

Chapter 25

Standard Costs and Balanced Scorecard

STUDY OBJECTIVES

After studying this chapter, you should be able to:

- 1 Distinguish between a standard and a budget.
- 2 Identify the advantages of standard costs.
- 3 Describe how companies set standards.
- 4 State the formulas for determining direct materials and direct labor variances.
- 5 State the formula for determining the total manufacturing overhead variance.
- 6 Discuss the reporting of variances.
- 7 Prepare an income statement for management under a standard costing system.
- 8 Describe the balanced scorecard approach to performance evaluation.



The Navigator

Scan Study Objectives	■
Read Feature Story	■
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Read text and answer DO IT! p. 1115 ■ p. 1118 ■ p. 1122 ■ p. 1127 ■	■
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Review Summary of Study Objectives	■
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Feature Story

HIGHLIGHTING PERFORMANCE EFFICIENCY

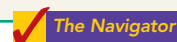
There's a very good chance that the highlighter you're holding in your hand was made by **Sanford** (www.sanfordcorp.com), a maker of permanent markers and other writing instruments. Sanford, headquartered in Illinois, annually sells hundreds of millions of dollars' worth of Accent[®] highlighters, fine-point pens, Sharpie permanent markers, Expo dry-erase markers for overhead projectors, and other writing instruments.

Since Sanford makes literally billions of writing utensils per year, the company must keep tight control over manufacturing costs. A very important part of Sanford's manufacturing process is determining how much direct materials, labor, and overhead should cost. The company then compares these costs to actual costs to assess performance efficiency. Raw materials for Sanford's markers include a barrel, plug, cap, ink reservoir, and a nib (tip). Machines assemble these parts to produce thousands of units per hour. A major component of manufacturing overhead is machine maintenance—some fixed, some variable.



"Labor costs are associated with material handling and equipment maintenance functions. Although the assembly process is highly automated, labor is still required to move raw materials to the machine and to package the finished product. In addition, highly skilled technicians are required to service and maintain each piece of equipment," says Mike Orr, vice president, operations.

Labor rates are predictable because the hourly workers are covered by a union contract. The story is the same with the fringe benefits and some supervisory salaries. Even volume levels are fairly predictable—demand for the product is high—so fixed overhead is efficiently absorbed. Raw material standard costs are based on the previous year's actual prices plus any anticipated inflation. For the past several years, though, inflation had been so low that the company was considering any price increase in raw material to be unfavorable because its standards remained unchanged.



Inside Chapter 25...

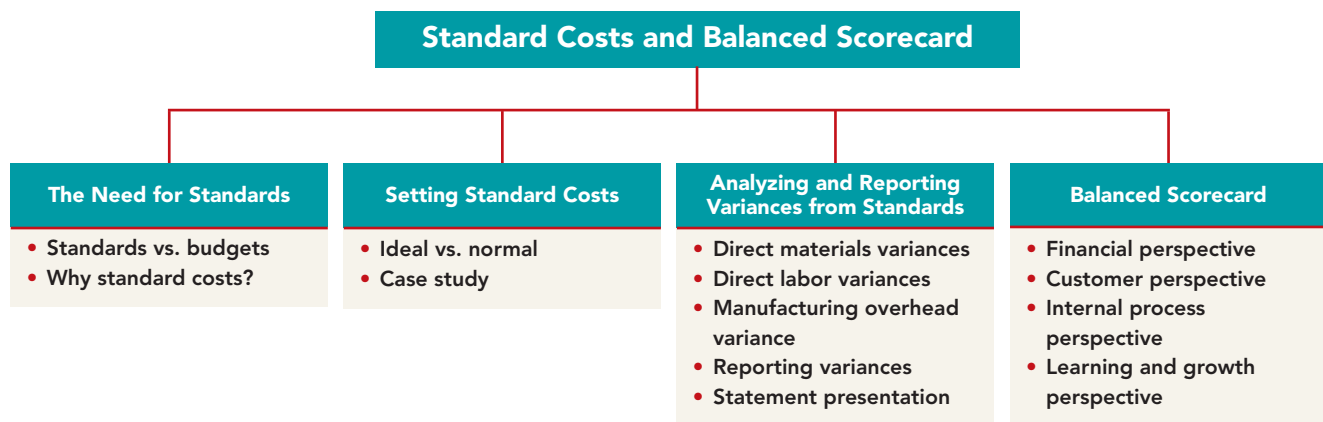
- **How Can We Make Susan's Chili Profitable?** (p. 1115)
- **It May Be Time to Fly United Again** (p. 1126)

Preview of Chapter 25

Standards are a fact of life. You met the admission standards for the school you are attending. The vehicle that you drive had to meet certain governmental emissions standards. The hamburgers and salads you eat in a restaurant have to meet certain health and nutritional standards before they can be sold. As described in our Feature Story, **Sanford Corp.** has standards for the costs of its materials, labor, and overhead. The reason for standards in these cases is very simple: They help to ensure that overall product quality is high while keeping costs under control.

In this chapter we continue the study of controlling costs. You will learn how to evaluate performance using standard costs and a balanced scorecard.

The content and organization of Chapter 25 are as follows.



THE NEED FOR STANDARDS

Standards are common in business. Those imposed by government agencies are often called **regulations**. They include the Fair Labor Standards Act, the Equal Employment Opportunity Act, and a multitude of environmental standards. Standards established internally by a company may extend to personnel matters, such as employee absenteeism and ethical codes of conduct, quality control standards for products, and standard costs for goods and services. In managerial accounting, **standard costs** are predetermined unit costs, which companies use as measures of performance.

We will focus on manufacturing operations in this chapter. But you should also recognize that standard costs also apply to many types of service businesses as well. For example, a fast-food restaurant such as **McDonald's** knows the price it should pay for pickles, beef, buns, and other ingredients. It also knows how much time it should take an employee to flip hamburgers. If the company pays too much for pickles or if employees take too much time to prepare Big Macs, McDonald's notices the deviations and takes corrective action. Not-for-profit enterprises such as universities, charitable organizations, and governmental agencies also may use standard costs.

Distinguishing between Standards and Budgets

Both **standards** and **budgets** are predetermined costs, and both contribute to management planning and control. There is a difference, however, in the way the terms are expressed. A standard is a **unit** amount. A budget is a **total** amount. Thus, it is customary to state that the **standard cost** of direct labor for a unit of product is, say, \$10. If the company produces 5,000 units of the product, the \$50,000 of direct labor is the **budgeted** labor cost. A standard is the budgeted **cost per unit** of product. A standard is therefore concerned with each individual cost component that makes up the entire budget.

There are important accounting differences between budgets and standards. Except in the application of manufacturing overhead to jobs and processes, budget data are not journalized in cost accounting systems. In contrast, as we illustrate in the appendix to this chapter, standard costs may be incorporated into cost accounting systems. Also, a company may report its inventories at standard cost in its financial statements, but it would not report inventories at budgeted costs.

STUDY OBJECTIVE 1

Distinguish between a standard and a budget.


Why Standard Costs?

Standard costs offer a number of advantages to an organization, as shown in Illustration 25-1.


Illustration 25-1

Advantages of standard costs


Advantages of standard costs



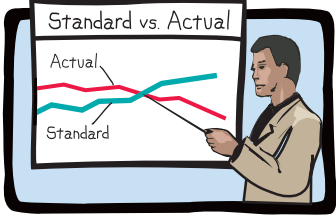
Facilitate management planning



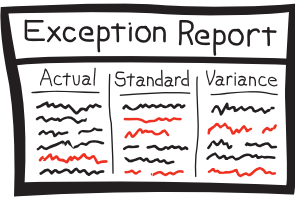
Promote greater economy by making employees more "cost-conscious"




Useful in setting selling prices



Contribute to management control by providing basis for evaluation of cost control



Useful in highlighting variances in management by exception



Simplify costing of inventories and reduce clerical costs

The organization will realize these advantages only when standard costs are carefully established and prudently used. Using standards solely as a way to place blame can have a negative effect on managers and employees. To minimize this effect, many companies offer wage incentives to those who meet the standards.

STUDY OBJECTIVE 2

Identify the advantages of standard costs.

SETTING STANDARD COSTS—A DIFFICULT TASK

STUDY OBJECTIVE 3

Describe how companies set standards.

The setting of standard costs to produce a unit of product is a difficult task. It requires input from all persons who have responsibility for costs and quantities. To determine the standard cost of direct materials, management consults purchasing agents, product managers, quality control engineers, and production supervisors. In setting the cost standard for direct labor, managers obtain pay rate data from the payroll department. Industrial engineers generally determine the labor time requirements. The managerial accountant provides important input for the standard-setting process by accumulating historical cost data and by knowing how costs respond to changes in activity levels.

To be effective in controlling costs, standard costs need to be current at all times. Thus, standards are under continuous review. They should change whenever managers determine that the existing standard is not a good measure of performance. Circumstances that warrant revision of a standard include changed wage rates resulting from a new union contract, a change in product specifications, or the implementation of a new manufacturing method.

Ideal versus Normal Standards

Companies set standards at one of two levels: ideal or normal. **Ideal standards** represent optimum levels of performance under perfect operating conditions. **Normal standards** represent efficient levels of performance that are attainable under expected operating conditions.

Some managers believe ideal standards will stimulate workers to ever-increasing improvement. However, most managers believe that ideal standards lower the morale of the entire workforce because they are difficult, if not impossible, to meet. Very few companies use ideal standards.

Most companies that use standards set them at a normal level. Properly set, normal standards should be **rigorous but attainable**. Normal standards allow for rest periods, machine breakdowns, and other “normal” contingencies in the production process. In the remainder of this chapter we will assume that standard costs are set at a normal level.



ETHICS NOTE

When standards are set too high, employees sometimes feel pressure to consider unethical practices to meet these standards.

A Case Study

To establish the standard cost of producing a product, it is necessary to establish standards for each manufacturing cost element—direct materials, direct labor, and manufacturing overhead. The standard for each element is derived from the standard price to be paid and the standard quantity to be used.

To illustrate, we look at a case study of how standard costs are set. In this extended example, we assume that Xonic, Inc. wishes to use standard costs to measure performance in filling an order for 1,000 gallons of Weed-O, a liquid weed killer.

DIRECT MATERIALS

The **direct materials price standard** is the cost per unit of direct materials that should be incurred. This standard should be based on the purchasing department’s best estimate of the **cost of raw materials**. This cost is frequently based on current purchase prices. The price standard also includes an amount for related costs such as receiving, storing, and handling. The materials price standard per pound of material for Xonic’s weed killer is:

Item	Price
Purchase price, net of discounts	\$2.70
Freight	0.20
Receiving and handling	0.10
Standard direct materials price per pound	<u><u>\$3.00</u></u>

Illustration 25-2

Setting direct materials price standard

The **direct materials quantity standard** is the quantity of direct materials that should be used per unit of finished goods. This standard is expressed as a physical measure, such as pounds, barrels, or board feet. In setting the standard, management considers both the quality and quantity of materials required to manufacture the product. The standard includes allowances for unavoidable waste and normal spoilage. The standard quantity per unit for Xonic, Inc. is as follows.

Item	Quantity (Pounds)
Required materials	3.5
Allowance for waste	0.4
Allowance for spoilage	0.1
Standard direct materials quantity per unit	<u><u>4.0</u></u>

Illustration 25-3

Setting direct materials quantity standard

The standard direct materials cost per unit is the standard direct materials price times the standard direct materials quantity. For Xonic, Inc., the standard direct materials cost per gallon of Weed-O is \$12.00 ($\3.00×4.0 pounds).

DIRECT LABOR

The **direct labor price standard** is the rate per hour that should be incurred for direct labor. This standard is based on current wage rates, adjusted for anticipated changes such as cost of living adjustments (COLAs). The price standard also generally includes employer payroll taxes and fringe benefits, such as paid holidays and vacations. For Xonic, Inc., the direct labor price standard is as follows.

Item	Price
Hourly wage rate	\$ 7.50
COLA	0.25
Payroll taxes	0.75
Fringe benefits	1.50
Standard direct labor rate per hour	<u><u>\$10.00</u></u>

ALTERNATIVE TERMINOLOGY

The direct labor price standard is also called the *direct labor rate standard*.

Illustration 25-4

Setting direct labor price standard

The **direct labor quantity standard** is the time that should be required to make one unit of the product. This standard is especially critical in labor-intensive companies. Allowances should be made in this standard for rest periods, cleanup, machine setup, and machine downtime. For Xonic, Inc., the direct labor quantity standard is as follows.

Item	Quantity (Hours)
Actual production time	1.5
Rest periods and cleanup	0.2
Setup and downtime	0.3
Standard direct labor hours per unit	<u><u>2.0</u></u>

ALTERNATIVE TERMINOLOGY

The direct labor quantity standard is also called the *direct labor efficiency standard*.

Illustration 25-5

Setting direct labor quantity standard

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The standard direct labor cost per unit is the standard direct labor rate times the standard direct labor hours. For Xonic, Inc., the standard direct labor cost per gallon of Weed-O is \$20 ($\10.00×2.0 hours).

MANUFACTURING OVERHEAD

For manufacturing overhead, companies use a **standard predetermined overhead rate** in setting the standard. This overhead rate is determined by dividing budgeted overhead costs by an expected standard activity index. For example, the index may be standard direct labor hours or standard machine hours.

As discussed in Chapter 21, many companies employ activity-based costing (ABC) to allocate overhead costs. Because ABC uses multiple activity indices to allocate overhead costs, it results in a better correlation between activities and costs incurred than do other methods. As a result, the use of ABC can significantly improve the usefulness of standard costing for management decision making.

