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Introduction to Cost-Accounting Systems

Cost-accounting systems recognize, measure, record, and report cost and associated nonfinancial information related to a company's activities, products, services, processes, functions, and organizational units. Cost is a measurement in money terms of resources used for some purpose.

Each item, unit, or activity for which costs are measured is referred to as a cost object. A cost object is the technical name for a product, project, organizational unit, or other purpose or activity for which costs are measured.¹

The output of cost systems is used for *both* financial-reporting and management-accounting purposes. Financial reporting uses cost-accounting information to measure inventories and cost of goods sold. Management uses the output of cost systems for a wide range of managerial purposes including budgeting, strategy formulation, forecasting, product- and process-improvement studies, performance measurement, as well as a variety of other operating decisions.

This note describes cost systems used for measuring product costs in a manufacturing situation. Many of the principles and processes described are equally applicable to cost-system design and use in service firms, nonprofit organizations, and government agencies. The same is true for organizational functions beyond manufacturing, such as sales and human resource management.

Later in the course, more refined cost-accounting systems and their use in various management-accounting applications will be covered.

Cost Systems

Cost systems are based on a simple design. In order to cost a cost object, the costs to be assigned are divided into two categories—*direct* and *indirect* costs. Direct costs are *traced* directly to cost objects. Indirect costs are *allocated* to cost objects using the following process. Initially, total indirect costs are directly traced to *cost pools*. Next, the costs aggregated in cost pools are assigned to cost objects using a *cost-allocation base*.

¹ IMA Statement No. 48, "Allocation of Service and Administrative Costs."

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Direct costs are those costs that can be traced directly in an economical and feasible manner to a cost object. The labor and materials used to produce a manufactured product are common examples of direct costs. Their consumption can be tied directly through time cards and materials requisitions to the manufactured product.

Indirect costs are those costs related to a cost object that cannot be classified as direct costs. The factory manager's salary is an indirect cost in most manufacturing situations. It cannot be related directly to any particular product, but it is a necessary manufacturing cost for producing products.

Cost pools are an intermediate step in the allocation of indirect costs to cost objects. A cost pool is a grouping of indirect costs. It can encompass all indirect costs or be as restrictive as the indirect costs associated with a particular activity, such as product inspection. The indirect costs assigned individually to cost pools should have a common cause-and-effect relationship to the cost object. This leads to more accurate costing of the cost object.

Cost pools are assigned to cost objects using a *cost-allocation* basis. The cost-allocation basis should reflect the cause-and-effect relationship of the cost pool to the cost object. For example, a cost pool consisting of indirect factory labor costs and the factory personnel department cost might be allocated to the cost object using direct-labor hours. The cause-and-effect relationship assumed is that the demand for indirect labor and the personnel department resources are a function of the direct labor hours worked.

The basic structure and process of a cost-accounting system is illustrated in **Exhibit 1**. The following discussion illustrates the application of the basic cost-system structure and process depicted in **Exhibit 1** to costing manufactured products (the cost objects). In our example, the only direct costs are labor and materials. All of the remaining manufacturing costs are classified as indirect costs.

Direct Material and Labor

Cost systems are classified by the way that direct material and direct labor are identified with specific products. Direct material and labor costs are those material and labor costs that can be specifically traced to the item being costed in an economically feasible way. The costing approach used is, to quite an extent, dictated by the production processes. The two basic assignment approaches are a job-order cost system and a process cost system.

Job-order cost system In a job-order cost system the principal cost object is the job or order. Where a production process is on the basis of individual job orders or the products are produced in batches, some type of job-order cost system can be used. A job-order system requires three things. First, each job or batch must be given an identifying symbol, usually a number. Second, all material put into a process must be identified with a specific job or batch. This can take many forms. The most simple form is a material requisition system that requires the user of material to identify the batch or job on which it is to be used. Third, all direct labor must be assigned to a specific job or batch.

Exhibit 2 presents the basic structure of a job-order cost system (direct costs only). The following numerical example using financial and usage data illustrates a job-order cost system application similar to the one described in **Exhibit 2**. Assume three jobs pass through the same department during the same week. The department's weekly cost report shows the following direct material and direct labor cost information. What is the total direct material and direct labor cost per job? How were these costs measured?

Table A***Weekly Direct-Cost Report*****Total Use and Costs**

Total direct material used—100 lbs.

