# CHAPTER

**7**

**STANDARD COSTING AND VARIANCE ANALYSIS**

**Learning Objectives**

After reading and studying Chapter 7, you should be able to answer the following questions:

1. Why are standard cost systems used?
2. How are material, labor, and overhead standards set?
3. How are material, labor, and overhead variances calculated and recorded?
4. How have the setting and use of standards changed over time?
5. How does the use of a single conversion element (rather than the traditional labor and overhead elements) affect standard costing?
6. (Appendix) How are variances affected by multiple material and labor categories?

**Terminology**

**Bill of materials:** a document that contains specifications for materials, including quality and quantity

**Budget variance:** the difference between total actual overhead and budgeted overhead based on standard hours allowed for the production achieved during the period

**Controllable variance:** the budget variance of the two-variance approach to analyzing overhead variances; it is so named because managers are able to exert influence on this amount during the short run

**Expected standard:** expected cost or result; expected standards anticipate and allow for future waste and inefficiencies and therefore are not of significant value for motivation, control, or performance evaluation

**Fixed overhead spending variance:** the difference between the total actual fixed overhead and budgeted fixed overhead; this amount normally represents the price variance for multiple fixed overhead components

**Ideal standards:** standards that provide for no inefficiencies of any type (e.g., normal operating delays and human limitations such as fatigue, boredom, or misunderstanding); ideal standards are impossible to attain on a continuous basis and should not be used in motivating workers or determining their performance levels

**Labor efficiency variance (LEV):** in terms of hours, the difference between actual hours worked for the period and the standard hours allowed for the actual output achieved; in terms of costs, (actual hours worked for the period - standard hours allowed for the actual output) x the standard labor rate

**Labor mix variance:** the financial effect associated with changing the proportionate amount of higher or lower paid workers in production; it can also be computed as (standard mix x actual hours x standard rate) minus (actual mix x actual hours x standard rate)

**Labor rate variance (LRV):** the difference between the actual wages paid for total hours worked and the standard wages for hours worked; it can also be computed as (actual labor rate - standard labor rate) x total actual hours worked during the period

**Labor yield variance:** the monetary impact of using a higher or lower number of hours than the standard allowed; it can be computed as (standard mix x standard hours x standard rate) minus (standard mix x actual hours x standard rate)

**Management by exception:** a practice whereby managers investigate only those processes, costs, variances, or other items of interest that deviate from expectation

**Material mix variance:** the effect of substituting a nonstandard mix of materials during the production process; it can also be computed as (standard mix × actual quantity × standard price) minus (actual mix × actual quantity × standard price)

**Material price variance (MPV):** the difference between the amount actually paid for material and the standard price of the material; it can also be computed as (actual purchase price per unit of material - standard purchase price per unit of material) x the actual number of units purchased

**Material quantity variance (MQV):** in terms of units of material, the difference between the actual quantity of material used and the standard quantity allowed for the actual output achieved; in terms of cost, (actual quantity of materials used - standard quantity allowed) x standard price of material

**Material yield variance:** the difference between the actual total quantity of input and the standard total quantity allowed based on output; this difference reflects standard mix and standard prices; it can be computed as (standard mix × standard quantity × standard price) minus (standard mix × actual quantity × standard price)

**Methods-time measurement (MTM):** an industrial engineering process that analyzes work tasks to determine the time a trained worker requires to perform a given operation at a rate that can be sustained for an eight-hour workday

**Mix:** any possible combination of material or labor inputs

**Noncontrollable variance:** the fixed overhead variance due to capacity utilization (i.e., volume); it can also be computed as applied fixed overhead minus budgeted fixed overhead

**Operations flow document:** a document listing all operations necessary to produce one unit of product (or perform a specific service) and the corresponding time allowed for each operation

**Overhead efficiency variance:** a variance consisting solely of variable overhead, it is the difference between total budgeted overhead at the actual activity level and total budgeted overhead at the standard activity level under the three variance approach; it can also be computed as budgeted overhead based on standard input quantity allowed minus budgeted overhead based on actual input quantity used

**Overhead spending variance:** the difference between the actual overhead and total budgeted overhead at the actual activity level under the three-variance approach; it is the sum of the variable and fixed overhead spending variances of the four-variance approach

**Practical standard:** a standard that can be reached or slightly exceeded with reasonable effort by workers; it allows for normal, unavoidable time problems or delays such as machine downtime and worker breaks; it is often believed to be most effective in motivating workers and determining performance levels

**Standard:** the expected costs and quantities needed to manufacture a single unit of product or perform a single service