Xonic, Inc. uses standard direct labor hours as the activity index. The company expects to produce 13,200 gallons of Weed-O during the year at normal capacity. **Normal capacity** is the average activity output that a company should experience in the long run. Since it takes 2 direct labor hours for each gallon, total standard direct labor hours are 26,400 ($13,200$ gallons $\times 2$ hours).

At normal capacity of 26,400 direct labor hours, overhead costs are expected to be \$132,000. Of that amount, \$79,200 are variable and \$52,800 are fixed. Illustration 25-6 shows computation of the standard predetermined overhead rates for Xonic, Inc.

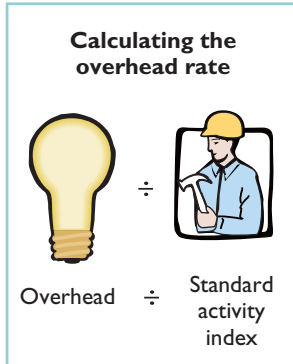


Illustration 25-6
Computing predetermined overhead rates

Budgeted Overhead Costs	Amount	\div	Standard Direct Labor Hours	=	Overhead Rate per Direct Labor Hour
Variable	\$ 79,200		26,400		\$3.00
Fixed	52,800		26,400		2.00
Total	<u>\$132,000</u>		26,400		<u>\$5.00</u>

The standard manufacturing overhead rate per unit is the predetermined overhead rate times the activity index quantity standard. For Xonic, Inc., which uses direct labor hours as its activity index, the standard manufacturing overhead rate per gallon of Weed-O is \$10 ($\5×2 hours).

TOTAL STANDARD COST PER UNIT

After a company has established the standard quantity and price per unit of product, it can determine the total standard cost. The total standard cost per unit is the sum of the standard costs of direct materials, direct labor, and manufacturing overhead. For Xonic, Inc., the total standard cost per gallon of Weed-O is \$42, as shown on the following standard cost card.

Illustration 25-7
Standard cost per gallon of Weed-O

Product: Weed-O		Unit Measure: Gallon		
Manufacturing Cost Elements	Standard Quantity	\times	Standard Price	= Standard Cost
Direct materials	4 pounds		\$ 3.00	\$ 12.00
Direct labor	2 hours		\$ 10.00	\$ 20.00
Manufacturing overhead	2 hours		\$ 5.00	\$ 10.00
				<u>\$42.00</u>

The company prepares a standard cost card for each product. This card provides the basis for determining variances from standards.

MANAGEMENT INSIGHT



How Can We Make Susan's Chili Profitable?

Setting standards can be difficult. Consider **Susan's Chili Factory**, which manufactures and sells chili. The cost of manufacturing Susan's chili consists of the costs of raw materials, labor to convert the basic ingredients to chili, and overhead. We will use materials cost as an example. Managers need to develop three standards: (1) What should be the formula (mix) of ingredients for one gallon of chili? (2) What should be the normal wastage (or shrinkage) for the individual ingredients? (3) What should be the standard cost for the individual ingredients that go into the chili?

Susan's Chili Factory also illustrates how managers can use standard costs in controlling costs. Suppose that summer droughts have reduced crop yields. As a result, prices have doubled for beans, onions, and peppers. In this case, actual costs will be significantly higher than standard costs, which will cause management to evaluate the situation. Similarly, assume that poor maintenance caused the onion-dicing blades to become dull. As a result, usage of onions to make a gallon of chili tripled. Because this deviation is quickly highlighted through standard costs, managers can take corrective action promptly.

Source: Adapted from David R. Beran, "Cost Reduction Through Control Reporting," *Management Accounting*, April 1982, pp. 29–33.



How might management use this raw material cost information?

DO IT!

Ridette Inc. accumulated the following standard cost data concerning product Cty31.

Materials per unit: 1.5 pounds at \$4 per pound

Labor per unit: 0.25 hours at \$13 per hour.

Manufacturing overhead: Predetermined rate is 120% of direct labor cost.

Compute the standard cost of one unit of product Cty31.

Solution

Manufacturing Cost Element	Standard Quantity	×	Standard Price	=	Standard Cost
Direct materials	1.5 pounds		\$4.00		\$6.00
Direct labor	0.25 hours		\$13.00		3.25
Manufacturing overhead	120%		\$3.25		3.90
Total					<u>\$13.15</u>

Related exercise material: BE25-2, E25-1, E25-2, E25-3, and **DO IT!** 25-1.

STANDARD COSTS

action plan

- ✓ Know that standard costs are predetermined unit costs.
- ✓ To establish the standard cost of producing a product, establish the standard for each manufacturing cost element—direct materials, direct labor, and manufacturing overhead.
- ✓ Compute the standard cost for each element from the standard price to be paid and the standard quantity to be used.

ANALYZING AND REPORTING VARIANCES FROM STANDARDS

ALTERNATIVE TERMINOLOGY

In business, the term **variance** is also used to indicate differences between total budgeted and total actual costs.

Illustration 25-8

Actual production costs

One of the major management uses of standard costs is to identify variances from standards. **Variances** are the differences between total actual costs and total standard costs.

To illustrate, we will assume that in producing 1,000 gallons of Weed-O in the month of June, Xonic, Inc. incurred the following costs.

Direct materials	\$13,020
Direct labor	20,580
Variable overhead	6,500
Fixed overhead	4,400
Total actual costs	<u><u>\$44,500</u></u>

Companies determine total standard costs by multiplying the units produced by the standard cost per unit. The total standard cost of Weed-O is \$42,000 (1,000 gallons × \$42). Thus, the total variance is \$2,500, as shown below.

Illustration 25-9

Computation of total variance

Actual costs	\$44,500
Less: Standard costs	<u>42,000</u>
Total variance	<u><u>\$ 2,500</u></u>

Note that the variance is expressed in total dollars, and not on a per unit basis.

When actual costs exceed standard costs, the variance is **unfavorable**. The \$2,500 variance in June for Weed-O is unfavorable. An unfavorable variance has a negative connotation. It suggests that the company paid too much for one or more of the manufacturing cost elements or that it used the elements inefficiently.

If actual costs are less than standard costs, the variance is **favorable**. A favorable variance has a positive connotation. It suggests efficiencies in incurring manufacturing costs and in using direct materials, direct labor, and manufacturing overhead.

However, be careful: A favorable variance could be obtained by using inferior materials. In printing wedding invitations, for example, a favorable variance could result from using an inferior grade of paper. Or, a favorable variance might be achieved in installing tires on an automobile assembly line by tightening only half of the lug bolts. A variance is not favorable if the company has sacrificed quality control standards.

Direct Materials Variances

STUDY OBJECTIVE 4

State the formulas for determining direct materials and direct labor variances.

In completing the order for 1,000 gallons of Weed-O, Xonic used 4,200 pounds of direct materials. These were purchased at a cost of \$3.10 per unit. The **total materials variance** is computed from the following formula.

Illustration 25-10

Formula for total materials variance

Actual Quantity × Actual Price (AQ) × (AP)	–	Standard Quantity × Standard Price (SQ) × (SP)	=	Total Materials Variance (TMV)
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For Xonic, Inc., the total materials variance is \$1,020 (\$13,020 – \$12,000) unfavorable, as shown below.

$$(4,200 \times \$3.10) - (4,000 \times \$3.00) = \$1,020 \text{ U}$$

Next, the company analyzes the total variance to determine the amount attributable to price (costs) and to quantity (use). The **materials price variance** is computed from the following formula.¹

Actual Quantity × Actual Price (AQ) × (AP)	–	Actual Quantity × Standard Price (AQ) × (SP)	=	Materials Price Variance (MPV)
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Illustration 25-11
Formula for materials price variance

For Xonic, Inc., the materials price variance is \$420 (\$13,020 – \$12,600) unfavorable, as shown below.

$$(4,200 \times \$3.10) - (4,200 \times \$3.00) = \$420 \text{ U}$$

The price variance can also be computed by multiplying the actual quantity purchased by the difference between the actual and standard price per unit. The computation in this case is $4,200 \times (\$3.10 - \$3.00) = \$420 \text{ U}$.

The **materials quantity variance** is determined from the following formula.

HELPFUL HINT

The alternative formula is:

$$\boxed{\text{AQ}} \times \boxed{\text{AP} - \text{SP}} = \boxed{\text{MPV}}$$

Actual Quantity × Standard Price (AQ) × (SP)	–	Standard Quantity × Standard Price (SQ) × (SP)	=	Materials Quantity Variance (MQV)
--	---	--	---	--

Illustration 25-12
Formula for materials quantity variance

For Xonic, Inc., the materials quantity variance is \$600 (\$12,600 – \$12,000) unfavorable, as shown below.

$$(4,200 \times \$3.00) - (4,000 \times \$3.00) = \$600 \text{ U}$$

The price variance can also be computed by applying the standard price to the difference between actual and standard quantities used. The computation in this example is $\$3.00 \times (4,200 - 4,000) = \600 U .

The total materials variance of \$1,020 U, therefore, consists of the following.

HELPFUL HINT

The alternative formula is:

$$\boxed{\text{SP}} \times \boxed{\text{AQ} - \text{SQ}} = \boxed{\text{MQV}}$$

Materials price variance	\$ 420 U
Materials quantity variance	<u>600 U</u>
Total materials variance	<u><u>\$1,020 U</u></u>

Illustration 25-13
Summary of materials variances

Companies sometimes use a matrix to analyze a variance. **When the matrix is used, a company computes the formulas for each cost element first and then computes the variances.** Illustration 25-14 (page 1118) shows the completed matrix for the direct materials variance for Xonic, Inc. The matrix provides a convenient structure for determining each variance.

¹We will assume that all materials purchased during the period are used in production and that no units remain in inventory at the end of the period.

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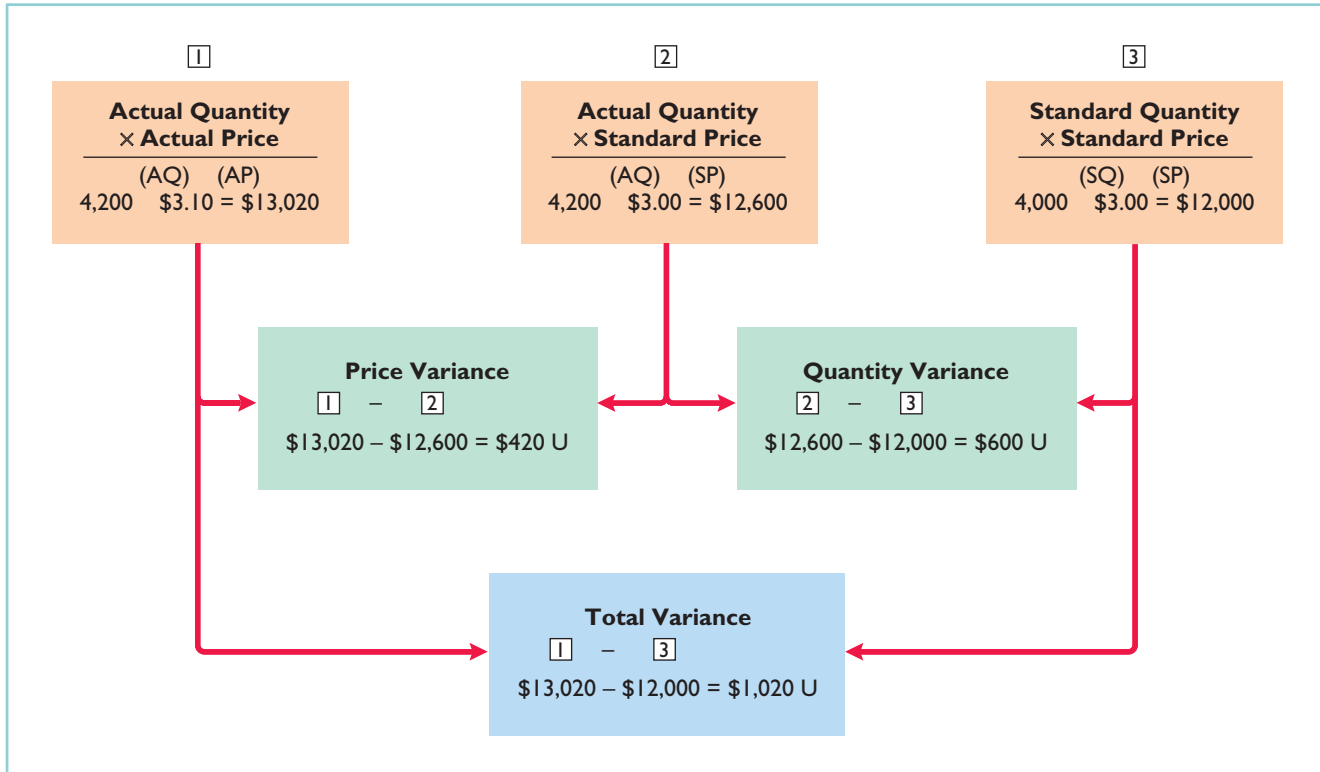


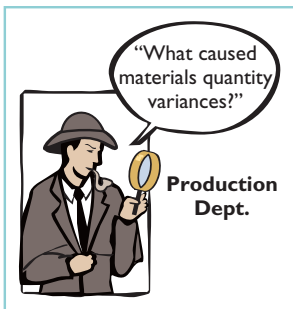
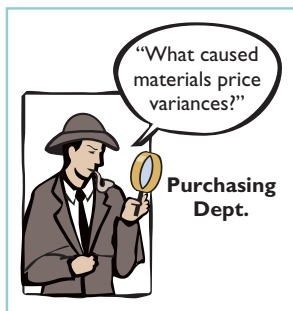
Illustration 25-14
Matrix for direct materials variances

CAUSES OF MATERIALS VARIANCES

What are the causes of a variance? The causes may relate to both internal and external factors. The investigation of a **materials price variance usually begins in the purchasing department**. Many factors affect the price paid for raw materials. These include availability of quantity and cash discounts, the quality of the materials requested, and the delivery method used. To the extent that these factors are considered in setting the price standard, the purchasing department is responsible for any variances.