Direct material cost per lbs.—\$5

Total direct labor used—200 hours

Direct labor cost per hours—\$10

	Usage Per Job		
	Job #1	Job #2	Job #3
Direct material (lbs.)	50	30	20
Direct labor (hours)	100	60	40

	Direct Costs Per Job		
	Material	Labor	Total Direct
Job #1	\$250	\$1,000	\$1,250
Job #2	150	600	750
Job #3	<u>100</u>	<u>400</u>	<u>500</u>
	<u>\$500</u>	<u>\$2,000</u>	<u>\$2,500</u>

Source: Casewriter.

Process-cost systems The units of production are the principal cost object in a process-cost system. If a manufacturing facility employs continuous processing, and if each operating department produces a reasonably homogeneous product, a process-cost system can be used. Under this system, all direct material and direct labor are charged to the operating department that uses the material and employs the labor. In its most simple form, the direct material and direct labor cost of a product is the total material and labor cost for the department for a period (usually a month) divided by the total unit production. The direct cost of the finished product is the sum of the direct material and labor costs incurred in each operating department through which the product has passed.

In actual practice, process-cost systems are frequently much more complex because products are not completely homogeneous and because operating departments may produce more than one product. Under these circumstances, the appropriate assignment of costs can be considerably more challenging.

Exhibit 3 depicts the basic process-cost system structure and process (direct costs only). The following numerical example using a department's weekly cost and usage data illustrates a process-cost system application similar to the one described in **Exhibit 3**. Assume only one product is produced in the department. The weekly direct material and direct labor cost report is reproduced below. What is the direct material and direct labor cost per unit produced? How were these costs measured?

Table B***Weekly Direct-Cost Report*****Total Use, Costs, and Production**

Total direct material cost—\$500

Total direct labor cost—\$2,000

Number of units produced—1,000

	Direct Cost per Unit		
	Material	Labor	Total
Per Unit Cost	\$0.50	\$2.00	<u>\$2.50</u>

Source: Casewriter.

Indirect Manufacturing Costs

Indirect costs (sometimes called overhead and burden) are costs that cannot be directly traced to a specific product in an economical manner. These costs must be *allocated* to products. The general goal of cost allocation is to assign indirect costs to a particular cost object using an allocation basis that links the indirect cost to the cost object in a meaningful and systematic manner. Since indirect costs are often four or five times as much as direct labor, the accuracy of the indirect cost assignments to cost objects by a cost-accounting system depends on the validity of the methodology for allocating indirect costs.

There are three steps in developing a system for allocating indirect costs: (1) the selection of appropriate cost pools; (2) the direct tracing of all indirect costs to cost pools; and (3) the allocation of cost-pool costs to the cost object.

In the note's demonstration example, indirect manufacturing costs include all manufacturing costs other than direct material and direct labor. The process for allocating indirect costs to manufactured products is illustrated in **Exhibit 4**. A numerical application of this process is presented below.

Assume the manufacturing department's weekly total indirect costs of \$20,000 have been assigned by direct tracing to two cost pools—Cost Pools A and B. The allocation basis used to assign Cost Pool A's indirect costs to products is direct labor hours. Cost Pool B's indirect costs are assigned using machine hours. Furthermore, assume Parts X and Y are produced by the manufacturing department and the weekly indirect cost report shows the following activity and indirect cost information. How were the two cost-pool allocation bases calculated? How were the indirect costs per unit determined?

Table C***Weekly Indirect Cost Report***

	Part X	Part Y	Total
Direct Labor Hours	1,000	500	1,500
Machine Hours	30	70	100
Units Produced	1,000	2,000	3,000
<u>Total Indirect Costs</u>			
\$20,000			
Indirect Cost Pools			
– Cost Pool A	\$15,000		
– Cost Pool B	\$5,000		
Indirect Cost–Allocation Bases			
– Cost Pool A	\$10 per direct labor hour		
– Cost Pool B	\$50 per machine hour		
	Part X	Part Y	Total
Indirect Cost Allocations			
– Cost Pool A	\$10,000	\$5,000	\$15,000
– Cost Pool B	<u>\$ 1,500</u>	<u>\$3,500</u>	<u>\$ 5,000</u>
Total Indirect Costs	<u>\$11,500</u>	<u>\$8,500</u>	<u>\$20,000</u>
Indirect Cost Per Unit	<u>\$ 11.50</u>	<u>\$ 4.25</u>	

Source: Casewriter.

