abnormal Loss/Abnormal Gain:** If the actual output is less than the normal output [Normal output = Input - Normal Loss], the difference between the two is the abnormal loss. On the other hand if the actual output is more than the normal output, the difference between the two is abnormal gain. Thus in the example given above, the normal output is 95 which is 100 - 5% of 100 as the normal loss. If the actual output is 93 units, 2 units will be abnormal loss and if the actual output is 97 units, 2 units will be abnormal gain. Abnormal loss/gain is to be treated differently and is illustrated subsequently.

**Inter Process Profits:** Sometimes, while transferring the cost of one process to the subsequent one, some percentage of profit is added in it. This is called as inter process profits. This is done when a process is treated as profit center. In such cases, unrealized profit is to be computed and shown separately. This is also illustrated separately.

**Process costing system:** is used for manufacturing processes which produce a single product or single mix of products continuously for an extended period of time. In this system, the cost of a product or service is obtained by using broad averages to assign costs to mass of similar units produced for general sale and not for any specific customers

Companies that use process costing system are:

- Cement factories
- Petroleum refineries
- Flour companies
- Beer factories
- Textile factories
- Beverage companies

#### **Difference between job order costing and process costing system.**

| Base of comparison | Job order costing | Process costing |
|--------------------|-------------------|-----------------|
|--------------------|-------------------|-----------------|

|                   |                                                  |                                                                                                   |
|-------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Type of product   | Diversified, heterogeneous and unique products   | Homogeneous products produced continuously                                                        |
| Cost accumulation | By job for a specified number of units           | By department or cost center for a specified period of time                                       |
| Cost per unit     | Cost accumulated by job, divided by units in job | Cost accumulated by cost centers divided by equivalent unit of production during a period of time |
| Reporting         | By job                                           | By cost center or department                                                                      |

Most companies have costing system that are neither pure job costing nor pure process costing, rather they combine elements of both job costing and process costing.

**Example 1:** Global defense inc. manufactures thousands of components for missiles and military equipment. We will focus on the production of one of these components; DG-19. The process costing system for DG-19 has a single direct cost category (DM) and a single indirect cost category (conversion cost). Each DG-19 unit passes through two departments, The assembly department and testing department. Every effort is made to ensure that all DG-19 units are identical and meet asset of demanding performance specification. Direct material is added at the beginning of the process in assembly department. Additional direct material is added at the end of the process in testing department when DG\_19 component is completed. Conversion cost is added evenly during both processes.

When the testing department finishes work on each DG-19 component, it is immediately transferred to finished goods.

**Required:** Summarize diagrammatically the above facts

We will use the manufacture of the DG-19 component to illustrate three cases.

**Case 1:** Process costing with no beginning or ending work in process inventory of DG-19, that is, all units are started and fully completed by the end of the accounting period. This case illustrates the basic averaging of cost idea that is a key feature of process costing

**Example2:** No beginning and ending WIP

On January 1, 2004, there were no beginnings WIP of DG-19 in the assembly department. During January 2004, Global defense started and completed assembly of DG-19 and transferred out to testing department 400 units.

Physical unit for January 2004

- WIP beginning----- 0 unit
- Started during January ----- 400 unit
- Completed and transferred --- 400 unit
- WIP ending ----- 0 unit

Total cost for January

- DM cost added during January -----\$32,000
- Conversion cost added ----- 24,000
- Total assembly department cost -----56,000

**Required:** Calculate the average unit cost in the assembly department

**Case 2:** Process costing with no beginning work in process inventory but an ending work in process inventory of DG-19, that is some unit of DG-19 started during the accounting period, is incomplete at the end of the period.

We use 5 steps to compute the unit cost (Average cost in each department)

**Step1:** summarize the flow of physical units

Physical unit express the physical flow of production. It is a measure of the units of production that have been started and that may or may not be completed. It does not consider the degree of completion.

