**INSTRUCTOR NOTES: CHAPTER 3**

**PRODUCT COSTING AND COST ACCUMULATION IN A**

**BATCH PRODUCTION ENVIRONMENT**

**Learning Objectives**

1. Discuss the role of product and service costing in manufactur­ing and nonmanufactur­ing firms.

2. Diagram and explain the flow of costs through the manufacturing accounts used in product costing.

3. Distinguish between job-order costing and process costing.

4. Compute a predetermined overhead rate, and explain its use in job-order costing for job-shop and batch-production environments.

5. Prepare journal entries to record the costs of direct material, direct labor, and manufacturing overhead in a job-order costing system.

6. Prepare a schedule of cost of goods manufactured, a schedule of cost of goods sold, and an income statement for a manufac­turer.

7. Describe the two-stage allocation process used to assign manufacturing overhead costs to production jobs.

8. Describe the process of project costing used in service industry firms and nonprofit organizations.

**Chapter Overview**

I. Product and Service Costing

A. Use in financial accounting

B. Use in managerial accounting

C. Use in cost management

D. Use in reporting to interested organizations

II. Flow of Costs in Manufacturing Firms

A. Work-in-process inventory

B. Finished-goods inventory

C. Cost of goods sold

III. Types of Product-Costing Systems

A. Job-order costing systems

B. Process-costing systems

IV. Accumulating Costs in a Job-Order Costing System

A. Job-cost record

B. Direct materials costs

C. Direct labor costs

**D. Manufacturing-overhead costs**

 **1. Overhead application**

 **2. Predetermined overhead rate**

 **3. Applying overhead costs**

V. Job-Order Costing

A. Purchase of material

B. Use of direct material

C. Use of indirect material

D. Use of direct labor

E. Use of indirect labor

F. Incurrence of manufacturing-overhead costs

G. Application of manufacturing overhead

H. Summary of overhead accounting

I. Selling and administrative costs

J. Completion of a production job

K. Sale of goods

**L. Underapplied and overapplied overhead**

M. Schedule of cost of goods manufactured

N. Schedule of cost of goods sold

O. Posting journal entries to the ledger

VI. Further Aspects of Overhead Application

A. Actual and normal costing

B. Choosing the cost driver for overhead application

C. Departmental overhead rates

VII. Two-stage cost allocation

VIII. Project Costing: Job-Order Costing in Nonmanufacturing Organizations

IX. Changing Technology in Manufacturing Operations

1. EDI and XML
2. Use of bar codes and RFID system

**Key Concepts**

Students should not expect to apply a so-called "textbook system" to any real-world company, because cost systems must be designed to meet a firm's unique needs. However, the two traditional system models, *job order* and *process costing*, give users the ability to build-in various modifications for use in actual situations.

**I. Product and Service Costing**

1. A **product-costing costing system** accumulates the total cost of making products and facilitates the calculation of a per-unit cost. Applications exist in:
* *Financial accounting*: Valuation of ending inventory on the balance sheet and determination of cost of goods sold for the income statement
* *Managerial accounting*: Planning, cost control, and decision making
* *Cost management*: Cost control and cost reduction
* *Reporting to interested organizations:* Audience includes state regulatory agencies, insurance companies, hospitals, and the government.
1. Managers of nonmanufac­tur­ing organizations need product-cost information as well. For example, product costs are used by account­ing firms, which set a contract price for audit jobs, and by hospitals, which are reim­bursed on a per-case basis under Medicare.

**II. Flow of Costs in Manufacturing Firms**

1. As production takes place, manufacturing costs are tracked in the Work-in-Process Inventory account. Every product is made up of three cost components: direct materials, direct labor, and manufacturing overhead.
2. After products are completed, the corresponding cost leaves the Work-in-Process account and is debited to the Finished-Goods account. (A merchandising firm buys its goods already completed and directly debits the items' cost to Merchandise Inventory.)
3. When units are sold, the Finished-Goods Inventory account is credited and Cost of Goods Sold is debited.

**III. Types of Product-Costing Systems**

1. A product-costing system must be adapted to match the environment in which it operates.
2. A **job-order costing system** is used in an industry where products are made individually, or in relatively small batches, and one product or batch is readily distinguishable from the other.
* Candidates for job-costing systems would be custom homebuilding, custom printing, custom furniture construction, legal cases, medical cases, audits, and research projects.
1. A **process-costing system** is employed in an environment at the other end of the continuum: the mass production of like units. Users might include manufacturers of chemicals, gasoline, and microchips. This topic is discussed fully in Chapter 4.

**IV. Accumulating Costs in a Job-Order Costing System**

1. A **job-cost record** is used to accumulate the actual direct materials, actual direct labor, and applied manufacturing overhead costs for each job. The recording of costs on this record and in the general ledger is triggered by various **source docu­ments.**
* **Material requisition forms** authorize the transfer of direct materials from the warehouse to production. In many firms, the requisitions are based on a **bill of materials** that lists all of the materials (e.g., parts) needed.
* **Supply chain—**the flow of all goods, services, and information into and out of the organization. The supply chain often has ramifications for materials, as manufacturers work with vendors to achieve improved delivery schedules and reductions in material cost.
* **Time records** are used to gather the amount of direct labor worked on a specific job.
* *Manufacturing overhead is entered on the job-cost record in the form of applied (i.e., estimated) overhead.* Source documents, such as invoices for factory insurance and schedules for factory depreciation, trigger a general-ledger entry that debits the Manufacturing Overhead account.
1. Overhead accounting involves a number of steps. Chapter 3 focuses on the final step: the application of overhead to jobs and products.
* Although overhead cannot be directly traced to the product, the use of an application rate should allocate an equitable amount of cost to each job (known as **overhead application)**.
* *Step 1:* Set a **predetermined overhead rate** at the beginning of the accounting period. This is done by dividing the period's estimated (budgeted)overhead by the period's estimated number of cost-driver units.