The above per unit data indicate that each unit of Part X produced would be allocated \$11.50 of indirect costs and each unit of Part Y produced would be allocated \$4.25 of indirect costs.

The above example allocates the indirect manufacturing costs to the cost object in a single stage. In practice, the multi-stage allocation process is often adopted. That is, the total indirect manufacturing products are assigned to two or more cost pools. Each cost pool is then allocated using the appropriate allocation base and rate to the cost object.

Direct and Full Costing Systems

When only direct manufacturing costs are assigned to products, cost accountants say they are using a *direct costing system*. When all of the manufacturing costs are assigned to products, the cost system is referred to as a *full* or *absorption costing system*. Both generally accepted accounting principles and the tax code require finished goods inventories to be valued at full cost. Companies using a direct costing system must adjust their inventory costs to full costs for financial-reporting and taxation purposes.

Standard Costs

The cost systems described to date are called historical cost systems because they assign costs actually incurred during a period to the products produced during that period. *Standard costs*, on the other hand, are estimates of what a product *should* cost. Bills of material for each product are prepared and priced. Direct labor minutes are developed for each operation, preferably on the basis of time and motion studies, and these labor times are multiplied by the appropriate labor rates. Standard indirect costs per unit of production are also developed.

When standard costs are used, material, direct labor, and indirect costs are charged to work in process at the actual costs incurred.² The cost of work in process is transferred to the finished inventory account at the standard cost for the products actually produced. The amount remaining in the work-in-process inventory is called a variance and is charged to the variance account.

Assume that the following standards were established for the three products produced by a company with a single operating department.

Table D

Unit Standard Costs	Products		
	A	B	C
Direct Material	\$1.00	\$2.00	\$3.00
Direct Labor	2.00	3.00	1.00
Indirect Costs	4.00	5.00	3.00

Source: Casewriter.

Assume that in the month of January, 1,000 units of A, 2,000 units of B, and 3,000 units of C were produced. The following actual costs were incurred: direct material, \$12,000; direct labor, \$12,000; and overhead, \$25,000. An analysis of monthly cost performance is shown below. How were the total standard costs for material, labor, and indirect costs calculated? How were the variances determined?

Table E

	Direct Material	Direct Labor	Indirect Costs	Total
Standard Costs				
Product A	\$ 1,000	\$ 2,000	\$ 4,000	\$ 7,000
Product B	4,000	6,000	10,000	20,000
Product C	<u>9,000</u>	<u>3,000</u>	<u>9,000</u>	<u>21,000</u>
Total	\$14,000	\$11,000	\$23,000	\$48,000
Actual Cost	<u>12,000</u>	<u>12,000</u>	<u>25,000</u>	<u>49,000</u>
Variance-Favorable/ (Unfavorable)	<u>\$ 2,000</u>	<u>(\$ 1,000)</u>	<u>(\$ 2,000)</u>	<u>(\$ 1,000)</u>

Source: Casewriter.

² Material is usually included at the standard cost for the material actually used because material is entered into raw-material inventory at its standard unit cost. The difference between the actual cost of the material and the standard cost is thus identified when the material is received and charged to a "purchase-price variance" account that is written off each month as an expense. This has the advantage of identifying immediately variances from standard price levels.

Exhibit 5 shows the accounting entries for the above example. **Exhibit 5** also shows the individual variances for direct materials, direct labor, and indirect costs.

Advantages of Standard Costs over Historical Costs

Standard cost systems overcome three principal limitations of historical cost systems: First, the effort of identifying direct material and direct labor with specific products can be expensive and, in some types of manufacturing processes, almost impossible. Second, cost inefficiencies may be buried in the value of finished-goods inventory and not reflected in the income statement until a considerable period after these inefficiencies were incurred. Third, historical cost systems do not provide an adequate means for measuring the efficiency of the manufacturing operation. This part of the note describes how standard costs overcome these problems.

Recordkeeping Efficiency

In many production processes, especially in mass-production industries, it is very difficult, if not nearly impossible, to identify specific costs with the products being produced. Literally hundreds of different products flow through a given department during any period. The scheduling of mass-production operations is such that costs are not identified directly with a product. Even where it is possible to identify costs with products, it can be expensive to maintain the records necessary to identify costs by product and to maintain a record for each individual product.