Physical flow

|                       |           |
|-----------------------|-----------|
| Beginning WIP -----   | XX        |
| Units started -----   | <u>XX</u> |
| To account -----      | <u>XX</u> |
| Ending WIP-----       | XX        |
| Units completed ----- | <u>XX</u> |
| Accounted for -----   | <u>XX</u> |

**Step-2:** compute output in terms of equivalent units (EU)

Equivalent units measure output in terms of the physical quantity of each of the input (factor of production) that has been consumed when producing the units. Equivalent units are computed using physical units. It disregards dollar amount. Equivalent unit of each major category of production inputs is calculated:

Equivalent unit = physical unit \* percentage of completion

**Step 3:** compute equivalent unit cost

Cost per EU =  $\frac{\text{Production cost}}{\text{Equivalent}}$

**Step4:** summarize total cost to account for.

**Step 5:** Assign total cost to units completed and units in ending WIP.

**Example 3:** No beginning WIP but some ending WIP

In february2004, Global Defense places another 400 unit of DG-19 in to the assembly process. Because all units placed in production in January were completely assembled, there is no beginning WIP on february1, some customers order is late, so not all units started in February were completed by the end of the month; only 175 units are completed and transferred to the testing department. Data for The assembly department for February 2004 are:

- Physical unit for february2004:
  - WIP beginning(february1) ----- 0 unit
  - Started during February ----- 400 unit
  - Completed and transferred out -----175 unit
  - WIP ending ( February 29) -----225 unit
    - DM (100%complete)
    - CC(60%complete)
- Total cost for February:
  - DM cost added during February ----- \$32,000
  - CC cost added during February ----- 18600
  - Total assembly department ----- 50,600

Required:

- a) Summarize the flow of physical unit
- b) Compute out put in terms of equivalent unit
- c) Compute equivalent unit cost
- d) Summarize total cost to account for
- e) Assign total cost to units completed and to unit in ending WIP
- f) Record the required journal entry

**Case 3:** Process costing with both beginning and ending work in process inventory of DG-19.

In addition to the five steps used in process costing, we use the two inventory costing methods. These are:

### **1. Weighted average method (WA)**

- calculate the equivalent unit of cost of all work done to date regardless of the accounting period it was done
- It merges equivalent unit in beginning WIP with equivalent unit of work done in the current period.

## 2. First in first out(FIFO) method:

- o Work done on WIP beginning before the current period is kept separate from work done in the current period.
- o Cost incurred in the current period and units produced in the current period are used to calculate cost per equivalent unit of work done in the current period

### **Example4:** Some beginning WIP and some ending WIP

At the beginning of March 2004, Global defense had 225 units of partially assembled DG-19 in the assembly department. It started production of another 275 units in March 2004; data for assembly department for March are:

Physical units for March 2004

- WIP beginning----- 225 unit  
DM (100%complete)  
CC (60% complete)
- Started during March ----- 275 unit
- Completed and transferred out ----- 400 unit
- WIP ending ----- 100 units  
DM 9100%complete)  
CC (50%complete)

Total cost for March:

WIP beginning

DM -----\$18,000

CC----- 8,100 -----\$26,100

DM added during March ----- 19,800

CC added during March ----- 16,380

Total cost to account for ----- \$62,280

Requirements: using WA &FIFO

- a) Summarize the flow of physical unit
- b) Compute out put in terms of equivalent unit
- c) Compute equivalent unit cost
- d) Summarize total cost to account for
- e) Assign total cost to units completed and to unit in ending WIP
- f) Compare the result under WA &FIFO
- g) Record the required journal entry

### **Transferred in costs in processing costing.**

- Many process costing systems have two or more department or processes in the production cycle.
- Transferred in cost (also called previous department cost) are the cost incurred in previous department that are carried forward as the product cost when it moves to a subsequent process in the production cycle.
- Transferred in cost are treated as if they are a separate type of direct material added at the beginning of the process.