**Standard cost card:** a document that summarizes the standard quantities and costs for direct material, direct labor, and overhead needed to complete one unit of product

**Standard quantity:** the standard input quantity that should have been needed to achieve a given output

**Total cost of ownership (TCO):** the direct purchase price of an input plus freight/duty/tax charges, payment and discount terms, inventory storage costs, scrap rates, rebates or special incentives, warranties, and disposal costs

**Total overhead variance:** the difference between total actual overhead and total applied overhead; it is the amount of underapplied or overapplied overhead

**Variable overhead efficiency variance:** the difference between budgeted variable overhead for actual hours and standard variable overhead; this variance quantifies the effect of using more or less overhead-based inputs (e.g., labor hours, machine hours) than the standard allowed for the production achieved; it can also be computed as (standard hours – actual hours) x hourly variable overhead rate

**Variable overhead spending variance:** the difference between total actual variable overhead and the budgeted variable overhead based on actual hours; it can also be computed as budgeted variable overhead for actual hours – actual variable overhead for the period

**Variance:** the difference between total actual cost incurred and total standard cost applied to the output of the period

**Variance analysis:** the process of categorizing the nature (favorable or unfavorable) of the differences between standard and actual costs and determining the reasons for those differences

**Volume variance:** a fixed overhead variance that represents the difference between budgeted fixed overhead and fixed overhead applied to production; it is also referred to as the noncontrollable variance; this variance is caused solely by producing at a level that differs from that used to compute the predetermined overhead rate which incorrectly treats fixed overhead as a variable cost; it can also be computed under three-variance analysis as applied fixed overhead minus budgeted fixed overhead

**Yield** (or process yield): the output quantity that results from a specified input

**Lecture Outline**

**LO.1: Why are standard cost systems used?**

1. Why Standard Cost Systems are Used
   1. Clerical efficiency—a company that uses standard costs to trace the flow of costs through its accounting system usually discovers that less clerical time and effort are required than in an actual cost system.
   2. Motivation—standards represent a technique of communicating management’s expectations of efficiency to workers.
   3. Planning—managers can use currently available standard costs to estimate future quantities and costs.
   4. Controlling—the control process begins with the establishment of standards which provide a basis against which actual costs can be measured so variances may be computed.
      1. **Variance analysis** is the process of categorizing the nature (favorable or unfavorable) of the differences between standard and actual costs and determining the reasons for those differences.
      2. The setting of upper and lower tolerance limits for deviations allows managers to implement the ***management by exception*** concept. (See text **Exhibit 7.1 p. 245**.)
   5. Decision making—standard cost information availability facilitates many decisions.
   6. Performance evaluation—summary variance reports focus attention on the operating performance of subordinate managers, allowing top managers to determine when costs were and were not controlled by which managers. Top management can then provide vital feedback to the subordinate managers.
2. Considerations in Establishing Standards
   1. Appropriateness
      1. Appropriateness and attainability need to be considered when standards are established.
         1. *Appropriateness,* in relation to a standard, refers to the basis on which the standards are developed and how long they are expected to last.
      2. Standards are developed from past and current information, and they should reflect technical and environmental factors expected during the period in which the standards are to be applied.
      3. Factors such as the materials quality, normal ordering quantities of materials, expected employee wage rates, degree of plant automation, facility layout, and mix of employee skills should be considered.
      4. Standards must evolve over the organization’s life to reflect its changing methods and processes.
   2. Attainability
      1. *Attainability* refers to management’s belief about the degree of difficulty or rigor that should be incurred in achieving the standard. Standards can be classified by their degree of rigor and, thus, their motivational value from easy to difficult as follows: expected, practical, and ideal.
      2. **Expected standards** are standards set at a level that reflects what is actually expected to occur in the future period; these standards anticipate future wastes and inefficiencies and allow for them; they are not of significant value for control and performance evaluation purposes.
      3. **Practical standards** are standards that can be reached or slightly exceeded approximately 60 to 70 percent of the time with reasonable effort by workers; they allow for normal, unavoidable time problems or delays and for worker breaks; they are believed to be most effective in inducing the best performance from workers, since such standards represent an attainable challenge.
      4. **Ideal standards** are standards that provide for no inefficiencies of any type, are impossible to attain, and are sometimes called theoretical standards.