In standard cost systems, actual costs are *not* identified by product; they are charged only to departments. Products move from the work-in-process inventory to finished-goods inventory at *standard cost*. Thus, it is necessary to know only the number and type of product completed by each department.

Cost Inefficiency

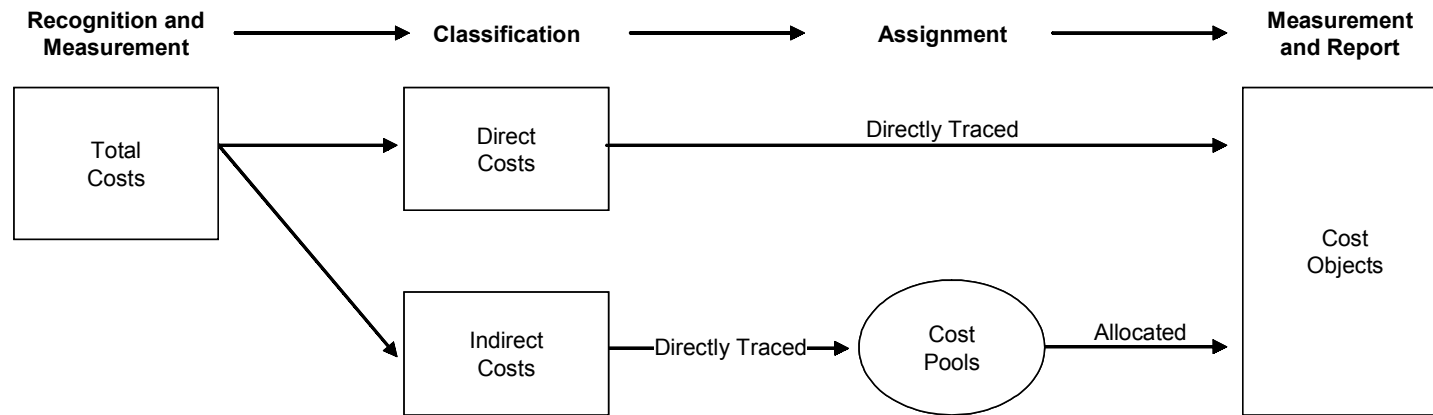
Using a historical cost system, the finished-goods inventory is charged with all costs incurred. Suppose, for example, in a given month a major breakdown occurred that doubled the labor cost of certain products. The excess costs would be charged to finished-goods inventory and, if the company was on a first-in, first-out basis of inventory valuation, profits might not be affected for several months. If the company was on an average-inventory valuation basis, the effect of one month's inefficiencies could affect profits over the next several months.

With standard costs, finished-goods inventories are valued at standard, and costs in excess of standard are identified as variances and can be written off against profits in the period in which they were incurred or carried forward to future periods to offset expected future variances.