However, a variance may be beyond the control of the purchasing department. Sometimes, for example, prices may rise faster than expected. Moreover, actions by groups over which the company has no control, such as the OPEC nations' oil price increases, may cause an unfavorable variance. There are also times when a production department may be responsible for the price variance. This may occur when a rush order forces the company to pay a higher price for the materials.

The starting point for determining the cause(s) of an unfavorable **materials quantity variance is in the production department**. If the variances are due to inexperienced workers, faulty machinery, or carelessness, the production department is responsible. However, if the materials obtained by the purchasing department were of inferior quality, then the purchasing department is responsible.



DO IT!

MATERIALS VARIANCES

The standard cost of Product XX includes two units of direct materials at \$8.00 per unit. During July, the company buys 22,000 units of direct materials at \$7.50 and uses those materials to produce 10,000 units. Compute the total, price, and quantity variances for materials.

Solution

Substituting amounts into the formulas, the variances are:

$$\text{Total materials variance} = (22,000 \times \$7.50) - (20,000 \times \$8.00) = \$5,000 \text{ unfavorable.}$$

$$\text{Materials price variance} = (22,000 \times \$7.50) - (22,000 \times \$8.00) = \$11,000 \text{ favorable.}$$

$$\text{Materials quantity variance} = (22,000 \times \$8.00) - (20,000 \times \$8.00) = \$16,000 \text{ unfavorable.}$$

Related exercise material: BE25-4, E25-5, and **DO IT!** E25-2.

action plan

✓ Use the formulas for computing each of the materials variances:

$$\text{Total materials variance} = (\text{AQ} \times \text{AP}) - (\text{SQ} \times \text{SP})$$

$$\text{Materials price variance} = (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP})$$

$$\text{Materials quantity variance} = (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP})$$

**Direct Labor Variances**

The process of determining direct labor variances is the same as for determining the direct materials variances. In completing the Weed-O order, Xonic, Inc. incurred 2,100 direct labor hours at an average hourly rate of \$9.80. The standard hours allowed for the units produced were 2,000 hours (1,000 gallons \times 2 hours). The standard labor rate was \$10 per hour. The **total labor variance** is computed from the following formula.

$$\begin{array}{r} \text{Actual Hours} \\ \times \text{Actual Rate} \\ (\text{AH}) \times (\text{AR}) \end{array} - \begin{array}{r} \text{Standard Hours} \\ \times \text{Standard Rate} \\ (\text{SH}) \times (\text{SR}) \end{array} = \begin{array}{r} \text{Total Labor} \\ \text{Variance} \\ (\text{TLV}) \end{array}$$

Illustration 25-15
Formula for total labor variance

The total labor variance is \$580 (\$20,580 $-$ \$20,000) unfavorable, as shown below.

$$(2,100 \times \$9.80) - (2,000 \times \$10.00) = \$580 \text{ U}$$

The formula for the **labor price variance** is as follows.

$$\begin{array}{r} \text{Actual Hours} \\ \times \text{Actual Rate} \\ (\text{AH}) \times (\text{AR}) \end{array} - \begin{array}{r} \text{Actual Hours} \\ \times \text{Standard Rate} \\ (\text{AH}) \times (\text{SR}) \end{array} = \begin{array}{r} \text{Labor Price} \\ \text{Variance} \\ (\text{LPV}) \end{array}$$

Illustration 25-16
Formula for labor price variance

For Xonic, Inc., the labor price variance is \$420 (\$20,580 $-$ \$21,000) favorable, as shown below.

$$(2,100 \times \$9.80) - (2,100 \times \$10.00) = \$420 \text{ F}$$

The labor price variance can also be computed by multiplying actual hours worked by the difference between the actual pay rate and the standard pay rate. The computation in this example is $2,100 \times (\$10.00 - \$9.80) = \$420 \text{ F}$.

The **labor quantity variance** is derived from the following formula.

$$\begin{array}{r} \text{Actual Hours} \\ \times \text{Standard Rate} \\ (\text{AH}) \times (\text{SR}) \end{array} - \begin{array}{r} \text{Standard Hours} \\ \times \text{Standard Rate} \\ (\text{SH}) \times (\text{SR}) \end{array} = \begin{array}{r} \text{Labor Quantity} \\ \text{Variance} \\ (\text{LQV}) \end{array}$$

Illustration 25-17
Formula for labor quantity variance

HELPFUL HINT

The alternative formula is:

$$\boxed{\text{AH}} \times \boxed{\text{AR} - \text{SR}} = \boxed{\text{LPV}}$$

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For Xonic, Inc., the labor quantity variance is \$1,000 (\$21,000 – \$20,000) unfavorable:
 $(2,100 \times \$10.00) - (2,000 \times \$10.00) = \$1,000 \text{ U}$

HELPFUL HINT
 The alternative formula is:
 $\boxed{\text{SR}} \times \boxed{\text{AH} - \text{SH}} = \boxed{\text{LQV}}$

The same result can be obtained by multiplying the standard rate by the difference between actual hours worked and standard hours allowed. In this case the computation is $\$10.00 \times (2,100 - 2,000) = \$1,000 \text{ U}$.

The total direct labor variance of \$580 U, therefore, consists of:

Illustration 25-18
 Summary of labor variances

Labor price variance	\$ 420 F
Labor quantity variance	<u>1,000 U</u>
Total direct labor variance	<u>\$ 580 U</u>

These results can also be obtained from the matrix in Illustration 25-19.

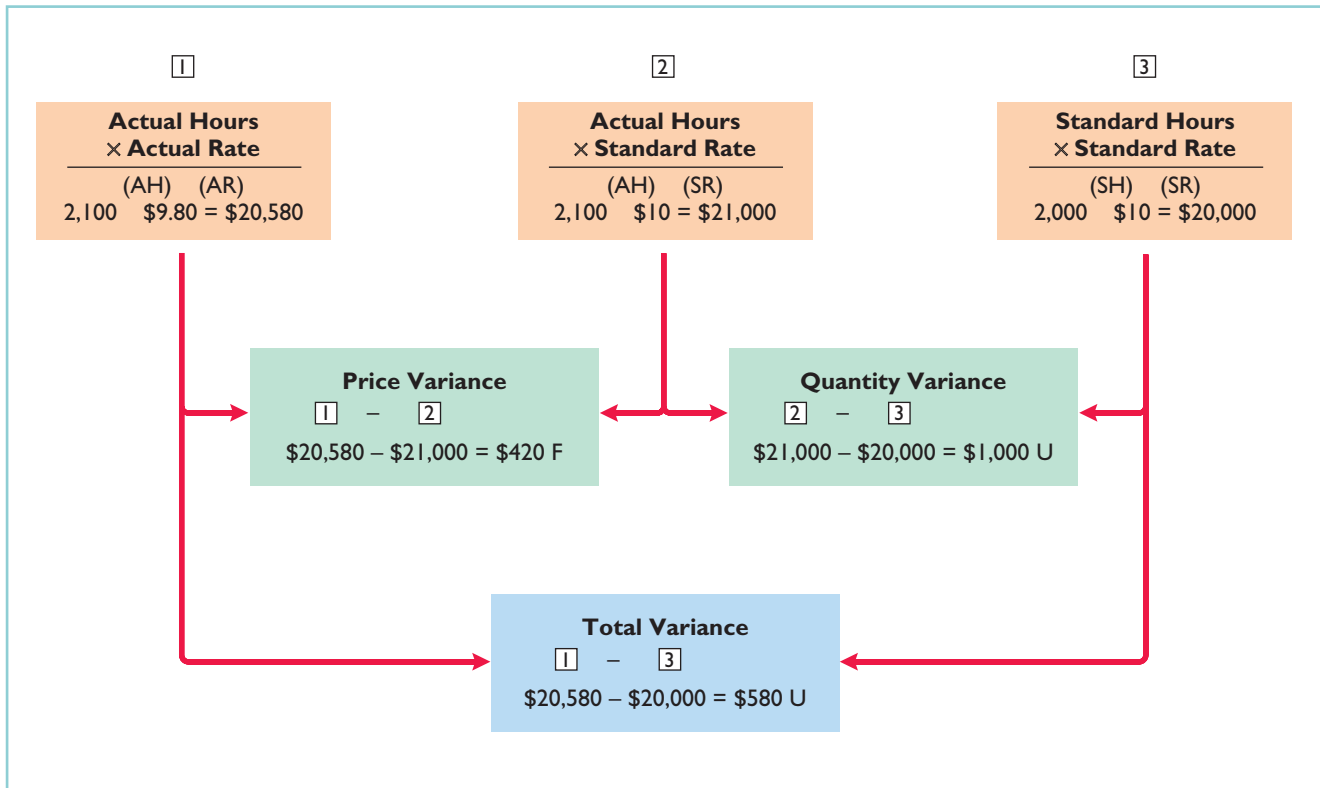
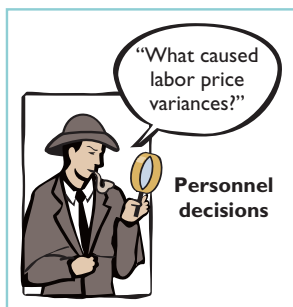


Illustration 25-19
 Matrix for direct labor variances

CAUSES OF LABOR VARIANCES

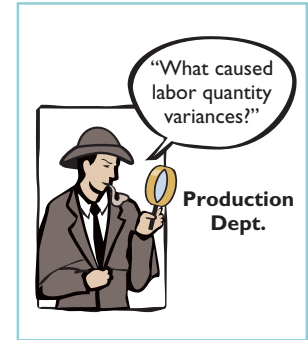
Labor price variances usually result from two factors: (1) paying workers **higher wages than expected**, and (2) **misallocation of workers**. In companies where pay rates are determined by union contracts, labor price variances should be infrequent. When workers are not unionized, there is a much higher likelihood of such variances. The responsibility for these variances rests with the manager who authorized the wage increase.

Misallocation of the workforce refers to using skilled workers in place of unskilled workers and vice versa. The use of an inexperienced worker instead of an experienced one will result in a favorable price variance because of the lower pay rate of the unskilled worker. An unfavorable price variance would result if a skilled worker were



substituted for an inexperienced one. The production department generally is responsible for labor price variances resulting from misallocation of the workforce.

Labor quantity variances relate to the **efficiency of workers**. The cause of a quantity variance generally can be traced to the production department. The causes of an unfavorable variance may be poor training, worker fatigue, faulty machinery, or carelessness. These causes are the responsibility of the **production department**. However, if the excess time is due to inferior materials, the responsibility falls outside the production department.



Manufacturing Overhead Variance

The **total overhead variance** is the difference between the actual overhead costs and overhead costs applied based on standard hours allowed. As indicated in Illustration 25-8, Xonic incurred overhead costs of \$10,900 (\$6,500 + \$4,400) to produce 1,000 gallons of Weed-O in June. The computation of the actual overhead is comprised of a variable and a fixed component. Illustration 25-20 shows this computation.

STUDY OBJECTIVE 5

State the formula for determining the total manufacturing overhead variance.

Variable overhead	\$ 6,500
Fixed overhead	4,400
Total actual overhead	<u>\$10,900</u>

Illustration 25-20
Actual overhead costs

We then determine the overhead costs applied based on standard hours allowed times the predetermined overhead rate. **Standard hours allowed** are the hours that *should* have been worked for the units produced. Because it takes two hours of direct labor to produce one gallon of Weed-O, for the 1,000-gallon Weed-O order, the standard hours allowed are 2,000 hours (1,000 gallons × 2 hours). We then apply the predetermined overhead rate to the 2,000 standard hours allowed.

The predetermined rate for Weed-O is \$5, comprised of a variable overhead rate of \$3 and a fixed rate of \$2. Recall from Illustration 25-6 that the amount of budgeted overhead costs at normal capacity of \$132,000 was divided by normal capacity of 26,400 direct labor hours, to arrive at a predetermined overhead rate of \$5 (\$132,000 ÷ 26,400). The predetermined rate of \$5 is then multiplied by the 2,000 standard hours allowed, to determine the overhead costs applied.

Illustration 25-21 shows the formula for the total overhead variance and the calculation for Xonic, Inc. for the month of June.

Actual Overhead	–	Overhead Applied*	=	Total Overhead Variance
\$10,900 (\$6,500 + \$4,400)	–	\$10,000 (\$5 × 2,000 hours)	=	\$900 U

*Based on standard hours allowed.

Illustration 25-21
Formula for total overhead variance

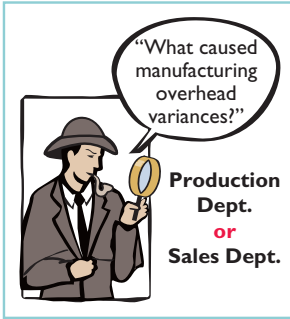
Thus, for Xonic, Inc. the total overhead variance is \$900 unfavorable.

The overhead variance is generally analyzed through a price and quantity variance. The name usually given to the price variance is the **overhead controllable variance**; the quantity variance is referred to as the **overhead volume variance**. Appendix 25B discusses how the total overhead volume variance can be broken down into these two variances.

CAUSES OF MANUFACTURING OVERHEAD VARIANCES

One reason for an overhead variance relates to over- or under-spending on overhead items. For example, overhead may include indirect labor for which a company paid wages higher than the standard labor price allowed. Or the price of electricity to run the company's machines increased, and the company did not anticipate this additional cost. Companies should investigate any spending variances, to determine whether they will continue in the future. Generally, the responsibility for these variances rests with the production department.