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| **A key concept is the selection of a cost driver to assign (allocate, apply) overhead to products for product costing purposes.** Because product costs are used in a variety of ways, accountants frequently use a **predetermined manufacturing overhead rate**)(*an estimate of what the overhead rate will actually be*) for assigning costs during the period. In Chapter 10, we will discuss how *variance analysis* (e.g., comparison of actual overhead versus budget or estimated overhead) is used for managerial decision making.

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| **Predetermined manufacturing overhear rate per unit of activity** | = | Budgeted (estimated, predicted) total manufacturing overhead cost for the year |
|  |  | Budgeted (predicted) units of activity (1) |

1. E.G., direct labor hours, machine hours
 |

* *Step 2:* Use the predetermined overhead rate to apply an equitable portion of overhead to each job. As the actual number of cost-driver units used on a job becomes known, it is multiplied by the predetermined overhead rate.

* **Actual overhead** costs incurred during the year are debited to the Manufacturing Overhead control account. In contrast, **applied overhead** is debited to Work-in-Process Inventory and credited to Manufacturing Overhead.

**The major issue that students usually encounter in job costing is the concept of *manufacturing overhead*.**

* The year-end difference between actual and applied amounts is known as **over- or underapplied** **overhead.** This figure is adjusted in the process of closing the Manufacturing Overhead account to zero by either:
* Charging or crediting the amount to cost of goods sold. This approach is acceptable if the over- or underapplication is small or if most of the products made during the period have been sold.
* **Prorating** the amount among work in process, finished goods, and cost of goods sold.

***NOTE:*  under- and overapplied overhead is the *difference between actual and applied overhead*, not actual and budgeted overhead.**

The budgeted figure is used solely in the determination of the predetermined rate.

**V. Job-Order Costing**

1. Work-in-Process Inventory account contains charges for direct materials used, direct labor, and applied manufacturing overhead.
* Period costs are expensed and not charged to Manufacturing Overhead.
* A sale requires two journal entries: one to record the sales revenue and another to transfer the goods' cost from Finished-Goods Inventory to Cost of Goods Sold.
1. The **schedule of cost of goods manufactured** details the activity in the Work-in-Process account (beginning balance, direct materials used, direct labor, applied overhead, and ending balance).
2. The **schedule of cost of goods sold** details the activity in the Finished- Goods Inventory account. It is similar to the cost-of-goods-sold schedule as shown in financial accounting courses for merchandising companies, except the "purchases" amount is replaced with cost of goods manufactured.

**VI. Further Aspects of Overhead Application**

1. Actual and normal costing
* *Accountants prefer predetermined application rates,* which are used in a **normal-costing system.** Such rates help to smooth product costs over time and allow users to cost products/jobs upon completion.
* In contrast, users of **actual-costing systems** derive an actual overhead rate at the end of the accounting period. *Product-cost information to management is therefore delayed. This delay means that management does not have timely information*
1. Choosing an appropriate cost driver
* Direct labor has been a very common and appropriate cost driver. Past processes were labor intensive, and products incurring more labor often produced higher amounts of manufacturing overhead.
* Today, many processes are automated and less dependent on labor. Thus, firms now use machine hours, process time, **throughput (cycle) time** (the average amount of time to convert raw materials into finished goods), and other measures as cost drivers.

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| **Note: We assume normal costing throughout the course** |

* **Single vs. multiple overhead rates**
* Companies commonly use multiple (rather than single) application rates. With computerized accounting systems, multiple rates are easily generated, thus lowering the cost of producing highly accurate information.
* A single overhead rate is commonly known as a **plantwide rate.** In an environment with multiple departments, multiple rates are often known as **departmental rates.**

**VII. Two-stage cost allocation**

**Overhead may be allocated in a two-stage cost allocation process when multiple departments and multiple service departments are used** (discussed in much more depth in Chapter 5)

* *Stage one:* Overhead is first accumulated in production departments. This frequently requires the allocation of **service department costs** to production departments.
* *Stage two:* As a final step, production department costs are assigned to individual jobs and products via overhead application.

**VIII. Project Costing: Job-Order Costing in Nonmanufacturing Organizations**

* Project costing refers to job costing in a nonmanufacturing environment. "Jobs" in this case refer to cases, contracts, and/or programs.
* Costing involves tracking the direct, easily traceable costs and subdividing them by project. Overhead is then applied by using a predetermined rate, with a possible application base being a project's direct professional labor cost.

**IX. Changing Technology in Manufacturing Operations**

1. Technology such as bar coding may be used to track appropriate costs to projects, although this is just one of many possible applications. Service providers, along with manufacturers, are also making use of:
* Electronic data interchange (EDI), which involves the electronic transfer of information from one organization to another by using a computer-to-computer interface.
* Extensible markup language (XML), which is web-based and allows users to share structured data such as product order lists and price data.