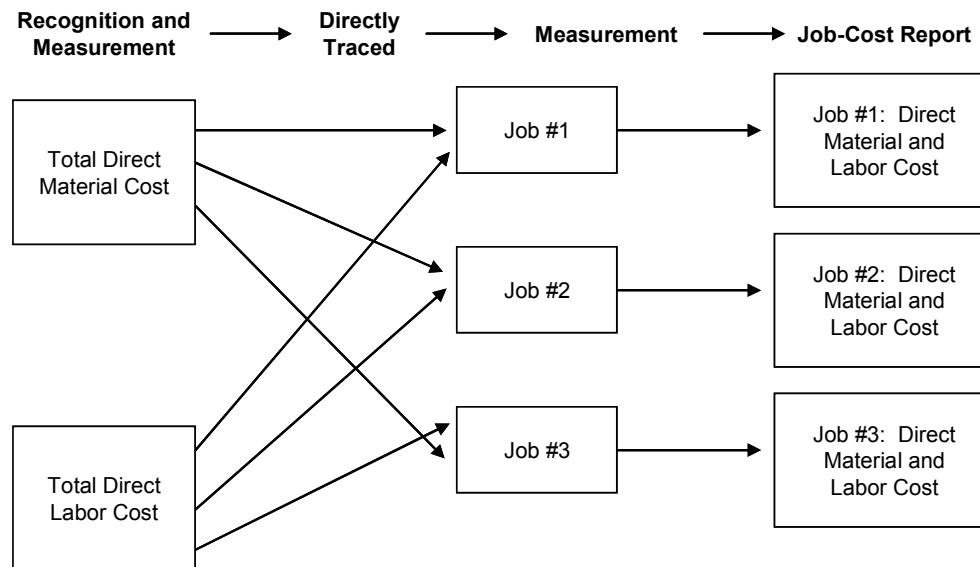
Evaluation

Standard cost systems provide a means for evaluating manufacturing managers. Ideally, a standard cost should represent the potential efficiency of an operating facility. The difference between the actual and the standard represents how well this potential is realized. This, then, can be a basis for measuring the efficiency of the people responsible. You should note, however, that variances alone do not measure efficiency because some variances may be beyond the control of the

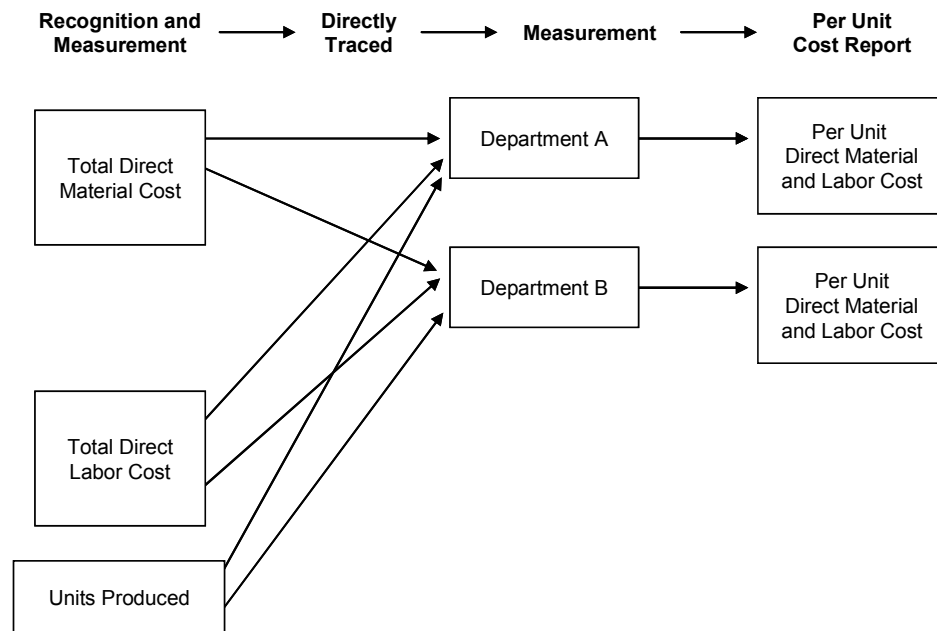
operating manager. All management evaluation requires some degree of subjective judgment. Variances help in the exercise of this judgment.

Exhibit 1 Basic Cost-System Structure and Process

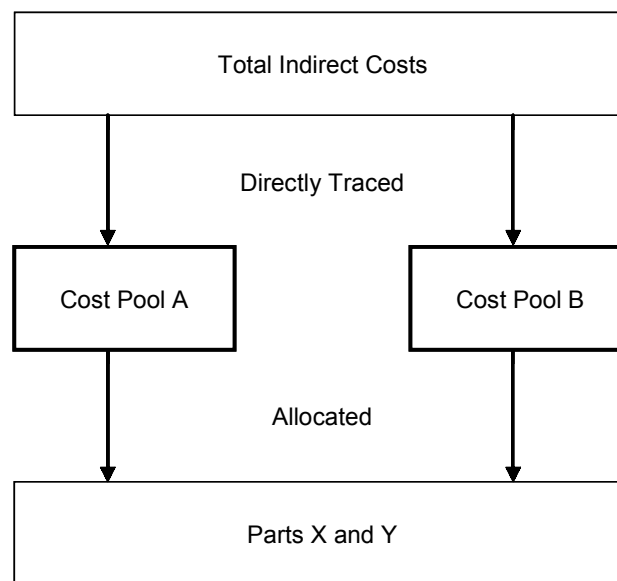
Source: Casewriter.

Exhibit 2 Job-Order Cost System (direct costs only)

Source: Casewriter.