The overhead variance can also result from the inefficient use of overhead. For example, because of poor maintenance, a number of the manufacturing machines are experiencing breakdowns on a consistent basis, leading to reduced production. Or the flow of materials through the production process is impeded because of a lack of skilled labor to perform the necessary production tasks, due to a lack of planning. In both of these cases, the production department is responsible for the cause of these variances. On the other hand, overhead can also be underutilized because of a lack of sales orders. When the cause is a lack of sales orders, the responsibility rests outside the production department.



DO IT!

LABOR AND MANUFACTURING OVERHEAD VARIANCES

action plan

✓ Use the formulas for computing each of the variances:

$$\text{Total labor variance} = (\text{AH} \times \text{AR}) - (\text{SH} \times \text{SR})$$

$$\text{Labor price variance} = (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR})$$

$$\text{Labor quantity variance} = (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR})$$

$$\text{Total overhead variance} = \text{Actual overhead} - \text{Overhead applied}^*$$

*Based on standard hours allowed.

The standard cost of Product YY includes 3 hours of direct labor at \$12.00 per hour. The predetermined overhead rate is \$20.00 per direct labor hour. During July, the company incurred 3,500 hours of direct labor at an average rate of \$12.40 per hour and \$71,300 of manufacturing overhead costs. It produced 1,200 units.

(a) Compute the total, price, and quantity variances for labor. (b) Compute the total overhead variance.

Solution

Substituting amounts into the formulas, the variances are:

$$\text{Total labor variance} = (3,500 \times \$12.40) - (3,600 \times \$12.00) = \$200 \text{ Unfavorable}$$

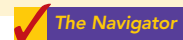
$$\text{Labor price variance} = (3,500 \times \$12.40) - (3,500 \times \$12.00) = \$1,400 \text{ Unfavorable}$$

$$\text{Labor quantity variance} = (3,500 \times \$12.00) - (3,600 \times \$12.00) = \$1,200 \text{ Favorable}$$

$$\text{Total overhead variance} = \$71,300 - \$72,000^* = \$700 \text{ Favorable}$$

$$^*3,600 \text{ hours} \times \$20.00$$

Related exercise material: BE25-5, BE25-6, E25-4, E25-6, E25-7, E25-8, E25-10, E25-11, and **DO IT!** 25-3.



Reporting Variances

STUDY OBJECTIVE 6

Discuss the reporting of variances.

All variances should be reported to appropriate levels of management as soon as possible. The sooner managers are informed, the sooner they can evaluate problems and take corrective action.

The form, content, and frequency of variance reports vary considerably among companies. One approach is to prepare a weekly report for each department that has primary responsibility for cost control. Under this approach, materials price variances are reported to the purchasing department, and all other variances are reported to the production department that did the work. Illustration 25-22 is a materials price variance report for Xonic, Inc., with the materials for the Weed-O order listed first.

XONIC, INC.					
Variance Report — Purchasing Department For Week Ended June 8, 2010					
Type of Materials	Quantity Purchased	Actual Price	Standard Price	Price Variance	Explanation
X100	4,200 lbs.	\$3.10	\$3.00	\$420 U	Rush order
X142	1,200 units	2.75	2.80	60 F	Quantity discount
A85	600 doz.	5.20	5.10	60 U	Regular supplier on strike
Total price variance				\$420 U	

Illustration 25-22
Materials price variance report

The explanation column is completed after consultation with the purchasing department manager.

Variance reports facilitate the principle of “management by exception” explained in Chapter 24. For example, the vice president of purchasing can use the report shown above to evaluate the effectiveness of the purchasing department manager. Or, the vice president of production can use production department variance reports to determine how well each production manager is controlling costs. In using variance reports, top management normally looks for **significant variances**. These may be judged on the basis of some quantitative measure, such as more than 10% of the standard or more than \$1,000.

Statement Presentation of Variances

In income statements **prepared for management** under a standard cost accounting system, **cost of goods sold is stated at standard cost and the variances are disclosed separately**. Illustration 25-23 shows this format. Based entirely on the production and sale of Weed-O, it assumes selling and administrative costs of \$3,000. Observe that each variance is shown, as well as the total net variance. In this example, variations from standard costs reduced net income by \$2,500.

STUDY OBJECTIVE 7

Prepare an income statement for management under a standard costing system.

XONIC, INC.	
Income Statement For the Month Ended June 30, 2010	
Sales	\$60,000
Cost of goods sold (at standard)	<u>42,000</u>
Gross profit (at standard)	18,000
Variances	
Materials price	\$ 420
Materials quantity	600
Labor price	(420)
Labor quantity	1,000
Overhead variance	<u>900</u>
Total variance unfavorable	<u>2,500</u>
Gross profit (actual)	15,500
Selling and administrative expenses	<u>3,000</u>
Net income	<u><u>\$12,500</u></u>

Illustration 25-23
Variances in income statement for management

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Standard costs may be used in financial statements prepared for stockholders and other external users. The costing of inventories at standard costs is in accordance with generally accepted accounting principles when there are no significant differences between actual costs and standard costs. **Hewlett-Packard** and **Jostens, Inc.**, for example, report their inventories at standard costs. However, if there are significant differences between actual and standard costs, the financial statements must report inventories and cost of goods sold at actual costs.

It is also possible to show the variances in an income statement prepared in the variable costing (CVP) format. To do so, it is necessary to analyze the overhead variances into variable and fixed components. This type of analysis is explained in cost accounting textbooks.





BALANCED SCORECARD

STUDY OBJECTIVE 8

Describe the balanced scorecard approach to performance evaluation.

Financial measures (measurement of dollars), such as variance analysis and return on investment (ROI), are useful tools for evaluating performance. However, many companies now supplement these financial measures with nonfinancial measures to better assess performance and anticipate future results. For example, airlines, like **Delta**, **American**, and **United**, use capacity utilization as an important measure to understand and predict future performance. Newspaper publishers, such as the *New York Times* and the *Chicago Tribune*, use circulation figures as another measure by which to assess performance. Illustration 25-24 lists some key nonfinancial measures used in various industries.

Illustration 25-24
Nonfinancial measures used in various industries

Industry		Measure
Automobiles		Capacity utilization of plants. Average age of key assets. Impact of strikes. Brand-loyalty statistics.
Computer Systems		Market profile of customer end-products. Number of new products. Employee stock ownership percentages. Number of scientists and technicians used in R&D.
Chemicals		Customer satisfaction data. Factors affecting customer product selection. Number of patents and trademarks held. Customer brand awareness.
Regional Banks		Number of ATMs by state. Number of products used by average customer. Percentage of customer service calls handled by interactive voice response units. Personnel cost per employee. Credit card retention rates.

Source: Financial Accounting Standards Board, *Business Reporting: Insights into Enhancing Voluntary Disclosures* (Norwalk, Conn.: FASB, 2001)

Most companies recognize that both financial and nonfinancial measures can provide useful insights into what is happening in the company. As a result, many companies now use a broad-based measurement approach, called the **balanced scorecard**, to evaluate performance. The **balanced scorecard** incorporates financial and nonfinancial measures in an integrated system that links performance measurement and a company's strategic goals. Nearly 50% of the largest companies in the United States including **Unilever**, **Chase**, and **Wal-Mart**, are using the balanced scorecard approach.

The balanced scorecard evaluates company performance from a series of "perspectives." The four most commonly employed perspectives are as follows.

1. The **financial perspective** is the most traditional view of the company. It employs financial measures of performance used by most firms.
2. The **customer perspective** evaluates how well the company is performing from the viewpoint of those people who buy and use its products or services. This view measures how well the company compares to competitors in terms of price, quality, product innovation, customer service, and other dimensions.
3. The **internal process perspective** evaluates the internal operating processes critical to success. All critical aspects of the value chain—including product development, production, delivery and after-sale service—are evaluated to ensure that the company is operating effectively and efficiently.
4. The **learning and growth perspective** evaluates how well the company develops and retains its employees. This would include evaluation of such things as employee skills, employee satisfaction, training programs, and information dissemination.

Within each perspective, the balanced scorecard identifies objectives that will contribute to attainment of strategic goals. Illustration 25-25 shows examples of objectives within each perspective.

<p>Financial perspective</p> <ul style="list-style-type: none"> Return on assets Net income Credit rating Share price Profit per employee 	<p>Internal process perspective</p> <ul style="list-style-type: none"> Percentage of defect-free products Stockouts Labor utilization rates Waste reduction Planning accuracy
<p>Customer perspective</p> <ul style="list-style-type: none"> Percentage of customers who would recommend product Customer retention Response time per customer request Brand recognition Customer service expense per customer 	<p>Learning and growth perspective</p> <ul style="list-style-type: none"> Percentage of employees leaving in less than one year Number of cross-trained employees Ethics violations Training hours Reportable accidents

Illustration 25-25
Examples of objectives within the four perspectives of balanced scorecard

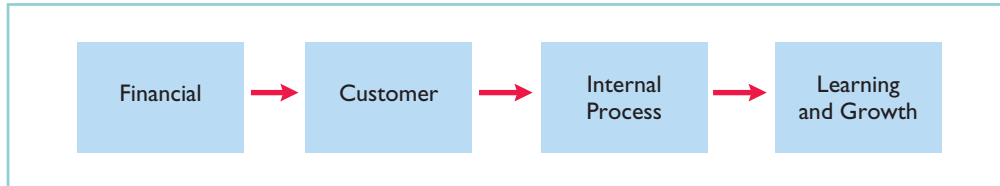
The objectives are linked across perspectives in order to tie performance measurement to company goals. The financial objectives are normally set first, and then objectives are set in the other perspectives in order to accomplish the financial objectives.

For example, within the financial perspective, a common goal is to increase profit per dollars invested as measured by ROI. In order to increase ROI, a customer-perspective objective might be to increase customer satisfaction as measured by the percentage of customers who would recommend the product to a

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friend. In order to increase customer satisfaction, an internal business process perspective objective might be to increase product quality as measured by the percentage of defect-free units. Finally, in order to increase the percentage of defect-free units, the learning and growth perspective objective might be to reduce factory employee turnover as measured by the percentage of employees leaving in under one year. Illustration 25-26 illustrates this linkage across perspectives.

Illustration 25-26
Linked process across
balanced scorecard
perspectives



Through this linked process, the company can better understand how to achieve its goals and what measures to use to evaluate performance. In summary, the balanced scorecard does the following:

1. Employs both financial and nonfinancial measures. (For example, ROI is a financial measure; employee turnover is a nonfinancial measure.)
2. Creates linkages so that high-level corporate goals can be communicated all the way down to the shop floor.
3. Provides measurable objectives for such nonfinancial measures as product quality, rather than vague statements such as “We would like to improve quality.”
4. Integrates all of the company’s goals into a single performance measurement system, so that an inappropriate amount of weight will not be placed on any single goal.

ACCOUNTING ACROSS THE ORGANIZATION



It May Be Time to Fly United Again

Many of the benefits of a balanced scorecard approach are evident in the improved operations at **United Airlines**. At the time it filed for bankruptcy in 2002, United had a reputation for some of the worst service in the airline business. But when Glenn Tilton took over as United’s Chief Executive Officer in September 2002, he recognized that things had to change.

One thing he did was to implement an incentive program that allows all of United’s 63,000 employees to earn a bonus of 2.5% or more of their wages if the company “exceeds its goals for on-time flight departures and for customer intent to fly United again.” Since instituting this program the company’s on-time departures are among the best, its customer complaints have been reduced considerably, and its number of customers who say that they would fly United again is at its highest level ever. While none of these things guarantees that United will survive (given the substantial increase in oil prices), these improvements certainly increase its chances.

Source: Susan Carey, “Friendlier Skies: In Bankruptcy, United Airlines Forges a Path to Better Service,” *Wall Street Journal*, June 15, 2004.



Which of the perspectives of a balanced scorecard were the focus of United’s CEO?

DO IT!

Indicate which of the four perspectives in the balanced scorecard is most likely associated with the objectives that follow.

BALANCED SCORECARD

1. Percentage of repeat customers.
2. Number of suggestions for improvement from employees.
3. Contribution margin.
4. Market share.
5. Number of cross-trained employees.
6. Amount of setup time.

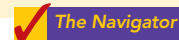
action plan

- ✓ The financial perspective employs traditional financial measures of performance.
- ✓ The customer perspective evaluates company performance as seen by the people who buy its products or services.
- ✓ The internal process perspective evaluates the internal operating processes critical to success.
- ✓ The learning and growth perspective evaluates how well the company develops and retains its employees.

Solution

1. Customer perspective.
2. Learning and growth perspective.
3. Financial perspective.
4. Customer perspective.
5. Learning and growth perspective.
6. Internal process perspective.

Related exercise material: BE25-7, E25-16, and **DO IT!** 25-4.



Comprehensive

DO IT!



Manlow Company makes a cologne called Allure. The standard cost for one bottle of Allure is as follows.

<u>Manufacturing Cost Elements</u>	<u>Standard</u>			
	<u>Quantity</u>	×	<u>Price</u>	= <u>Cost</u>
Direct materials	6 oz.	×	\$ 0.90	= \$ 5.40
Direct labor	0.5 hrs.	×	\$12.00	= 6.00
Manufacturing overhead	0.5 hrs.	×	\$ 4.80	= 2.40
				<u>\$13.80</u>

During the month, the following transactions occurred in manufacturing 10,000 bottles of Allure.

1. 58,000 ounces of materials were purchased at \$1.00 per ounce.
2. All the materials purchased were used to produce the 10,000 bottles of Allure.
3. 4,900 direct labor hours were worked at a total labor cost of \$56,350.
4. Variable manufacturing overhead incurred was \$15,000 and fixed overhead incurred was \$10,400.

The manufacturing overhead rate of \$4.80 is based on a normal capacity of 5,200 direct labor hours. The total budget at this capacity is \$10,400 fixed and \$14,560 variable.