**LO.2: How are material, labor, and overhead standards set?**

1. Introduction
   1. General
      1. Organizations develop and use standards for almost all tasks.
      2. Because of the variety of organizational activities and information objectives, no single standard costing system is appropriate for all situations.
      3. This chapter discusses a traditional standard cost system that provides price and quantity standards for each manufacturing cost component and explains how standards are developed and illustrates the information that can be gained from performing a detailed variance analysis.
2. Development of a Standard Cost System
   1. General
      1. A *standard* is a performance benchmark or norm used for planning and control purposes. **Standards** specify the expected costs and quantities needed to manufacture a single unit of product or perform a single service.
      2. A *standard cost system* is a product costing system that determines product cost by using standards or norms for quantities and/or prices of component elements; it allows actual costs to be compared against norms for cost control purposes.
         1. Developing a standard cost involves judgment and practicality in identifying material and labor types, quantities, and prices as well as an understanding of the types of organizational overhead costs and how they behave.
         2. A primary objective in manufacturing a product is to minimize unit cost while achieving certain quality specifications.
         3. After management has determined the input resources needed to achieve desired output quality at reasonable cost, it can develop quantity and price standards.
      3. Standards should be developed by a group, composed of representatives from the following areas: cost accounting, industrial engineering, human resources, data processing, purchasing, and management.
      4. To ensure credibility of the standards and to motivate people to operate as close to the standards as possible, standard-setting involvement of managers and workers whose performance will be compared to standards is vital.
   2. Material standards
      1. The first step in developing material standards is to identify and list the specific direct material components used to manufacture the product. Four things must be known about the materials inputs:
         1. type of material needed;
         2. quality (grade) of material needed;
         3. quantity of material needed; and
         4. price per unit of material (must be based on level of quality specified).
      2. In making quality decisions, managers should remember that as the material grade rises, so generally does price; decisions about material inputs usually seek to balance the relationships of price, quality, and projected selling prices with company objectives.
      3. The **bill of materials** is a document that contains specifications for materials, including quality and quantity (See text **Exhibit 7.2 p. 249**).
         1. Companies often make allowances for normal waste of components.
         2. Purchasing agents should be aware of company purchasing habits and of alternative suppliers and such information should be incorporated into price standards.
      4. Rather than considering only the direct purchase price of an input, purchasing agents now try to estimate and minimize the **total cost of ownership**, which includes price, freight/duty/tax charges, payment and discounts terms, inventory storage costs, scrap rates, rebates or special incentives, warranties, and disposal costs.
      5. When all quantity and price information is available, component quantities are multiplied by unit prices to obtain the total cost of each component. These totals are summed to determine the total standard material cost of one unit of product.
   3. Labor Standards
      1. The development of labor standards requires the same basic procedures as those used for materials.
      2. Each production operation performed by workers or by machinery should be identified.
         1. All unnecessary movements of workers and of material should be disregarded when time standards are set.
      3. To develop effective standards, a company must obtain quantitative information for each production operation. **Methods-time measurement** is an industrial engineering process that analyzes work tasks to determine the time a trained worker takes to perform a given operation at a rate that can be sustained for an eight-hour workday.
      4. After an analysis of labor tasks is completed, an **operations flow document** can be prepared which lists all operations necessary to make one unit of product (or perform a specific service) and the corresponding time allowed for each operation. (See text **Exhibit 7.3 p. 250**.)
      5. Labor rate standards should reflect the wages paid to employees who perform the various production tasks as well as the related employer costs such as fringe benefits, FICA, and unemployment taxes.
         1. A weighted average rate, computed as the total wage cost per hour divided by the number of workers, should be used if employees are paid different wage rates.
      6. When time and rate information are available, job task times are multiplied by wage rates to generate the total cost of each operation. Theses totals are summed to obtain the total standard labor cost for one unit of product.
   4. Overhead standards
      1. Overhead should be assigned to separate cost pools based on the cost drivers, and allocations to products are made using various activity drivers in order to provide the most appropriate costing information.
      2. The development of the bill of materials, operations flow document, and predetermined overhead rates is followed by the preparation of a **standard cost card**, which summarizes all standard quantities and costs needed to complete one unit of product. (See text **Exhibit 7.4 p. 251**.)
      3. Both actual and standard costs are recorded in a standard cost system. But standard costs, rather than actual costs, are charged to the Raw (Direct) Material, Work in Process, and Finished Goods Inventory accounts with any differences between actual and standard costs reported as variances.