### **Example 5: Transferred in cost in process costing**

The assembly department of Global defense transfers DG-19 units to its testing department. Here the units receive additional direct material such as crating and other packing material to prepare the units for shipment at the end of the process. Conversion costs are added evenly during the process. As units are completed in testing department, they are immediately transferred to finished goods

Physical units

WIP beginning ----- 240 units

TIC (100% complete)

DM (0% complete)

CC (62.5% complete)  
 Transferred in during April ----- 400 unit  
 Completed during April ----- 440 unit  
 WIP ending -----200 units

TIC (100% complete)

DM (0% complete)

CC (80% complete)

Cost for testing department in April

WIP beginning

TIC----- \$33,600  
 DM ----- 0  
 CC ----- 18,000

Transferred in during April

WA (Ex3) ----- \$52,000  
 FIFO EX3) ----- 52,480

Direct material cost added during April ----- 13,200

Conversion cost during April ----- 48,600

### **Requirements: using WA &FIFO**

- Summarize the flow of physical unit
- Compute out put in terms of equivalent unit
- Compute equivalent unit cost
- Summarize total cost to account for
- Assign total cost to units completed and to unit in ending WIP
- Compare the result under WA &FIFO
- Record the required journal entry

## Accounting for Spoilage

**Spoilages (Defective):** are units of production whether fully or partially completed that don't meet the standard required by customers for good units and that are discarded or sold for reduced price. Example, Defective shirts, shoes, electronic devices.

### Types of spoilage

**Normal spoilage:** is spoilage inherent in a particular production process that arises even under efficient operating condition. Depending on the production process, management decides the spoilage it considers normal. Cost of normal spoilage is typically included as a component of cost of good unit's manufactured because good units cannot be made without also making some units that are spoiled.

**Abnormal spoilage:** is spoilage that would not arise under efficient operating condition. It is not inherent in a particular production process. It arises because of machine break down and operators' error. Abnormal spoilage is usually avoidable or controllable. Abnormal spoilage cost is recorded separately and treated as loss of the current year.

### Example 6: spoilage using WA and FIFO

ABC Company manufactures a wooden recycling container in its forming department. Direct materials for this product are added at the beginning of the production cycle. Conversion costs are added evenly during production. Some units of this product are spoiled as result of defects, which are detected only upon inspection of finished units. Normally spoiled units are 10% of the good units completed. That is for 10 good units produced; there is one unit of normal spoilage. Summary data for July 2003 are:

Physical units for July 2003

WIP beginning ----- 1,500 units

DM (100% complete)

CC (60% complete)

Started during July ----- 8,500 unit  
 Completed and transferred out ----- 7,000 unit  
 WIP ending ----- 2,000 units  
     DM (100% complete)  
     CC (50% complete)

Total cost for July

WIP beginning

    DM ----- \$12,000  
     CC ----- 9,000 ----- \$21,000

Dm cost added during July ----- 76,500  
 CC cost added during July ----- 89,100  
 Total cost to account for ----- 189,600

**Requirements: using WA &FIFO**

- Identify units of both normal and abnormal spoilage
- Summarize the flow of physical unit
- Compute out put in terms of equivalent unit
- Compute equivalent unit cost
- Summarize total cost to account for
- Assign total cost to units completed and to unit in ending WIP
- Compare the result under WA &FIFO
- Record the required journal entry

**Job order costing system and spoilage**

The concept of spoilage is the same under both job order costing system and process costing. However in Job order costing system, Normal spoilage may be attributable to a specific job or common to all jobs.

Example18: ABC Furniture Company manufactures and sells house hold and office furniture

During the current fiscal year 10 units become spoiled. The cost of spoiled units is Br.10, 000. Give the journal entries for the following separate cases

1. If the spoiled units are normal and attributable to specific job and they can be sold at \$4,500
2. If the spoiled units are normal and common to all jobs and they can be sold at \$4,500
3. If the spoiled units are abnormal and they can be sold at \$4,500

### **Job order costing system and Rework**

**Reworks:** are units of production that don't meet the standard required by customers for finished units that are subsequently repaired and sold as acceptable finished unit.

In job order costing system, like spoilage, they are divided as normal rework attributable to a specific job, normal rework common to all jobs and abnormal rework.

Example 7: ABC manufacturing company manufactures and sells house holds and office furniture. Suppose 20 defective units were found at the point of inspection and the following additional costs are incurred to rework them and sell at normal price.