Instructions

- (a) Compute the total variance and the price and quantity variances for direct material and direct labor elements.
- (b) Compute the total variance for manufacturing overhead.

action plan

- ✓ Check to make sure the total variance and the sum of the individual variances are equal.
- ✓ Find the price variance first, then the quantity variance.
- ✓ Base overhead applied on standard hours allowed.
- ✓ Ignore actual hours worked in computing overhead variance.

Solution to Comprehensive DO IT!

(a)

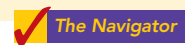
		<u>Total Variance</u>		
Actual costs incurred				
	Direct materials		\$ 58,000	
	Direct labor		56,350	
	Manufacturing overhead		<u>25,400</u>	
			139,750	
	Standard cost (10,000 × \$13.80)		<u>138,000</u>	
	Total variance		<u>\$ 1,750 U</u>	

		<u>Direct Materials Variances</u>			
Total	=	\$58,000	–	\$54,000	= \$4,000 U
		(58,000 × \$1.00)		(60,000 × \$0.90)	
Price	=	\$58,000	–	\$52,200	= \$5,800 U
		(58,000 × \$1.00)		(58,000 × \$0.90)	
Quantity	=	\$52,200	–	\$54,000	= \$1,800 F
		(58,000 × \$0.90)		(60,000 × \$0.90)	

		<u>Direct Labor Variances</u>			
Total	=	\$56,350	–	\$60,000	= \$3,650 F
		(4,900 × \$11.50)		(5,000 × \$12.00)	
Price	=	\$56,350	–	\$58,800	= \$2,450 F
		(4,900 × \$11.50)		(4,900 × \$12.00)	
Quantity	=	\$58,800	–	\$60,000	= \$1,200 F
		(4,900 × \$12.00)		(5,000 × \$12.00)	

(b)

		<u>Overhead Variance</u>			
Total	=	\$25,400	–	\$24,000	= \$ 1,400 U
		(\$15,000 + \$10,400)		(5,000 × \$4.80)	



SUMMARY OF STUDY OBJECTIVES



- 1 Distinguish between a standard and a budget.** Both standards and budgets are predetermined costs. The primary difference is that a standard is a unit amount, whereas a budget is a total amount. A standard may be regarded as the budgeted cost per unit of product.
- 2 Identify the advantages of standard costs.** Standard costs offer a number of advantages. They (a) facilitate management planning, (b) promote greater economy, (c) are useful in setting selling prices, (d) contribute to management control, (e) permit “management by exception,” and (f) simplify the costing of inventories and reduce clerical costs.
- 3 Describe how companies set standards.** The direct materials price standard should be based on the delivered cost

of raw materials plus an allowance for receiving and handling. The direct materials quantity standard should establish the required quantity plus an allowance for waste and spoilage.

The direct labor price standard should be based on current wage rates and anticipated adjustments such as COLAs. It also generally includes payroll taxes and fringe benefits. Direct labor quantity standards should be based on required production time plus an allowance for rest periods, cleanup, machine setup, and machine downtime.

For manufacturing overhead, a standard predetermined overhead rate is used. It is based on an expected standard activity index such as standard direct labor hours or standard machine hours.

4 State the formulas for determining direct materials and direct labor variances. The formulas for the direct materials variances are:

$$\left(\begin{array}{l} \text{Actual quantity} \\ \times \text{Actual price} \end{array} \right) - \left(\begin{array}{l} \text{Standard quantity} \\ \times \text{Standard price} \end{array} \right) = \begin{array}{l} \text{Total} \\ \text{materials} \\ \text{variance} \end{array}$$

$$\left(\begin{array}{l} \text{Actual quantity} \\ \times \text{Actual price} \end{array} \right) - \left(\begin{array}{l} \text{Actual quantity} \\ \times \text{Standard price} \end{array} \right) = \begin{array}{l} \text{Materials} \\ \text{price} \\ \text{variance} \end{array}$$

$$\left(\begin{array}{l} \text{Actual quantity} \\ \times \text{Standard price} \end{array} \right) - \left(\begin{array}{l} \text{Standard quantity} \\ \times \text{Standard price} \end{array} \right) = \begin{array}{l} \text{Materials} \\ \text{quantity} \\ \text{variance} \end{array}$$

The formulas for the direct labor variances are:

$$\left(\begin{array}{l} \text{Actual hours} \\ \times \text{Actual rate} \end{array} \right) - \left(\begin{array}{l} \text{Standard hours} \\ \times \text{Standard rate} \end{array} \right) = \begin{array}{l} \text{Total} \\ \text{labor} \\ \text{variance} \end{array}$$

$$\left(\begin{array}{l} \text{Actual hours} \\ \times \text{Actual rate} \end{array} \right) - \left(\begin{array}{l} \text{Actual hours} \\ \times \text{Standard rate} \end{array} \right) = \begin{array}{l} \text{Labor} \\ \text{price} \\ \text{variance} \end{array}$$

$$\left(\begin{array}{l} \text{Actual hours} \\ \times \text{Standard rate} \end{array} \right) - \left(\begin{array}{l} \text{Standard hours} \\ \times \text{Standard rate} \end{array} \right) = \begin{array}{l} \text{Labor} \\ \text{quantity} \\ \text{variance} \end{array}$$

5 State the formula for determining the total manufacturing overhead variance. The formula for the total manufacturing overhead variance is:

$$\left(\begin{array}{l} \text{Actual} \\ \text{overhead} \end{array} \right) - \left(\begin{array}{l} \text{Overhead} \\ \text{applied at} \\ \text{standard} \\ \text{hours} \\ \text{allowed} \end{array} \right) = \begin{array}{l} \text{Total overhead} \\ \text{variance} \end{array}$$

6 Discuss the reporting of variances. Variances are reported to management in variance reports. The reports facilitate management by exception by highlighting significant differences.

7 Prepare an income statement for management under a standard costing system. Under a standard costing system, an income statement prepared for management will report cost of goods sold at standard cost and then disclose each variance separately.

8 Describe the balanced scorecard approach to performance evaluation. The balanced scorecard incorporates financial and nonfinancial measures in an integrated system that links performance measurement and a company's strategic goals. It employs four perspectives: financial, customer, internal processes, and learning and growth. Objectives are set within each of these perspectives that link to objectives within the other perspectives.



GLOSSARY

Balanced scorecard An approach that incorporates financial and nonfinancial measures in an integrated system that links performance measurement and a company's strategic goals. (p. 1125)

Customer perspective A viewpoint employed in the balanced scorecard to evaluate the company from the perspective of those people who buy and use its products or services. (p. 1125)

Direct labor price standard The rate per hour that should be incurred for direct labor. (p. 1113)

Direct labor quantity standard The time that should be required to make one unit of product. (p. 1113)

Direct materials price standard The cost per unit of direct materials that should be incurred. (p. 1112)

Direct materials quantity standard The quantity of direct materials that should be used per unit of finished goods. (p. 1113)

Financial perspective A viewpoint employed in the balanced scorecard to evaluate a company's performance using financial measures. (p. 1125)

Ideal standards Standards based on the optimum level of performance under perfect operating conditions. (p. 1112)

Internal process perspective A viewpoint employed in the balanced scorecard to evaluate the effectiveness and

efficiency of a company's value chain, including product development, production, delivery, and after-sale service. (p. 1125)

Labor price variance The difference between the actual hours times the actual rate and the actual hours times the standard rate for labor. (p. 1119)

Labor quantity variance The difference between actual hours times the standard rate and standard hours times the standard rate for labor. (p. 1119)

Learning and growth perspective A viewpoint employed in the balanced scorecard to evaluate how well a company develops and retains its employees. (p. 1125)

Materials price variance The difference between the actual quantity times the actual price and the actual quantity times the standard price for materials. (p. 1117)

Materials quantity variance The difference between the actual quantity times the standard price and the standard quantity times the standard price for materials. (p. 1117)

Normal capacity The average activity output that a company should experience over the long run. (p. 1114)

Normal standards Standards based on an efficient level of performance that are attainable under expected operating conditions. (p. 1112)

Standard costs Predetermined unit costs which companies use as measures of performance. (p. 1110)



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Standard hours allowed The hours that should have been worked for the units produced. (p. 1121)

Standard predetermined overhead rate An overhead rate determined by dividing budgeted overhead costs by an expected standard activity index. (p. 1114)

Total labor variance The difference between actual hours times the actual rate and standard hours times the standard rate for labor. (p. 1119)

Total materials variance The difference between the actual quantity times the actual price and the standard quantity times the standard price of materials. (p. 1116)

Total overhead variance The difference between actual overhead costs and overhead costs applied to work done. (p.1121)

Variiances The difference between total actual costs and total standard costs. (p. 1116)

APPENDIX 25A Standard Cost Accounting System

STUDY OBJECTIVE 9

Identify the features of a standard cost accounting system.

A **standard cost accounting system** is a double-entry system of accounting. In this system, companies use standard costs in making entries, and they formally recognize variances in the accounts. Companies may use a standard cost system with either job order or process costing.

In this appendix, we will explain and illustrate a **standard cost, job order cost accounting system**. The system is based on two important assumptions:

- (1) Variances from standards are recognized at the earliest opportunity.
- (2) The Work in Process account is maintained exclusively on the basis of standard costs.

In practice, there are many variations among standard cost systems. The system described here should prepare you for systems you see in the “real world.”

Journal Entries

We will use the transactions of Xonic, Inc. to illustrate the journal entries. Note as you study the entries that the major difference between the entries here and those for the job order cost accounting system in Chapter 20 is the **variance accounts**.

1. Purchase raw materials on account for \$13,020 when the standard cost is \$12,600.

Raw Materials Inventory	12,600		
Materials Price Variance	420		
Accounts Payable			13,020
(To record purchase of materials)			

Xonic debits the inventory account for actual quantities at standard cost. This enables the perpetual materials records to show actual quantities. Xonic debits the price variance, which is unfavorable, to Materials Price Variance.

2. Incur direct labor costs of \$20,580 when the standard labor cost is \$21,000.

Factory Labor	21,000		
Labor Price Variance			420
Wages Payable			20,580
(To record direct labor costs)			

Like the raw materials inventory account, Xonic debits Factory Labor for actual hours worked at the standard hourly rate of pay. In this case, the labor variance is favorable. Thus, Xonic credits Labor Price Variance.

3. Incur actual manufacturing overhead costs of \$10,900.

Manufacturing Overhead	10,900	
Accounts Payable/Cash/Acc. Depreciation		10,900
(To record overhead incurred)		

The controllable overhead variance is not recorded at this time. It depends on standard hours applied to work in process. This amount is not known at the time overhead is incurred.

4. Issue raw materials for production at a cost of \$12,600 when the standard cost is \$12,000.

Work in Process Inventory	12,000	
Materials Quantity Variance	600	
Raw Materials Inventory		12,600
(To record issuance of raw materials)		

Xonic debits Work in Process Inventory for standard materials quantities used at standard prices. It debits the variance account because the variance is unfavorable. The company credits Raw Materials Inventory for actual quantities at standard prices.

5. Assign factory labor to production at a cost of \$21,000 when standard cost is \$20,000.

Work in Process Inventory	20,000	
Labor Quantity Variance	1,000	
Factory Labor		21,000
(To assign factory labor to jobs)		

Xonic debits Work in Process Inventory for standard labor hours at standard rates. It debits the unfavorable variance to Labor Quantity Variance. The credit to Factory Labor produces a zero balance in this account.

6. Applying manufacturing overhead to production \$10,000.

Work in Process Inventory	10,000	
Manufacturing Overhead		10,000
(To assign overhead to jobs)		

Xonic debits Work in Process Inventory for standard hours allowed multiplied by the standard overhead rate.

7. Transfer completed work to finished goods \$42,000.

Finished Goods Inventory	42,000	
Work in Process Inventory		42,000
(To record transfer of completed work to finished goods)		

In this example, both inventory accounts are at standard cost.

8. The 1,000 gallons of Weed-O are sold for \$60,000.

Accounts Receivable	60,000	
Cost of Goods Sold	42,000	
Sales		60,000
Finished Goods Inventory		42,000
(To record sale of finished goods and the cost of goods sold)		

The company debits Cost of Goods Sold at standard cost. Gross profit, in turn, is the difference between sales and the standard cost of goods sold.

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9. Recognize unfavorable total overhead variance:

Overhead Variance	900	
Manufacturing Overhead		900
(To recognize total overhead variance)		

Prior to this entry, a debit balance of \$900 existed in Manufacturing Overhead. This entry therefore produces a zero balance in the Manufacturing Overhead account. The information needed for this entry is often not available until the end of the accounting period.

Ledger Accounts

Illustration 25A-1 shows the cost accounts for Xonic, Inc., after posting the entries. Note that six variance accounts are included in the ledger. The remaining accounts are the same as those illustrated for a job order cost system in Chapter 20, in which only actual costs were used.