**LO.3: How are material, labor, and overhead variances calculated and recorded?**

1. General Variance Analysis Model
   1. General
      1. A **total variance** is the difference between total actual cost for the production inputs and the total standard cost applied to the production output:

Actual cost of actual input – Standard cost of actual output

* + 1. Total variances indicate differences between actual and expected production costs, but they do not provide useful information for determining why such differences occurred. Thus, total variances are subdivided into price and usage variances in order to help managers accomplish their control objectives:
       1. A price (or rate) variance reflects the difference between the actual price (AP) paid for inputs and the standard input price (SP) for the actual quantity (AQ) of inputs used during the period:
          - Price (or Rate) Variance = (AP – SP)(AQ)
       2. A usage (quantity or efficiency) variance shows the difference between the actual quantity (AQ) of inputs used and the standard quantity (SQ) of inputs allowed for the actual output achieved during the period. Usage variances focus on the efficiency of results—the relationship of inputs to outputs:
          - Quantity (or Efficiency) Variance = (AQ – SQ) (SP)
    2. The **standard quantity (SQ)** is the quantity of input that should have been used to achieve the actual output.
    3. Variances occur when the actual price or quantity amounts differ from standard.
       1. Variances are labeled “unfavorable” if the actual price or quantity amounts are higher than the standard price or quantity amounts; variances are labeled “favorable” when the actual price or quantity amounts are lower than the standard amounts.
       2. The terms favorable and unfavorable do not necessarily equate to good and bad performance, respectively.
       3. A total variance can be computed for each production cost element (DM, DL, OH).

1. Material and Labor Variance Computations
   1. Material Variances
      1. Text **Exhibit 7.5 (p. 253)** presents the standard cost card for a mountain bike made by Salinas Corporation as well as actual costs and quantities used. This information is used in the text narrative to illustrate variance analysis.
      2. The total *material variance* can be subdivided into the *material price variance* and the *material quantity variance:*

AP × AQ SP × AQ SP × SQ

Material Material

Price Variance Quantity Variance

Total Material Variance

* + 1. The **material price variance** **(MPV)** indicates whether the amount paid for material was less than or more than standard price.
       1. This variance is usually the responsibility of the purchasing manager.
    2. The **material quantity variance (MQV)** indicates whether the actual quantity used was less than or more than the standard quantity for the actual output achieved.
       1. This variance is usually the responsibility of the production manager.
    3. The **total material variance (TMV)** is the summation of the individual variances or can also be calculated by subtracting the total standard cost from the total actual cost.
    4. Price and quantity variance computations must be made for each direct material component and these component variances are summed to obtain the total price and quantity variances (although such a sum does not provide useful information for cost control).
  1. Point of Purchase Material Variance Model
     1. When the quantity of material purchased is not the same as the quantity of material placed into production, the general variance model can be easily modified to isolate material price variances as early as possible to provide more rapid information for management control purposes.
        1. Because the material price variance relates to the purchasing (rather than the production) function, the point of purchase model calculates the material price variance using the quantity of materials purchased (Qp) rather than the quantity of materials used (Qu).
     2. The total *material variance* can be subdivided into the *material purchase price variance* and the *material price usage variance:*

AP × AQP SP × AQP

Material Price Variance

SP × AQU SP × SQ

Material Quantity Variance

* + 1. The *material purchase price variance* is the materials price variance when computed based on the quantity of materials purchased during the period rather than the quantity of materials used*.*
    2. The *material quantity variance* is the material usage variance when computed based on the quantity of materials used during the period.
    3. Note that because the price and quantity variances have been computed using different bases, they should not be summed to determine a total material variance under this method.
  1. Labor Variances
     1. The total *labor variance* can be subdivided into the *labor rate variance* and the *labor efficiency variance*.

AP × AQ SP × AQ SP × SQ

Labor Labor

Rate Variance Efficiency Variance

Total Labor Variance

* + 1. The **labor rate variance** **(LRV)** is the difference between the actual wages paid to labor for the period and the standard cost of actual hours worked.
    2. The **labor efficiency** **variance (LEV)** indicates whether the amount of time worked was less than or more than the standard quantity for the actual output.
    3. The **total labor variance** is the summation of the individual variances or can also be calculated by subtracting the total standard cost from the total actual cost.
    4. Note that because the rate and efficiency variances have been computed using the same base (actual hours), they may be summed to determine a total labor variance.