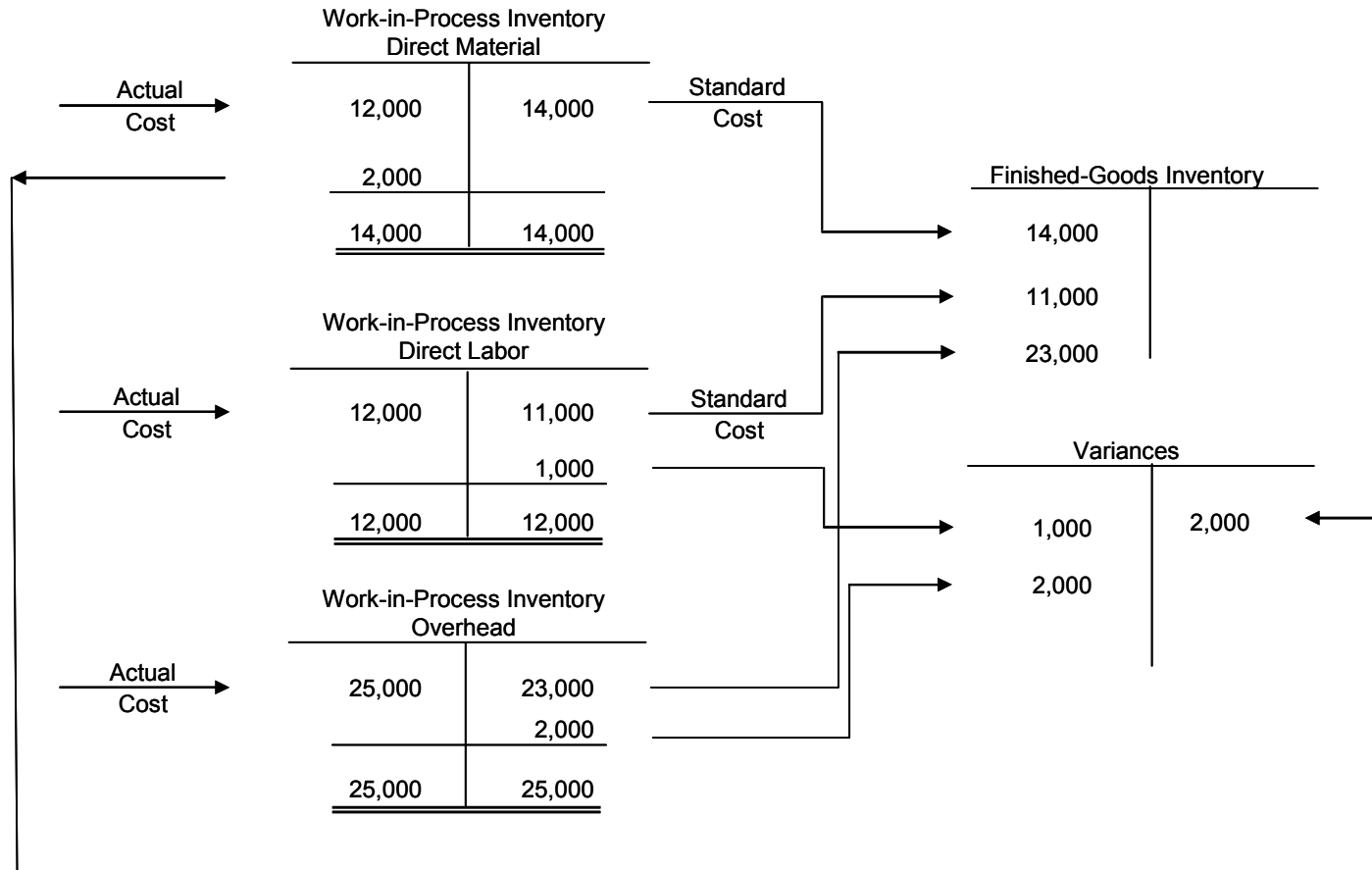
Exhibit 3 Process-Cost System (direct costs only)

Source: Casewriter.

Exhibit 4 Indirect Cost-Allocation Process

Source: Casewriter.

Exhibit 5 Standard Cost Example



Source: Casewriter.

Note: This example assumes that there was no beginning or ending work-in-process inventory. In actual practice, there is likely to be both a beginning and ending work-in-process inventory. This complicates the accounting procedure but in no way affects the principle.