Direct material ----- Br.1050

Direct labor cost ----- 950

MOH cost ----- 650

Required: Record the journal entry under each of the following cases

1. If the rework is normal rework attributable to specific job
2. If the rework is normal rework common to all jobs
3. If the rework is normal rework.

## **Job order costing system and scraps**

**Scraps:** are materials left over when making a product .They have low sales value compared with the sales value of the main products. Example, short lengths from wood working operations, frayed cloth etc.

There are two accounting methods with regard to the timing of recognition of scrap in the accounting record. These are the production method and the sales method.

### **1. Recognizing scrap at the time of production**

The value of scrap may be recognized at the time of production

- When the amount of scrap is huge and scrap needs proper accounting.
- When the time between production and sales is long and scrap material is to be stored in warehouse.

**Example 8:** ABC furniture company produce and sell house hold and office furniture. The value of a wood shaving created (scrap) when lumber is processed is recorded at the time of production. The value of this scrap on a specific balance sheet date was \$3,000

1. Record the value of scrap on the date of production if it is attributable to a specific job
2. Record the value of scrap on the date of production if it is common to all jobs
3. Record the sale of \$2000 of scraps if it is attributable to a specific job
4. Record the sale of \$2,000 of scraps if it is common to all jobs
5. Assume a scrap of \$1000 is reused in the production process, record the journal entry

### **2. Recognizing scrap at the time of sales.**

This method is used when the sales value of the scrap is immaterial and the time between production and sell is too short.

Example 22: Assuming the above Br.3000 scrap is immaterial and is to be recorded using the sales method

- a. Give the journal entry for the sales of Br2000 scrape, if it attributable to a specific job.
- b. Give the journal entry for the sales of Br2000 scrape, if it is common to all jobs.

### Assignment

**Problem 1:** ABC Electronics Company has two departments to manufacture computers, Assembly and testing departments. First component parts are assembled in assembly department and then transferred out to testing department. Direct materials are added some where in between the assembly process but conversion costs are added evenly through out the assembly process. The company uses process costing system. The following data are for the month of January for assembly department.

|                             | Physical units | Direct material | Conversion |
|-----------------------------|----------------|-----------------|------------|
| cost                        |                |                 |            |
| Beginning WIP               | 400            | \$2,484,000     | \$464,000  |
| Started in the month        | 2,500          |                 |            |
| Completed units             | 2,300          |                 |            |
| Cost added during the month |                |                 | 16,100,000 |
| 6,960,000                   |                |                 |            |

### Additional information

- There are 200 spoiled units 50% of which is abnormal
- Degree of completion -Beginning WIP
  - Direct material (90% complete)
  - Conversion cost (40% complete)
- Degree of completion -Ending WIP

- Direct material (60% complete)
- Conversion cost (30% complete)

Requirements: Under FIFO method

- Summarize the flow of physical units
- Compute equivalent unit in terms of each cost
- Compute cost per equivalent unit
- Assign the cost to units completed and WIP ending
- Pass the necessary journal entries

**Problem 2:** The following data pertain to Milan tire and Rubber Company for the month of May.

|                                           |            |
|-------------------------------------------|------------|
| WIP may1 (units)                          | ?          |
| Units started during may                  | 60,000     |
| Total units to account for                | 75,000     |
| Units completed and transferred out       | ?          |
| WIP may 31 ( in units)                    | 10,000     |
| Total equivalent units: Direct material   | 75,000     |
| Total equivalent units: Conversion cost   | ?          |
| WIP may 1:Direct material                 | Br 135,000 |
| WIP may 1:Conversion cost                 | ?          |
| Cost incurred during may: Direct material | ?          |
| Cost incurred during may: Conversion cost | Br 832,250 |
| WIP may1;Total cost                       | Br 172,500 |
| Cost per equivalent: Direct material      | Br 9.4     |
| Cost per equivalent: Conversion           | ?          |
| Total cost per equivalent unit            | Br 21.65   |

Additional information

- Direct material and conversion activities occurs uniformly through out the process

- Milan uses weighted average process costing
- The may 1 WIP was 100% complete for direct material and 20% complete for conversion cost

Required:

Prepare production report for the month of May, the report should show

1. Units to account for ,units accounted for and percentage of completion
2. Equivalent unit of production
3. Total cost to account for
4. Cost per equivalent
5. Cost of completed and transferred out and cost of ending WIP inventory.