1. Overhead Variances
   1. Overhead Variances
      1. Because total variable overhead changes in direct relationship with changes in activity and fixed overhead per unit changes inversely with changes in activity, a specific capacity level must be selected to compute budgeted overhead costs and to develop a predetermined overhead (OH) rate.
         1. *Capacity* refers to any measure of activity. The most common capacity measures are theoretical capacity, practical capacity, normal capacity, and expected capacity.
      2. If the company uses separate variable and fixed overhead application rates, separate price and usage components are calculated for each type of overhead. This four-variance approach provides managers the greatest detail and, thus, the greatest flexibility for control and performance evaluation.
   2. Variable Overhead
      1. The *total variable overhead variance* is the difference between actual variable overhead costs incurred for the period and standard variable overhead cost applied to the period’s actual production or service output.

Actual VOH Budgeted VOH Applied VOH  
 (for actual activity) (for standard quantity allowed)

AP × AQ SP × AQ SP × SQ

VOH VOH

Spending Variance Efficiency Variance

Total VOH Variance

(Underapplied or Overapplied VOH)

* + 1. The **variable overhead spending variance** is the difference between total actual variable overhead and the budgeted amount of variable overhead based on actual hours; it is caused by both component price and volume differences.
       1. Variable overhead spending variances associated with price differences can occur because, over time, changes in VOH prices have not been included in the standard rate.
       2. Variable overhead spending variances associated with quantity differences can be caused by waste or shrinkage of production inputs (such as indirect material).
    2. The **variable overhead efficiency variance** is the difference between budgeted variable overhead based on actual hours and variable overhead applied based on standard hours allowed for the production achieved.
       1. This variance quantifies the effect of using more or less of the activity or resource which is the base for variable overhead application. When actual input exceeds standard input allowed, production operations are considered to be inefficient. Excess input also indicates that an increased VOH budget is needed to support the additional activity base being used.
  1. Fixed Overhead
     1. The *total fixed overhead variance* is the difference between actual fixed overhead costs incurred and standard fixed overhead cost applied to the period’s actual production.

Actual FOH Budgeted FOH Applied FOH   
 (for standard quantity allowed)

SP × SQ

FOH

Spending Variance Volume Variance

Total FOH Variance

(Underapplied or Overapplied FOH)

* + 1. The left column is simply the total actual fixed overhead incurred. The middle column, budgeted FOH, is a constant amount throughout the relevant range of activity and was the amount used to developed the predetermined FOH rate; thus, this amount is a constant figure regardless of the actual quantity of input or the standard quantity of input allowed. The right column is the amount of fixed overhead applied to production based on the standard fixed overhead rate and standard quantity allowed.
    2. The **fixed overhead spending variance** is the difference between the total actual fixed overhead and budgeted fixed overhead.
       1. This variance amount normally represents the differences between budgeted and actual costs for the numerous FOH components, although it can also reflect resource mismanagement.
    3. The fixed overhead **volume variance** is the difference between budgeted and applied fixed overhead.
       1. Although capacity utilization is controllable to some degree, the volume variance is the one over which managers have the least influence and control, especially in the short run and for that reason the volume variance is also called the **noncontrollable variance.**
       2. The volume variance merely translates under-or-over-utilization into a dollar amount. An unfavorable volume variance indicates less-than-expected utilization of capacity. If available capacity is commonly being used at a level higher (or lower) than that which was anticipated or is available, managers should investigate and initiate appropriate action.
  1. Alternative Overhead Variance Approaches
     1. A four-variance approach can be used only if the accounting system distinguishes between variable and fixed costs.
     2. The **total overhead variance** is the difference between total actual overhead and total applied overhead, and is the only variance computed under the *one-variance approach:*

Actual Overhead Applied Overhead

(Variable OH + Fixed OH) (SP × SQ)

Total Overhead Variance

* + 1. A middle column representing *budgeted overhead based on standard quantity* is inserted between *total actual overhead* and *total applied overhead* under the *two-variance approach:*

Actual Overhead Budgeted OH

(Variable OH (for standard Applied OH

+ Fixed OH) quantity) SP × SQ

Budget Variance Volume Variance

(or Controllable (or Noncontrollable

Variance) Variance)

Total Overhead Variance

* + - 1. The **budget variance** is the difference between total actual overhead and budgeted overhead based on standard hours allowed for the production achieved; it is computed as part of the two-variance analysis; it is also referred to as the **controllable variance**.
      2. The *volume variance* can be computed under the four-variance, three-variance, or two-variance analysis.
    1. A column representing *budgeted overhead based on actual hours* is inserted immediately to the right of *total actual overhead* under the *three-variance approach*:

Budgeted Budgeted

Actual Overhead Overhead Applied

Overhead (for actual (for actual Overhead

(VOH + FOH) input used) output) (SP × SQ)

Overhead Overhead Overhead

Spending Efficiency Volume

Variance Variance Variance

Total Overhead Variance

* + - 1. The **overhead spending variance** is the difference between *total actual overhead* and *total budgeted overhead at actual input activity*;thus, a flexible budget is required. It is computed as part of the *three-variance analysis*; it is equal to the sum of the variable and fixed overhead spending variances.
      2. The **overhead efficiency variance** is the difference between *total budgeted overhead at actual input activity* and *total budgeted overhead at standard input allowed* (output activity); it is computed as part of the *three-variance analysis*; it is the same as *variable overhead efficiency variance.*
    1. Text **Exhibit 7.6 (p. 262)** shows the interrelationships of overhead variances.