Illustration 25A-1
Cost accounts with variances

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Raw Materials Inventory</th></tr> <tr><td style="width: 50%;">(1) 12,600</td><td style="width: 50%;">(4) 12,600</td></tr> </table>	Raw Materials Inventory		(1) 12,600	(4) 12,600	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Materials Price Variance</th></tr> <tr><td style="width: 50%;">(1) 420</td><td style="width: 50%;"></td></tr> </table>	Materials Price Variance		(1) 420		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Work in Process Inventory</th></tr> <tr><td style="width: 50%;">(4) 12,000</td><td style="width: 50%;">(7) 42,000</td></tr> <tr><td>(5) 20,000</td><td></td></tr> <tr><td>(6) 10,000</td><td></td></tr> </table>	Work in Process Inventory		(4) 12,000	(7) 42,000	(5) 20,000		(6) 10,000	
Raw Materials Inventory																		
(1) 12,600	(4) 12,600																	
Materials Price Variance																		
(1) 420																		
Work in Process Inventory																		
(4) 12,000	(7) 42,000																	
(5) 20,000																		
(6) 10,000																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Factory Labor</th></tr> <tr><td style="width: 50%;">(2) 21,000</td><td style="width: 50%;">(5) 21,000</td></tr> </table>	Factory Labor		(2) 21,000	(5) 21,000	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Materials Quantity Variance</th></tr> <tr><td style="width: 50%;">(4) 600</td><td style="width: 50%;"></td></tr> </table>	Materials Quantity Variance		(4) 600		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Finished Goods Inventory</th></tr> <tr><td style="width: 50%;">(7) 42,000</td><td style="width: 50%;">(8) 42,000</td></tr> </table>	Finished Goods Inventory		(7) 42,000	(8) 42,000				
Factory Labor																		
(2) 21,000	(5) 21,000																	
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(4) 600																		
Finished Goods Inventory																		
(7) 42,000	(8) 42,000																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Manufacturing Overhead</th></tr> <tr><td style="width: 50%;">(3) 10,900</td><td style="width: 50%;">(6) 10,000</td></tr> <tr><td></td><td>(9) 900</td></tr> </table>	Manufacturing Overhead		(3) 10,900	(6) 10,000		(9) 900	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Labor Price Variance</th></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;">(2) 420</td></tr> </table>	Labor Price Variance			(2) 420	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Cost of Goods Sold</th></tr> <tr><td style="width: 50%;">(8) 42,000</td><td style="width: 50%;"></td></tr> </table>	Cost of Goods Sold		(8) 42,000			
Manufacturing Overhead																		
(3) 10,900	(6) 10,000																	
	(9) 900																	
Labor Price Variance																		
	(2) 420																	
Cost of Goods Sold																		
(8) 42,000																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Labor Quantity Variance</th></tr> <tr><td style="width: 50%;">(5) 1,000</td><td style="width: 50%;"></td></tr> </table>	Labor Quantity Variance		(5) 1,000														
Labor Quantity Variance																		
(5) 1,000																		
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><th colspan="2" style="text-align: center;">Overhead Variance</th></tr> <tr><td style="width: 50%;">(9) 900</td><td style="width: 50%;"></td></tr> </table>	Overhead Variance		(9) 900														
Overhead Variance																		
(9) 900																		

HELPFUL HINT

All debit balances in variance accounts indicate unfavorable variances; all credit - balances indicate favorable variances.

SUMMARY OF STUDY OBJECTIVE FOR APPENDIX

9 Identify the features of a standard cost accounting system. In a standard cost accounting system, companies

journalize and post standard costs, and they maintain separate variance accounts in the ledger.

GLOSSARY FOR APPENDIX 25A



Standard cost accounting system A double-entry system of accounting in which standard costs are used in making entries and variances are recognized in the accounts. (p. 1130)

APPENDIX 25B A Closer Look at Overhead Variances

As indicated in the chapter, the total overhead variance is generally analyzed through a price variance and a quantity variance. The name usually given to the price variance is the **overhead controllable variance**; the quantity variance is referred to as the **overhead volume variance**.

STUDY OBJECTIVE 10

Compute overhead controllable and volume variance.

OVERHEAD CONTROLLABLE VARIANCE

The **overhead controllable variance** shows whether overhead costs are effectively controlled. To compute this variance, the company compares actual overhead costs incurred with budgeted costs for the **standard hours allowed**. The budgeted costs are determined from a manufacturing overhead flexible budget. The concepts related to a flexible budget were discussed in Chapter 24.

For Xonic the budget formula for manufacturing overhead is variable manufacturing overhead cost of \$3 per hour of labor plus fixed manufacturing overhead costs of \$4,400. Illustration 25B-1 shows the flexible budget for Xonic, Inc.

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					

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The overhead controllable variance for Xonic, Inc. is \$500 unfavorable.

Most controllable variances are associated with variable costs, which are controllable costs. Fixed costs are often known at the time the budget is prepared and are therefore not as likely to deviate from the budgeted amount. In Xonic's case, all of the overhead controllable variance is due to the difference between the actual variable overhead costs (\$6,500) and the budgeted variable costs (\$6,000).

Management can compare actual and budgeted overhead for each manufacturing overhead cost that contributes to the controllable variance. In addition, management can develop cost and quantity variances for each overhead cost, such as indirect materials and indirect labor.

OVERHEAD VOLUME VARIANCE

The **overhead volume variance** is the difference between normal capacity hours and standard hours allowed times the fixed overhead rate. The overhead volume variance relates to whether fixed costs were under- or over-applied during the year. For example, the overhead volume variance answers the question of whether Xonic effectively used its fixed costs. If Xonic produces less Weed-O than normal capacity would allow, an unfavorable variance results. Conversely, if Xonic produces more Weed-O than what is considered normal capacity, a favorable variance results.

The formula for computing the overhead volume variance is as follows.

Illustration 25B-3
Formula for overhead volume variance

$$\text{Fixed Overhead Rate} \times \left(\text{Normal Capacity Hours} - \text{Standard Hours Allowed} \right) = \text{Overhead Volume Variance}$$

To illustrate the fixed overhead rate computation, recall that Xonic Inc. budgeted fixed overhead cost for the year of \$52,800 (Illustration 25-6 on page 1114). At normal capacity, 26,400 standard direct labor hours are required. The fixed overhead rate is therefore \$2 (\$52,800 ÷ 26,400 hours).

Xonic produced 1,000 units of Weed-O in June. The standard hours allowed for the 1,000 gallons produced in June is 2,000 (1,000 gallons × 2 hours). For Xonic, standard direct labor hours for June at normal capacity is 2,200 (26,400 annual hours ÷ 12 months). The computation of the overhead volume variance in this case is as follows.

Illustration 25B-4
Computation of overhead volume variance for Xonic Co.

$$\begin{array}{rcccl} \text{Fixed Overhead Rate} & \times & \left(\text{Normal Capacity Hours} - \text{Standard Hours Allowed} \right) & = & \text{Overhead Volume Variance} \\ \$2 & \times & (2,200 - 2,000) & = & \$400 \text{ U} \end{array}$$

In Xonic's case, a \$400 unfavorable volume variance results. The volume variance is unfavorable because Xonic produced only 1,000 gallons rather than the normal capacity of 1,100 gallons in the month of June. As a result, it underapplied fixed overhead for that period.

In computing the overhead variances, it is important to remember the following.

1. Standard hours allowed are used in each of the variances.
2. Budgeted costs for the controllable variance are derived from the flexible budget.
3. The controllable variance generally pertains to variable costs.
4. The volume variance pertains solely to fixed costs.

SUMMARY OF STUDY OBJECTIVE FOR APPENDIX 25B



10 Compute overhead controllable and volume variance. The total overhead variance is generally analyzed through a price variance and a quantity variance. The

name usually given to the price variance is the overhead controllable variance. The quantity variance is referred to as the overhead volume variance.

GLOSSARY FOR APPENDIX 25B



Overhead controllable variance The difference between actual overhead incurred and overhead budgeted for the standard hours allowed. (p. 1133)

Overhead volume variance The difference between normal capacity hours and standard hours allowed times the fixed overhead rate. (p. 1134)

Note: All asterisked Questions, Exercises, and Problems relate to material in the appendices to the chapter.

SELF-STUDY QUESTIONS



Answers are at the end of the chapter.

- (SO 1) 1. Standards differ from budgets in that:
- budgets but not standards may be used in valuing inventories.
 - budgets but not standards may be journalized and posted.
 - budgets are a total amount and standards are a unit amount.
 - only budgets contribute to management planning and control.
- (SO 1) 2. Standard costs:
- are imposed by governmental agencies.
 - are predetermined unit costs which companies use as measures of performance.
 - can be used by manufacturing companies but not by service or not-for-profit companies.
 - All of the above.
- (SO 2) 3. The advantages of standard costs include all of the following *except*:
- management by exception may be used.
 - management planning is facilitated.
 - they may simplify the costing of inventories.
 - management must use a static budget.
- (SO 3) 4. Normal standards:
- allow for rest periods, machine breakdowns, and setup time.
 - represent levels of performance under perfect operating conditions.
 - are rarely used because managers believe they lower workforce morale.
 - are more likely than ideal standards to result in unethical practices.
- (SO 3) 5. The setting of standards is:
- a managerial accounting decision.
 - a management decision.
 - a worker decision.
 - preferably set at the ideal level of performance.
6. Each of the following formulas is correct except: (SO 4)
- Labor price variance = (Actual hours × Actual rate) – (Actual hours × Standard rate).
 - Overhead controllable variance = Actual overhead – Overhead budgeted.
 - Materials price variance = (Actual quantity × Actual price) – (Standard quantity × Standard price).
 - Overhead volume variance = Fixed overhead rate × (Normal capacity hours – Standard hours allowed).
7. In producing product AA, 6,300 pounds of direct materials were used at a cost of \$1.10 per pound. The standard was 6,000 pounds at \$1.00 per pound. The direct materials quantity variance is: (SO 4)
- \$330 unfavorable.
 - \$300 unfavorable.
 - \$600 unfavorable.
 - \$630 unfavorable.
8. In producing product ZZ, 14,800 direct labor hours were used at a rate of \$8.20 per hour. The standard was 15,000 hours at \$8.00 per hour. Based on these data, the direct labor: (SO 4)
- quantity variance is \$1,600 favorable.
 - quantity variance is \$1,600 unfavorable.
 - price variance is \$2,960 favorable.
 - price variance is \$3,000 unfavorable.
9. Which of the following is *correct* about the total overhead variance? (SO 5)
- Budgeted overhead and overhead applied are the same.
 - Total actual overhead is composed of variable overhead, fixed overhead, and period costs.
 - Standard hours actually worked are used in computing the variance.
 - Standard hours allowed for the work done is the measure used in computing the variance.
10. The formula for computing the total overhead variance is: (SO 5)
- actual overhead less overhead applied.
 - overhead budgeted less overhead applied.
 - actual overhead less overhead budgeted.
 - No correct answer given.

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- (SO 6) 11. Which of the following is *incorrect* about variance reports?
- They facilitate “management by exception.”
 - They should only be sent to the top level of management.
 - They should be prepared as soon as possible.
 - They may vary in form, content, and frequency among companies.
- (SO 6) 12. In using variance reports to evaluate cost control, management normally looks into:
- all variances.
 - favorable variances only.
 - unfavorable variances only.
 - both favorable and unfavorable variances that exceed a predetermined quantitative measure such as a percentage or dollar amount.
- (SO 7) 13. Generally accepted accounting principles allow a company to:
- report inventory at standard cost but cost of goods sold must be reported at actual cost.
 - report cost of goods sold at standard cost but inventory must be reported at actual cost.
 - report inventory and cost of goods sold at standard cost as long as there are no significant differences between actual and standard cost.
 - report inventory and cost of goods sold only at actual costs; standard costing is never permitted.
14. Which of the following would *not* be an objective used in the customer perspective of the balanced scorecard approach? (SO 8)
- Percentage of customers who would recommend product to a friend.
 - Customer retention.
 - Brand recognition.
 - Earnings per share.
- *15. Which of the following is *incorrect* about a standard cost accounting system? (SO 9)
- It is applicable to job order costing.
 - It is applicable to process costing.
 - It reports only favorable variances.
 - It keeps separate accounts for each variance.
- *16. The formula to compute the overhead volume variance is: (SO 10)
- Fixed overhead rate \times (Standard hours – Actual hours).
 - Fixed overhead rate \times (Normal capacity hours – Actual hours).
 - Fixed overhead rate \times (Normal capacity hours – Standard hours allowed).
 - (Variable overhead rate + Fixed overhead rate) \times (Normal capacity hours – Standard hours allowed).

Go to the book's companion website,
www.wiley.com/college/weygandt,
 for Additional Self-Study questions.



QUESTIONS

- “Standard costs are the expected total cost of completing a job.” Is this correct? Explain.
 - “A standard imposed by a governmental agency is known as a regulation.” Do you agree? Explain.
- Explain the similarities and differences between standards and budgets.
 - Contrast the accounting for standards and budgets.
- Standard costs facilitate management planning. What are the other advantages of standard costs?
- Contrast the roles of the management accountant and management in setting standard costs.
- Distinguish between an ideal standard and a normal standard.
- What factors should be considered in setting (a) the direct materials price standard and (b) the direct materials quantity standard?
- “The objective in setting the direct labor quantity standard is to determine the aggregate time required to make one unit of product.” Do you agree? What allowances should be made in setting this standard?
- How is the predetermined overhead rate determined when standard costs are used?
- What is the difference between a favorable cost variance and an unfavorable cost variance?
- In each of the following formulas, supply the words that should be inserted for each number in parentheses.
 - $(\text{Actual quantity} \times (1)) - (\text{Standard quantity} \times (2)) =$ Total materials variance
 - $((3) \times \text{Actual price}) - (\text{Actual quantity} \times (4)) =$ Materials price variance
 - $(\text{Actual quantity} \times (5)) - ((6) \times \text{Standard price}) =$ Materials quantity variance
- In the direct labor variance matrix, there are three factors: (1) Actual hours \times Actual rate, (2) Actual hours \times Standard rate, and (3) Standard hours \times Standard rate. Using the numbers, indicate the formulas for each of the direct labor variances.
- Greer Company's standard predetermined overhead rate is \$8 per direct labor hour. For the month of June, 26,000 actual hours were worked, and 27,000 standard hours were allowed. Normal capacity hours were 28,000. How much overhead was applied?
- How often should variances be reported to management? What principle may be used with variance reports?
- What circumstances may cause the purchasing department to be responsible for both an unfavorable materials price variance and an unfavorable materials quantity variance?
- What are the four perspectives used in the balanced scorecard? Discuss the nature of each, and how the perspectives are linked.
- Tom Jones says that the balanced scorecard was created to replace financial measures as the primary mechanism for performance evaluation. He says that it uses only nonfinancial measures. Is this true?
- What are some examples of nonfinancial measures used by companies to evaluate performance?
- How are variances reported in income statements prepared for management?
 - May standard costs be used in preparing financial statements for stockholders? Explain.