## CHAPTER 6

### JOINT PRODUCT AND BY PRODUCTS

### Meaning of terms

- Joint product: are products which are processed and manufactured in the same processes
  - o Raw milk: cream & liquid skim
  - o Coal: Ammonia, coke, Gas, Benzene, tare
  - o Petroleum: crude oil, gas, raw LPG
  - o Salt: Hydrogen, chlorine, caustic soda
- Joint cost is the cost of a single process that yields multiple products (joint products) simultaneously.
- Split off point is the junction in the process when one or more products in a joint setting become separately identified.
- Separable cost is costs incurred beyond the split off point to further process each joint product separately.
- Main product is a joint product having high sales value
- Byproduct s are joint products having low sales value compared to the main product

### Approaches to allocating joint cost

The benefit received criteria is used to allocate joint cost to the joint products.

There are four methods of allocating joint cost. These are:

- **Physical measure method:** allocates joint cost on the bases of their relative proportion at the split off point using a common physical measure such as weight or volume
- **Sales value at split off point method:** allocates joint cost on the bases of the relative sales value at the split off point of each product.
- **Estimated net realizable value method:** allocates joint cost on the basis of their relative estimated net realizable value.

**Net realizable value= final sales value - separable cost**

- **Constant gross margin percentage neat realizable value method:** allocates joint cost in such away that the over all gross margin percentage is identical for all the individual products

Steps to use this method

1. Compute the over all gross margin percentage for all sales value
2. Use this gross margin percentage to find gross margin of each product
3. Deduct separable cost from cost of goods available for sale

Among the four methods, the sales value at split of method is better when sales value data are available because of the following reasons

- It does not require information after split off point
  - Availability of meaningful basis to allocate joint cost to products
  - Simplicity to compute
- 
- It measures the value of joint product immediately at the end of the joint process

**Example1:** Farmers' dairy purchases raw milk from individual farmers and process it up to the split off point, where two products (cream and liquid skim) are obtained. The two products are sold to an independent company, which markets and distribute them to super markets and other retail outlets.

110 gallon of raw milk yields 100 gallon of good product with 10-gallon shrinkage.

| Products | Gallons produced | sales                 |
|----------|------------------|-----------------------|
| Cream    | 25 gallons       | 20 gallons at \$8 per |

|             |            |                              |
|-------------|------------|------------------------------|
|             |            | gallon                       |
| Liquid skim | 75 gallons | 30 gallons at \$4 per gallon |

Cost of purchasing 110 gallons of raw milk and processing it up to split of point to yield 25 gallon of cream and 75 gallon of liquid skim is \$400.

**Requirements:**

- I. Show the process diagrammatically
- II. Allocate the joint cost using physical measure method and prepare partial income statement.
- III. Allocate the joint cost using sales value at split off method and prepare partial income statement.

**Example2:** Assume the same situation as in example one except that both cream and liquid skim can be processed further.

Additional information:

- 25 gallons of cream are further processed to yield 20 gallons of butter cream at additional processing separable cost of \$280.
- Butter cream is sold for \$25 per gallon
- 75 gallons of liquid skim are further processed to yield 50 gallons of condensed milk at additional processing separable cost of \$520.
- Condensed milk is sold for \$22 per gallon
- Sales during The accounting period were 12 gallons of butter cream and 45 gallons of condensed milk.

Requirements:

- I. Show the process diagrammatically
- II. Allocate the joint cost using ENRV method and prepare partial income statement.

- III. Allocate the joint cost using constant GM method and prepare partial income statement.
- IV. Prepare income statement without allocating the joint cost (no allocation of the joint cost)

### **Irrelevance of joint cost for sell or process further decision making**

The decision to sell at the split of point or process further should be based on incremental operating income attainable beyond the split of point. The joint cost incurred up to the split of point is irrelevant for such decision.