1. Standard Cost System Journal Entries
   1. Standard cost system journal entries are presented in text **Exhibit 7.7 (p. 263).**
   2. Note that unfavorable variances have debit balances while favorable variances have credit balances.
   3. Although standard costs are useful for internal reporting, they can be used in financial statements only if the amounts are substantially equivalent to those that would have resulted from using an actual cost system.
2. Disposition of Standard Cost Variances
   1. At year-end, adjusting entries are made to eliminate standard cost variances. The entries depend on whether the variances are, in total, insignificant or significant.
      1. If insignificant, unfavorable variances are closed as debits to Cost of Goods Sold; favorable variances are credited to Cost of Goods Sold.
      2. If significant, variances are prorated at year-end among ending inventories and Cost of Goods Sold so that the balances in those accounts approximate actual costs.
         1. Proration is based on the relative size of the account balances as illustrated in the example provided in the text narrative (pp. 264-5).

**LO. 4: How have the setting and use of standards changed over time?**

1. Changes in Standards Usage
   1. Use of Ideal Standards and Theoretical Capacity
      1. Many accountants and business people believe that incorrect measurements are sometimes employed in utilizing variances for control and performance evaluation purposes.
      2. The Japanese philosophy is a notable exception to the practice of not using ideal or theoretical standards for performance evaluation.
         1. The just-in-time (JIT) production system and total quality management (TQM) concepts both have goals of zero defects, zero inefficiency, and zero downtime.
      3. Ideal standards become expected standards under such a system, and there is no (or only minimal) level of acceptable deviation from standard.
      4. Implementing ideal standards requires that employees communicate and work together to improve performance:
         1. Current problems must be identified and their causes must be pinpointed.
         2. Management must be willing to invest in those plant and equipment items, equipment rearrangements, worker training and/or pay increases, vendor changes, and so on that will make it possible to achieve ideal standards.
         3. Training is essential if workers are to perform at high levels of efficiency.
      5. Setting standards at the ideal level in part assigns the responsibility for quality to workers.
         1. Thus, management must empower workers with the authority to react effectively to problems since management has delegated the responsibility for quality to the workers.
         2. Management must provide rewards for achievement since people are required to work at their maximum potential.
      6. The process of implementing ideal standards is illustrated in text **Exhibit 7.8 (p. 266)**.
      7. World-class companies can also use theoretical capacity to set fixed overhead rates.
         1. Such a capacity measure would provide the lowest and most appropriate predetermined OH rate.
         2. Any underapplied OH resulting from a difference between theoretical and actual capacity would indicate capacity that should be either used or eliminated or it could indicate human capabilities that have not been fully developed.
         3. Any end-of-period underapplied OH would be viewed as a period cost and closed to a loss account to attract managerial attention to the inefficient and ineffective use of resources.
      8. Standards are slowly moving away from the practical and closer to the ideal in order for American companies to compete in global markets.
   2. Adjusting Standards
      1. Standards were traditionally set and retained for at least one year.
      2. The current business environment changes so swiftly that a standard might not be useful for management control purposes during the entire year.
      3. Management can either decide to ignore such changes or to incorporate the changes in the standard. Changing the standards to reflect the changes in prices or quantities would make some aspects of management control and performance evaluation more effective and others more difficult.
      4. Management may also consider the original standards to be “frozen” for budget purposes and prepare a revised budget using the new current standards.
         1. A combined “frozen” and revised budget system is depicted in text **Exhibit 7.9 (p. 268)**.
   3. Material Price Variance Based on Purchases Rather than Usage
      1. The material price variance calculation has usually been based on purchases rather than on usage.
      2. The variance is computed as quickly as possible relative to the incurrence of cost.
      3. Such variance calculation at the point of purchase does allow the manager to measure the impact of buying decisions more rapidly, but may not be relevant in a JIT environment.
      4. A material price variance computation based on purchases may lessen the probability of recognizing a relationship between a favorable material price variance and an unfavorable material quantity variance.
   4. Decline in Direct Labor
      1. The necessity for direct labor variance calculations will be minimized as the percentage of total product cost represented by direct labor cost declines.
      2. Direct labor cost may become a small part of a conversion cost category.
      3. An increase in automation often relegates labor to an indirect category since workers become machine overseers rather than product producers.