- *19. (a) Explain the basic features of a standard cost accounting system. (b) What type of balance will exist in the variance account when (1) the materials price variance is unfavorable and (2) the labor quantity variance is favorable?
- *20. If the \$8 per hour overhead rate in question 12 includes \$5 variable, and actual overhead costs were \$218,000, what is the overhead controllable variance for June? The normal capacity hours were 28,000. Is the variance favorable or unfavorable?
- *21. What is the purpose of computing the overhead volume variance? What is the basic formula for this variance?
- *22. Janet Finney does not understand why the overhead volume variance indicates that fixed overhead costs are under- or overapplied. Clarify this matter for Janet.
- *23. Nick Menke is attempting to outline the important points about overhead variances on a class examination. List four points that Nick should include in his outline.

BRIEF EXERCISES



- BE25-1** Orasco Company uses both standards and budgets. For the year, estimated production of Product X is 500,000 units. Total estimated cost for materials and labor are \$1,200,000 and \$1,600,000. Compute the estimates for (a) a standard cost and (b) a budgeted cost. *Distinguish between a standard and a budget.*
(SO 1)
- BE25-2** Asaki Company accumulates the following data concerning raw materials in making one gallon of finished product: (1) Price—net purchase price \$2.20, freight-in \$0.20 and receiving and handling \$0.10. (2) Quantity—required materials 2.6 pounds, allowance for waste and spoilage 0.4 pounds. Compute the following. *Set direct materials standard.*
(SO 3)
- (a) Standard direct materials price per gallon.
(b) Standard direct materials quantity per gallon.
(c) Total standard materials cost per gallon.
- BE25-3** Labor data for making one gallon of finished product in Asaki Company are as follows: (1) Price—hourly wage rate \$12.00, payroll taxes \$0.80, and fringe benefits \$1.20. (2) Quantity—actual production time 1.2 hours, rest periods and clean up 0.25 hours, and setup and downtime 0.15 hours. Compute the following. *Set direct labor standard.*
(SO 3)
- (a) Standard direct labor rate per hour.
(b) Standard direct labor hours per gallon.
(c) Standard labor cost per gallon.
- BE25-4** Neville Company's standard materials cost per unit of output is \$10 (2 pounds \times \$5). During July, the company purchases and uses 3,200 pounds of materials costing \$16,160 in making 1,500 units of finished product. Compute the total, price, and quantity materials variances. *Compute direct materials variances.*
(SO 4)
- BE25-5** Wamser Company's standard labor cost per unit of output is \$20 (2 hours \times \$10 per hour). During August, the company incurs 2,100 hours of direct labor at an hourly cost of \$10.50 per hour in making 1,000 units of finished product. Compute the total, price, and quantity labor variances. *Compute direct labor variances.*
(SO 4)
- BE25-6** In October, Keane Company reports 21,000 actual direct labor hours, and it incurs \$115,000 of manufacturing overhead costs. Standard hours allowed for the work done is 20,000 hours. The predetermined overhead rate is \$6 per direct labor hour. Compute the total overhead variance. *Compute total overhead variance.*
(SO 5)
- BE25-7** The four perspectives in the balanced scorecard are (1) financial, (2) customer, (3) internal process, and (4) learning and growth. Match each of the following objectives with the perspective it is most likely associated with: (a) Plant capacity utilization. (b) Employee work days missed due to injury. (c) Return on assets. (d) Brand recognition. *Match balanced scorecard perspectives.*
(SO 8)
- ***BE25-8** Journalize the following transactions for Orkin Manufacturing. *Journalize materials variances.*
(SO 9)
- (a) Purchased 6,000 units of raw materials on account for \$11,100. The standard cost was \$12,000.
(b) Issued 5,500 units of raw materials for production. The standard units were 5,800.
- ***BE25-9** Journalize the following transactions for Rogler Manufacturing. *Journalize labor variances.*
(SO 9)
- (a) Incurred direct labor costs of \$24,000 for 3,000 hours. The standard labor cost was \$25,200.
(b) Assigned 3,000 direct labor hours costing \$24,000 to production. Standard hours were 3,100.
- ***BE25-10** Some overhead data for Keane Company are given in BE25-6. In addition, the flexible manufacturing overhead budget shows that budgeted costs are \$4 variable per direct labor hour and \$50,000 fixed. Compute the overhead controllable variance. *Compute the overhead controllable variance.*
(SO 10)
- ***BE25-11** Using the data in BE25-6 and BE25-10, compute the overhead volume variance. *Compute overhead volume variance.*
(SO 10)

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DO IT! REVIEW



Compute standard cost.
(SO 3)

DO IT! 25-1 Riuto Company accumulated the following standard cost data concerning product I-Tal.

Materials per unit: 2 pounds at \$5 per pound
Labor per unit: 0.2 hours at \$14 per hour
Manufacturing overhead: Predetermined rate is 125% of direct labor cost

Compute the standard cost of one unit of product I-Tal.

Compute materials variance.
(SO 4)

DO IT! 25-2 The standard cost of product 999 includes 2 units of direct materials at \$6.00 per unit. During August, the company bought 29,000 units of materials at \$6.20 and used those materials to produce 15,000 units. Compute the total, price, and quantity variances for materials.

Compute labor and manufacturing overhead variances.
(SO 4, 5)

DO IT! 25-3 The standard cost of product 2525 includes 2 hours of direct labor at \$14.00 per hour. The predetermined overhead rate is \$21.00 per direct labor hour. During July, the company incurred 4,100 hours of direct labor at an average rate of \$14.40 per hour and \$81,300 of manufacturing overhead costs. It produced 2,000 units.

(a) Compute the total, price, and quantity variances for labor. (b) Compute the total overhead variance.

Match balance scorecard perspectives and their objectives.
(SO 8)

DO IT! 25-4 Indicate which of the four perspectives in the balanced scorecard is most likely associated with the objectives that follow.

1. Ethics violations.
2. Credit rating.
3. Customer retention.
4. Stockouts.
5. Reportable accidents.
6. Brand recognition.

EXERCISES



Compute budget and standard.
(SO 1, 2, 3)

E25-1 Lovitz Company is planning to produce 2,000 units of product in 2010. Each unit requires 3 pounds of materials at \$6 per pound and a half hour of labor at \$14 per hour. The overhead rate is 70% of direct labor.

Instructions

- (a) Compute the budgeted amounts for 2010 for direct materials to be used, direct labor, and applied overhead.
- (b) Compute the standard cost of one unit of product.
- (c) What are the potential advantages to a corporation of using standard costs?

Compute standard materials costs.
(SO 3)



E25-2 Tony Rondeli manufactures and sells homemade wine, and he wants to develop a standard cost per gallon. The following are required for production of a 50-gallon batch.

- 3,000 ounces of grape concentrate at \$0.04 per ounce
- 54 pounds of granulated sugar at \$0.35 per pound
- 60 lemons at \$0.60 each
- 50 yeast tablets at \$0.25 each
- 50 nutrient tablets at \$0.20 each
- 2,500 ounces of water at \$0.004 per ounce

Tony estimates that 4% of the grape concentrate is wasted, 10% of the sugar is lost, and 20% of the lemons cannot be used.

Instructions

Compute the standard cost of the ingredients for one gallon of wine. (Carry computations to two decimal places.)

Compute standard cost per unit.
(SO 3)

E25-3 Muhsin Company has gathered the information shown on the next page about its product.

Direct materials: Each unit of product contains 4.5 pounds of materials. The average waste and spoilage per unit produced under normal conditions is 0.5 pounds. Materials cost \$4 per pound, but Muhsin always takes the 2% cash discount all of its suppliers offer. Freight costs average \$0.25 per pound.

Direct labor: Each unit requires 2 hours of labor. Setup, cleanup, and downtime average 0.2 hours per unit. The average hourly pay rate of Muhsin's employees is \$12. Payroll taxes and fringe benefits are an additional \$3 per hour.

Manufacturing overhead: Overhead is applied at a rate of \$6 per direct labor hour.

Instructions

Compute Muhsin's total standard cost per unit.

E25-4 Rapid Repair Services, Inc. is trying to establish the standard labor cost of a typical oil change. The following data have been collected from time and motion studies conducted over the past month.

Actual time spent on the oil change	1.0 hour
Hourly wage rate	\$10
Payroll taxes	10% of wage rate
Setup and downtime	10% of actual labor time
Cleanup and rest periods	30% of actual labor time
Fringe benefits	25% of wage rate

Compute labor quantity variance.

(SO 3, 4)

Instructions

- (a) Determine the standard direct labor hours per oil change.
- (b) Determine the standard direct labor hourly rate.
- (c) Determine the standard direct labor cost per oil change.
- (d) If an oil change took 1.5 hours at the standard hourly rate, what was the direct labor quantity variance?

E25-5 The standard cost of Product B manufactured by Mateo Company includes three units of direct materials at \$5.00 per unit. During June, 28,000 units of direct materials are purchased at a cost of \$4.70 per unit, and 28,000 units of direct materials are used to produce 9,000 units of Product B.

Compute materials price and quantity variances.

(SO 4)



Instructions

- (a) Compute the total materials variance and the price and quantity variances.
- (b) Repeat (a), assuming the purchase price is \$5.20 and the quantity purchased and used is 26,200 units.

E25-6 Scheer Company's standard labor cost of producing one unit of Product DD is 4 hours at the rate of \$12.00 per hour. During August, 40,800 hours of labor are incurred at a cost of \$12.10 per hour to produce 10,000 units of Product DD.

Compute labor price and quantity variances.

(SO 4)

Instructions

- (a) Compute the total labor variance.
- (b) Compute the labor price and quantity variances.
- (c) Repeat (b), assuming the standard is 4.2 hours of direct labor at \$12.25 per hour.

E25-7 Haslett Inc., which produces a single product, has prepared the following standard cost sheet for one unit of the product.

Compute materials and labor variances.

(SO 4)

Direct materials (8 pounds at \$2.50 per pound)	\$20
Direct labor (3 hours at \$12.00 per hour)	\$36



During the month of April, the company manufactures 230 units and incurs the following actual costs.

Direct materials purchased and used (1,900 pounds)	\$4,940
Direct labor (700 hours)	\$8,120

Instructions

Compute the total, price, and quantity variances for materials and labor.

E25-8 The direct materials and direct labor data shown on the next page pertain to the operations of Solario Manufacturing Company for the month of August.

Compute the materials and labor variances and list reasons for unfavorable variances.

(SO 4)

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Costs		Quantities	
Actual labor rate	\$13 per hour	Actual hours incurred and used	4,200 hours
Actual materials price	\$128 per ton	Actual quantity of materials purchased and used	1,225 tons
Standard labor rate	\$12 per hour	Standard hours used	4,300 hours
Standard materials price	\$130 per ton	Standard quantity of materials used	1,200 tons

Instructions

- (a) Compute the total, price, and quantity variances for materials and labor.
- (b) Provide two possible explanations for each of the unfavorable variances calculated above, and suggest where responsibility for the unfavorable result might be placed.

Prepare a variance report for direct labor.

(SO 4, 6)

E25-9 During March 2010, Hinton Tool & Die Company worked on four jobs. A review of direct labor costs reveals the following summary data.

Job Number	Actual		Standard		Total Variance
	Hours	Costs	Hours	Costs	
A257	220	\$ 4,400	225	\$4,500	\$ 100 F
A258	450	9,900	430	8,600	1,300 U
A259	300	6,150	300	6,000	150 U
A260	115	2,070	110	2,200	130 F
Total variance					<u>\$1,220 U</u>

Analysis reveals that Job A257 was a repeat job. Job A258 was a rush order that required overtime work at premium rates of pay. Job A259 required a more experienced replacement worker on one shift. Work on Job A260 was done for one day by a new trainee when a regular worker was absent.

Instructions

Prepare a report for the plant supervisor on direct labor cost variances for March. The report should have columns for (1) Job No., (2) Actual Hours, (3) Standard Hours, (4) Quantity Variance, (5) Actual Rate, (6) Standard Rate, (7) Price Variance, and (8) Explanation.

Compute overhead variance.

(SO 5)

E25-10 Manufacturing overhead data for the production of Product H by Norland Company are as follows.

Overhead incurred for 52,000 actual direct labor hours worked	\$213,000
Overhead rate (variable \$3; fixed \$1) at normal capacity of 54,000 direct labor hours	\$4
Standard hours allowed for work done	51,000

Instructions

Compute the total overhead variance.

Compute overhead variance.

(SO 5)

E25-11 Jay Levitt Company produces one product, a putter called GO-Putter. Levitt uses a standard cost system and determines that it should take one hour of direct labor to produce one GO-Putter. The normal production capacity for this putter is 100,000 units per year. The total budgeted overhead at normal capacity is \$800,000 comprised of \$200,000 of variable costs and \$600,000 of fixed costs. Levitt applies overhead on the basis of direct labor hours.

During the current year, Levitt produced 90,000 putters, worked 94,000 direct labor hours, and incurred variable overhead costs of \$186,000 and fixed overhead costs of \$600,000.

Instructions

- (a) Compute the predetermined variable overhead rate and the predetermined fixed overhead rate.
- (b) Compute the applied overhead for Levitt for the year.
- (c) Compute the total overhead variance.

Compute variances for materials.