**Example3:** Do farmers dairy sell at the split of point or process further the two products in example two above? Make analysis

### **Accounting for by products**

By products are joint products that have low sales value compared to the main product. There are two accounting methods for by products

- **Production method:** recognize by products in the financial statement at the time production is completed as a cost reduction.
- **Sales method:** recognizes by products in the financial statement at the time when the byproduct is sold as a separate income

**Example 4:** A company is engaged in processing meat from slaughter house. One of its department cuts lump shoulder and generates two products

- Shoulder meat (The main product) ---sold for Br 60 per pack
- Hock meat (The by product) -----sold for Br 4 per pack

Both products are sold at the split off point with out further processing .Data for this department in July 2004 is as follows

|                  | Beg.<br>Inventory | productio<br>n | sales | End.<br>inventory |
|------------------|-------------------|----------------|-------|-------------------|
| Shoulder meat(in | 0                 | 500            | 400   | 100               |

|                     |   |     |    |    |
|---------------------|---|-----|----|----|
| pack)               |   |     |    |    |
| Hock meat( in pack) | 0 | 100 | 30 | 70 |

The total manufacturing cost of the products were Br25, 000

#### Requirements

- I. Show the process using diagram
- II. What is the gross profit under the two methods
- III. What is the inventory amount to be reported in balance sheet under each method
- IV. Which method do you recommend for the company

#### Assignment

**Problem 1:** Chicago Company operates a simple chemical process to convert a single material in to three separate products referred to as X, Y and Z. All the three products are separated simultaneously at single split off point.

All the three products can be sold at split of point but X and Y can also be further processed with out loss in units to super X and super Y respectively  
The table below presents operating budget for Chicago Company for the year 2007

| products | Units produced (in tones) | Units sold (In tones) | Selling price at split off point per tone | Further processing cost | Selling price per tone after further processed |
|----------|---------------------------|-----------------------|-------------------------------------------|-------------------------|------------------------------------------------|
| X        | 300                       | 180                   | \$150                                     | \$10,000                | \$200                                          |

|   |     |     |     |          |     |
|---|-----|-----|-----|----------|-----|
|   |     |     |     |          |     |
| Y | 420 | 340 | 100 | \$25,000 | 150 |
| Z | 480 | 400 | 70  | -        | -   |

The total joint cost incurred to process the three products up to the split off point for the year was \$40,000 .There were no beginning inventory of product X, Y and Z.

### **Requirements**

- a) Allocate the joint cost to the three products using
  1. Physical measure method
  2. sales value at split of method
  3. Neat realizable value method
  4. constant gross margin- NRV method
- b) Prepare income statement for the three products under each of the above method
- c) Should product X and Y be sold at split off point or processed further? .Make analysis

## **Chapter seven**

### **Income effect of alternative inventory costing system**

The three main production costs are direct material cost, direct labor cost and manufacturing overhead cost. Most of the time ,direct material cost ,direct labor cost and some manufacturing over head cost are variable in nature where as some manufacturing over head cost such as depreciation, plant insurance are fixed in amount.

### **Inventory cost methods**

There are three types of inventory costing methods

1. Absorption (Full costing): is the traditional method of inventory costing where all production costs i.e. both variable and fixed costs are assigned to inventory cost.

2. Direct (Variable or marginal costing) is a method of inventory costing in which all variable production costs are included as inventor able costs. All fixed manufacturing costs are excluded from inventor able cost.
3. Through put (Super variable) costing: is a costing method that treats all costs except those related to variable direct material as expense. The only inventor able cost is direct material cost

### **Income statement under alternative costing system**

The measurement of net income under the three costing method differs. The difference result from the amount of fixed manufactured over head cost. In general, the income measurements under the three methods will differ when production and sales amount differs.