**LO.5: How does the use of a single conversion element (rather than the traditional labor and overhead elements) affect standard costing?**

1. Conversion Cost as an Element in Standard Costing
   1. Direct labor cost usually represents an extremely small part of total product cost in highly automated factories.
      1. One worker may oversee a large number of machines and deal mainly with trouble-shooting machinery malfunctions.
      2. The worker’s wages may be more closely related to indirect labor rather than to direct labor.
   2. Many companies have responded to overhead costs being so much larger than direct labor costs by adapting their standard cost systems to provide for only two elements of product cost: direct material and conversion.
      1. Conversion costs are likely to be separated into their variable and fixed components.
      2. Conversion costs are also likely to be separated into direct and indirect categories based on their ability to be traced to a machine rather than to a product.
   3. Variance analysis for conversion cost in automated plants usually focuses on:
      1. Spending variances for overhead costs;
      2. Efficiency variances for machinery and production costs rather than labor costs; and
      3. Volume variance for production.
   4. In automated systems, managers are better able to control not only the spending and efficiency variances but also the volume variance.
   5. The analysis is similar to the traditional three-variance overhead approach.
      1. See text **Exhibit 7.10 (p. 269)** for an illustration of variance analysis under a conversion cost approach.

**LO.6: (Appendix) How are variances affected by multiple material and labor categories?**

1. Mix and Yield Variances
   1. Mix and Yield Variances
      1. A **mix** is any possible combination of materials or labor inputs.
      2. A **yield** is the quantity of output that results from a specified input.
      3. Text **Exhibit 7.11 (p. 271)** provides standard and actual information for an example discussed in the text narrative.
   2. Material Price, Mix, and Yield Variances
      1. A material price variance shows the dollar effect of paying prices that differ from the raw material standard.
      2. The **material mix variance** measures the monetary effect of substituting a nonstandard mix of materials; (actual mix × actual quantity × standard price) minus (standard mix × actual quantity × standard price).
      3. The **material yield variance** is the difference between the actual total quantity of input and the standard total quantity allowed based on output and uses standard mix and standard prices to determine variance; (standard mix × actual quantity × standard price) minus (standard mix × standard quantity × standard price).
      4. Text **Exhibit 7.12 (p. 272)** presents the computations for the material variances.
   3. Labor Rate, Mix, And Yield Variances
      1. The **labor mix variance** presents the financial effect associated with changing the proportionate amount of higher or lower paid workers in production; (actual mix × actual hours × standard rate) minus (standard mix × actual hours × standard rate).
      2. The **labor yield variance** shows the monetary impact of using more or fewer total hours than the standard allowed; (standard mix × actual hours × standard rate) minus (standard mix × standard hours × standard rate).
      3. Text **Exhibit 7.13 (p. 273)** presents the computations for the labor variances.
   4. Because there are trade-offs in mix and yield when component qualities and quantities are changed, management should observe the integrated nature of price, mix, and yield.
      1. The effects of changes of one element on the other two need to be considered for managing cost efficiency and output quality.
      2. If mix and yield can be increased by substituting less expensive resources while maintaining quality, then the standards and proportions of components should be changed.
      3. If costs are reduced but quality is maintained, selling prices may be reduced to gain a larger market share.