- If production is equal to sales, the operating income under absorption costing is the same as operating income under direct costing
- If production is greater than sales, the operating income under absorption costing is greater than operating income under direct costing
- If production is less than sales, the operating income under absorption costing is less than operating income under direct costing

### **Format of Absorption costing income statement**

|                       |           |           |
|-----------------------|-----------|-----------|
| Sales -----           | XX        |           |
| Cost of goods sold    |           |           |
| Direct material ----- | xx        |           |
| Direct labor -----    | xx        |           |
| Variable MOH -----    | xx        |           |
| Fixed MOH -----       | <u>xx</u> | <u>XX</u> |
| Gross profit -----    | XX        |           |

Variable operating expense -----xx  
 Fixed operating expense ----- xx  
 Operating income ----- XX

### Format of direct costing income statement

Sales revenue ----- XX  
 Variable cost  
 Direct material ----- xx  
 Direct labor ----- xx  
 Variable MOH -----xx  
 Variable expense ----- xx      XX  
 Contribution margin ----- XX  
 Fixed MOH cost ----- XX  
 Fixed operating expense -----XX  
 Operating income ----- XX

### Format of through put costing income statement

Sales revenue ----- XX  
 Direct material cost -----XX  
 Through put contribution ----- XX  
 Direct labor cost ----- xx  
 Variable MOH cost ----- xx  
 Fixed MOH cost ----- xx  
 Variable operating expense --xx  
 Fixed operating expense -----xx      XX  
 Operating income -----XX

### Comparison between the three costing systems

| Items of comparison | Absorption costing | Direct costing | Through put costing |
|---------------------|--------------------|----------------|---------------------|
| Direct material     | Product cost       | Product cost   | Product cost        |

|                      |                     |                     |                     |
|----------------------|---------------------|---------------------|---------------------|
|                      |                     |                     |                     |
| Direct labor         | Product cost        | Product cost        | periodic cost       |
| Variable MOH         | Product cost        | Product cost        | periodic cost       |
| Fixed MOH            | Product cost        | periodic cost       | periodic cost       |
| Variable Op.Exp.     | periodic cost       | periodic cost       | periodic cost       |
| Fixed Op. Exp.       | periodic cost       | periodic cost       | periodic cost       |
| GAAP                 | Acceptable          | Not Acceptable      | Not Acceptable      |
| Usefulness           | For external report | For internal report | For internal report |
| Performance eval.    | Not useful          | useful              | useful              |
| Terms used           | Gross profit        | Contribution margin | Through put cont.   |
| If Sales = prod., NI | Equal               | Equal               | Equal               |
| If Sales < prod., NI | Higher              | medium              | lower               |
| If Sales > prod., NI | lower               | medium              | Higher              |

**Example1:** NASCAR motors assemble and sell motor vehicles. It uses an actual costing system in which unit cost is calculated on monthly basis. Data relating to April and may of 2005 are given in the table below.

|                       | April    | May      |
|-----------------------|----------|----------|
| Unit data             |          |          |
| • Beginning inventory | 0 unit   | 150 unit |
| • Production          | 500 unit | 400 unit |

|                        |             |             |
|------------------------|-------------|-------------|
| • Sales                | 350 unit    | 520 unit    |
| Variable cost per unit |             |             |
| • Direct material      | \$6,700     | \$6,700     |
| • Direct labor         | 1,500       | 1,500       |
| • MOH cost             | 1,800       | 1,800       |
| • Marketing            | 3,000       | 3,000       |
| Fixed cost data        |             |             |
| • MOH cost             | \$2,000,000 | \$2,000,000 |
| • Marketing            | 600,000     | 600,000     |

Selling price of each motor vehicle is Br24, 000

Requirements:

a) Calculate the inventor able cost producing each unit under

1. Absorption costing
2. Direct costing
3. Through put costing

b) Present income statement for the two months under

4. Absorption costing
5. Direct costing
6. Through put costing

4. Explain the difference between absorption costing income and direct costing income

## Assignment

**Problem 1:** The following information relates to the operation of Sanfransisco Company for the year 2004.

|                      |          |
|----------------------|----------|
| Selling price        | \$20     |
| Units produced       | 10,000   |
| Unit sold            | 8,000    |
| Total DM cost        | \$40,000 |
| Total DL cost        | \$20,000 |
| Total VMOH cost      | \$60,000 |
| Total FMOH cost      | \$25,000 |
| V. marketing expense | \$4,500  |
| F.marketing expense  | \$25,000 |

Requirement: prepare income statement using

1. Absorption costing
2. Direct costing
3. Through put costing