**Multiple Choice Questions**

1. (LO.2) Select the correct statement regarding standards.
   1. A standard is a benchmark or norm used for planning and control.
   2. The difference between standard cost and actual cost is referred to as a variance.
   3. Standards are developed for materials, labor, and overhead.
   4. All of the above
2. (LO.2) The document that summarizes the expected quantities and costs needed to produce a unit is called a
   1. bill of materials.
   2. total cost of ownership document.
   3. operations flow document.
   4. standard cost card.
3. (LO.3) This month R Company planned to produce 3,000 units of its product. The standard cost card calls for six pounds of material at $.30 per pound. Actual production for the month was 3,100 units, resulting in a favorable price variance of $380 and an unfavorable quantity variance of $120. Based on these variances, one could conclude that:
   1. more materials were purchased than were used.
   2. the actual cost of material was less than the standard cost.
   3. the actual usage of material was less than the standard allowed.
   4. the actual cost and usage of material were both less than standard.
4. (LO.3) An unfavorable direct labor efficiency variance could be caused by a (n):
   1. unfavorable variable overhead spending variance.
   2. unfavorable fixed overhead volume variance.
   3. unfavorable material usage variance.
   4. favorable fixed overhead volume variance.
5. (LO.3) The flexible budget for the month of August was for 9,000 units with direct material at $15 per unit. Direct labor was budgeted at 45 minutes per unit for a total of $81,000. Actual output for the month was 8,500 units with $127,500 in direct material and $77,775 in direct labor expense. Direct labor hours of 6,375 were actually worked during the month. Variance analysis would show:
   1. a favorable direct labor efficiency variance of $1,275.
   2. an unfavorable direct labor efficiency variance of $1,275.
   3. an unfavorable direct labor rate variance of $1,275.
   4. none of the above.
6. (LO.3) The total fixed overhead variance is the:
   1. measure of the lost profits from the lack of sales volume.
   2. amount of the underapplied or overapplied fixed overhead costs.
   3. potential cost reduction that can be achieved from better cost control.
   4. measure of production inefficiency.
7. (LO.3) Variable overhead is applied on the basis of standard direct labor hours. If the direct labor efficiency variance is favorable, the variable overhead efficiency variance will be:
   1. unfavorable.
   2. favorable.
   3. zero.
   4. the same amount as the labor efficiency variance.
8. (LO.3) Y Company’s product has a labor standard of 2 hours per unit. For 2011, it estimates its production will be 200,000 units (400,000 DLHs). It budgets total overhead at $900,000, which results in a fixed overhead rate of $1.50 per hour. Actual data for the year include: Actual production, 198,000 units (440,000 DLHs), Actual variable overhead, $352,000, Actual fixed overhead, $575,000 The variable overhead efficiency variance for the year is:
   1. $66,000 unfavorable.
   2. $35,520 favorable.
   3. $33,000 favorable.
   4. $33,000 unfavorable.
9. (LO.1) Standard cost systems should be used for all of the following reasons *except*:
   1. motivation.
   2. decision-making.
   3. establishing blame.
   4. clerical efficiency.
10. (LO.1) Select the correct statement from the following.
    1. An extremely favorable variance is not necessarily a good variance.
    2. There is a movement in practice toward reporting variances less often than in the past.
    3. Only unfavorable variances need to be investigated.
    4. For proper performance evaluation to be made, responsibility for variances should not be traced to specific managers.
11. (LO.4) The best basis upon which cost standards should be set to measure controllable production *inefficiencies* is:
    1. engineering standards based on attainable performance.
    2. normal capacity.
    3. engineering standards.
    4. ideal capacity.
12. (LO.5) Variance analysis for conversion cost in automated plants normally focuses on:
    1. spending variances for overhead costs.
    2. efficiency variances for machinery and production costs rather than labor costs.
    3. volume variance for production.
    4. all of the above.
13. (LO.6) (Appendix) A possible combination of materials or labor is called
    1. materials-time measurement.
    2. yield.
    3. mix.
    4. conversion.
14. (LO.6) (Appendix) A measure of the difference between the actual total quantity of input and the standard total quantity allowed based on output is called the
    1. mix variance.
    2. yield variance.
    3. volume variance.
    4. none of the above.
15. (LO.6) (Appendix) Select the correct equation for the labor mix variance.
    1. (Actual mix x Actual hours x Actual rate) – (Actual mix x Actual hours x Standard rate)
    2. (Actual mix x Actual hours x Standard rate) – (Actual mix x Actual hours x Standard rate)
    3. (Actual mix x Actual hours x Standard rate) – (Standard mix x Actual hours x Standard rate)
    4. (Standard mix x Actual hours x Standard rate) – (Standard mix x Standard hours x Standard rate)

**Multiple Choice Solutions**

1. d
2. d
3. b
4. c
5. c

AP × AQ SP × AQ SP × SQ

$12.20 × 6,375 $12.00 × 6,375 $12.00 × 6,375

$77,775 $76,500 $76,500

$1,275 U $-0-

Labor Rate Variance Labor Efficiency Variance

**$1,275 U**

Total Labor Variance

1. b
2. b
3. d

Flexible Budget

Based on Input (Output Measure)

(SP × AQ) (SP × SQ)

($0.75 × 440,000 LHs) ($0.75 × 396,000 LHs)

$330,000 $297,000

**$33,000 U**

VOH

1. c
2. a
3. a
4. d
5. c
6. b
7. c