(SO 4)

E25-12 Buerhle Company purchased (at a cost of \$10,900) and used 2,300 pounds of materials during May. Buerhle's standard cost of materials per unit produced is based on 2 pounds per unit at a cost \$5 per pound. Production in May was 1,070 units.

Instructions

- (a) Compute the total, price, and quantity variances for materials.
- (b) Assume Buerhle also had an unfavorable labor quantity variance. What is a possible scenario that would provide one cause for the variances computed in (a) and the unfavorable labor quantity variance?

E25-13 Imperial Landscaping plants grass seed as the basic landscaping for business campuses. During a recent month the company worked on three projects (Ames, Korman, and Stilles). The company is interested in controlling the material costs, namely the grass seed, for these plantings projects.

Prepare a variance report.
(SO 4, 6)

In order to provide management with useful cost control information, the company uses standard costs and prepares monthly variance reports. Analysis reveals that the purchasing agent mistakenly purchased poor-quality seed for the Ames project. The Korman project, however, received higher-than-standard-quality seed that was on sale. The Stilles project received standard-quality seed; however, the price had increased and a new employee was used to spread the seed. Shown below are quantity and cost data for each project.

Project	Actual		Standard		Total Variance
	Quantity	Costs	Quantity	Costs	
Ames	500 lbs.	\$1,175	460 lbs.	\$1,150	\$ 25 U
Korman	400	960	410	1,025	65 F
Stilles	500	1,300	480	1,200	100 U
Total variance					<u>\$ 60 U</u>

Instructions

- (a) Prepare a variance report for the purchasing department with the following columns: (1) Project, (2) Actual pounds purchased, (3) Actual price, (4) Standard price, (5) Price variance, and (6) Explanation.
- (b) Prepare a variance report for the production department with the following columns: (1) Project, (2) Actual pounds, (3) Standard pounds, (4) Standard price, (5) Quantity variance, and (6) Explanation.

E25-14 Archangel Corporation prepared the following variance report.

Complete variance report.
(SO 6)

ARCHANGEL CORPORATION
Variance Report—Purchasing Department
for Week Ended January 9, 2011

Type of Materials	Quantity Purchased	Actual Price	Standard Price	Price Variance	Explanation
Rogue11	? lbs.	\$5.20	\$5.00	\$5,200 ?	Price increase
Storm17	7,000 oz.	?	3.25	1,050 U	Rush order
Beast29	22,000 units	0.45	?	440 F	Bought larger quantity

Instructions

Fill in the appropriate amounts or letters for the question marks in the report.

E25-15 Cepeda Company uses a standard cost accounting system. During January, the company reported the following manufacturing variances.

Prepare income statement for management.
(SO 7)

Materials price variance	\$1,250 U	Labor quantity variance	\$ 725 U
Materials quantity variance	700 F	Overhead variance	800 U
Labor price variance	525 U		

In addition, 8,000 units of product were sold at \$8.00 per unit. Each unit sold had a standard cost of \$6.00. Selling and administrative expenses were \$6,000 for the month.

Instructions

Prepare an income statement for management for the month ended January 31, 2010.

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Identify performance evaluation terminology.

(SO 3, 8)

E25-16 The following is a list of terms related to performance evaluation.

- | | |
|-------------------------------------|----------------------------------|
| (1) Balanced scorecard | (5) Customer perspective |
| (2) Variance | (6) Internal process perspective |
| (3) Learning and growth perspective | (7) Ideal standards |
| (4) Nonfinancial measures | (8) Normal standards |

Instructions

Match each of the following descriptions with one of the terms above.

- (a) The difference between total actual costs and total standard costs.
- (b) An efficient level of performance that is attainable under expected operating conditions.
- (c) An approach that incorporates financial and nonfinancial measures in an integrated system that links performance measurement and a company's strategic goals.
- (d) A viewpoint employed in the balanced scorecard to evaluate how well a company develops and retains its employees.
- (e) An evaluation tool that is not based on dollars.
- (f) A viewpoint employed in the balanced scorecard to evaluate the company from the perspective of those people who buy and use its products or services.
- (g) An optimum level of performance under perfect operating conditions.
- (h) A viewpoint employed in the balanced scorecard to evaluate the efficiency and effectiveness of the company's value chain.

Journalize entries in a standard cost accounting system.

(SO 9)

***E25-17** Peyton Company installed a standard cost system on January 1. Selected transactions for the month of January are as follows.

1. Purchased 18,000 units of raw materials on account at a cost of \$4.50 per unit. Standard cost was \$4.30 per unit.
2. Issued 18,000 units of raw materials for jobs that required 17,600 standard units of raw materials.
3. Incurred 15,200 actual hours of direct labor at an actual rate of \$4.80 per hour. The standard rate is \$5.50 per hour. (Credit Wages Payable)
4. Performed 15,200 hours of direct labor on jobs when standard hours were 15,400.
5. Applied overhead to jobs at the rate of 100% of direct labor cost for standard hours allowed.

Instructions

Journalize the January transactions.

Answer questions concerning missing entries and balances.

(SO 4, 5, 9)

***E25-18** Cesar Company uses a standard cost accounting system. Some of the ledger accounts have been destroyed in a fire. The controller asks your help in reconstructing some missing entries and balances.

Instructions

Answer the following questions.

- (a) Materials Price Variance shows a \$2,000 favorable balance. Accounts Payable shows \$128,000 of raw materials purchases. What was the amount debited to Raw Materials Inventory for raw materials purchased?
- (b) Materials Quantity Variance shows a \$3,000 unfavorable balance. Raw Materials Inventory shows a zero balance. What was the amount debited to Work in Process Inventory for direct materials used?
- (c) Labor Price Variance shows a \$1,500 unfavorable balance. Factory Labor shows a debit of \$140,000 for wages incurred. What was the amount credited to Wages Payable?
- (d) Factory Labor shows a credit of \$140,000 for direct labor used. Labor Quantity Variance shows a \$900 unfavorable balance. What was the amount debited to Work in Process for direct labor used?
- (e) Overhead applied to Work in Process totaled \$165,000. If the total overhead variance was \$1,200 unfavorable, what was the amount of overhead costs debited to Manufacturing Overhead?

Journalize entries for materials and labor variances.

(SO 9)

***E25-19** Data for Haslett Inc. are given in E25-7.

Instructions

Journalize the entries to record the materials and labor variances.

***E25-20** The following information was taken from the annual manufacturing overhead cost budget of Granada Company.


Variable manufacturing overhead costs	\$33,000
Fixed manufacturing overhead costs	\$19,800
Normal production level in labor hours	16,500
Normal production level in units	4,125
Standard labor hours per unit	4

Compute manufacturing overhead variances and interpret findings.

(SO 10)

During the year, 4,000 units were produced, 16,100 hours were worked, and the actual manufacturing overhead was \$54,000. Actual fixed manufacturing overhead costs equaled budgeted fixed manufacturing overhead costs. Overhead is applied on the basis of direct labor hours.

Instructions

- (a) Compute the total, fixed, and variable predetermined manufacturing overhead rates.
- (b) Compute the total, controllable, and volume overhead variances.
- (c)  Briefly interpret the overhead controllable and volume variances computed in (b).

***E25-21** The loan department of Local Bank uses standard costs to determine the overhead cost of processing loan applications. During the current month a fire occurred, and the accounting records for the department were mostly destroyed. The following data were salvaged from the ashes.

Compute overhead variances.

(SO 10)

Standard variable overhead rate per hour	\$9
Standard hours per application	2
Standard hours allowed	2,000
Standard fixed overhead rate per hour	\$6
Actual fixed overhead cost	\$13,200
Variable overhead budget based on standard hours allowed	\$18,000
Fixed overhead budget	\$13,200
Overhead controllable variance	\$ 1,500 U

Instructions

- (a) Determine the following.
 - (1) Total actual overhead cost.
 - (2) Actual variable overhead cost.
 - (3) Variable overhead cost applied.
 - (4) Fixed overhead cost applied.
 - (5) Overhead volume variance.
- (b) Determine how many loans were processed.

***E25-22** Jackson Company's annual overhead rate was based on estimates of \$200,000 for overhead costs and 20,000 direct labor hours. Jackson's standards allow 2 hours of direct labor per unit produced. Production in May was 900 units, and actual overhead incurred in May was \$18,800. The overhead budgeted for 1,800 standard direct labor hours is \$17,600 (\$5,000 fixed and \$12,600 variable).

Compute variances.

(SO 10)

Instructions

- (a) Compute the total, controllable, and volume variances for overhead.
- (b) What are possible causes of the variances computed in part (a)?

EXERCISES: SET B

Visit the book's companion website at www.wiley.com/college/veygandt, and choose the Student Companion site, to access Exercise Set B.



PROBLEMS: SET A

P25-1A Putnam Corporation manufactures a single product. The standard cost per unit of product is shown below.

Compute variances.

(SO 4, 5)

Direct materials—1 pound plastic at \$7.00 per pound	\$ 7.00
Direct labor—1.5 hours at \$12.00 per hour	18.00
Variable manufacturing overhead	11.25
Fixed manufacturing overhead	3.75
Total standard cost per unit	<u>\$40.00</u>



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The predetermined manufacturing overhead rate is \$10 per direct labor hour ($\$15.00 \div 1.5$). It was computed from a master manufacturing overhead budget based on normal production of 7,500 direct labor hours (5,000 units) for the month. The master budget showed total variable costs of \$56,250 (\$7.50 per hour) and total fixed overhead costs of \$18,750 (\$2.50 per hour). Actual costs for October in producing 4,900 units were as follows.

Direct materials (5,100 pounds)	\$ 37,230
Direct labor (7,000 hours)	87,500
Variable overhead	56,170
Fixed overhead	<u>19,680</u>
Total manufacturing costs	<u>\$200,580</u>

The purchasing department buys the quantities of raw materials that are expected to be used in production each month. Raw materials inventories, therefore, can be ignored.

Instructions

- Compute all of the materials and labor variances.
- Compute the total overhead variance.

Compute variances, and prepare income statement.

(SO 4, 5, 7)



P25-2A Dinkel Manufacturing Corporation accumulates the following data relative to jobs started and finished during the month of June 2010.

<u>Costs and Production Data</u>	<u>Actual</u>	<u>Standard</u>
Raw materials unit cost	\$2.25	\$2.00
Raw materials units used	10,600	10,000
Direct labor payroll	\$122,400	\$120,000
Direct labor hours worked	14,400	15,000
Manufacturing overhead incurred	\$184,500	
Manufacturing overhead applied		\$189,000
Machine hours expected to be used at normal capacity		42,500
Budgeted fixed overhead for June		\$51,000
Variable overhead rate per hour		\$3.00
Fixed overhead rate per hour		\$1.20

Overhead is applied on the basis of standard machine hours. Three hours of machine time are required for each direct labor hour. The jobs were sold for \$400,000. Selling and administrative expenses were \$40,000. Assume that the amount of raw materials purchased equaled the amount used.

Instructions

- Compute all of the variances for (1) direct materials and (2) direct labor.
- Compute the total overhead variance.
- Prepare an income statement for management. Ignore income taxes.

Compute and identify significant variances.

(SO 4, 5, 6)

P25-3A Rapache Clothiers is a small company that manufactures tall-men's suits. The company has used a standard cost accounting system. In May 2010, 11,200 suits were produced. The following standard and actual cost data applied to the month of May when normal capacity was 14,000 direct labor hours. All materials purchased were used.

<u>Cost Element</u>	<u>Standard (per unit)</u>	<u>Actual</u>
Direct materials	8 yards at \$4.30 per yard	\$371,050 for 90,500 yards (\$4.10 per yard)
Direct labor	1.2 hours at \$13.50 per hour	\$201,630 for 14,300 hours (\$14.10 per hour)
Overhead	1.2 hours at \$6.00 per hour (fixed \$3.50; variable \$2.50)	\$49,000 fixed overhead \$37,000 variable overhead

Overhead is applied on the basis of direct labor hours. At normal capacity, budgeted fixed overhead costs were \$49,000, and budgeted variable overhead was \$35,000.

Instructions

- Compute the total, price, and quantity variances for (1) materials and (2) labor.
- Compute the total overhead variance.
- Which of the materials and labor variances should be investigated if management considers a variance of more than 4% from standard to be significant?

P25-4A Dorantes Manufacturing Company uses a standard cost accounting system. In 2010, the company produced 28,000 units. Each unit took several pounds of direct materials and 1½ standard hours of direct labor at a standard hourly rate of \$12.00. Normal capacity was 50,000 direct labor hours. During the year, 131,000 pounds of raw materials were purchased at \$0.92 per pound. All materials purchased were used during the year.

Answer questions about variances.

(SO 4, 5)

Instructions

- (a) If the materials price variance was \$2,620 favorable, what was the standard materials price per pound?
- (b) If the materials quantity variance was \$4,700 unfavorable, what was the standard materials quantity per unit?
- (c) What were the standard hours allowed for the units produced?
- (d) If the labor quantity variance was \$7,200 unfavorable, what were the actual direct labor hours worked?
- (e) If the labor price variance was \$10,650 favorable, what was the actual rate per hour?
- (f) If total budgeted manufacturing overhead was \$350,000 at normal capacity, what was the pre-determined overhead rate?
- (g) What was the standard cost per unit of product?
- (h) How much overhead was applied to production during the year?
- (i) Using one or more answers above, what were the total costs assigned to work in process?

P25-5A Farm Labs, Inc. provides mad cow disease testing for both state and federal governmental agricultural agencies. Because the company's customers are governmental agencies, prices are strictly regulated. Therefore, Farm Labs must constantly monitor and control its testing costs. Shown below are the standard costs for a typical test.

Compute variances, prepare an income statement, and explain unfavorable variances.

(SO 4, 5, 7)

Direct materials (2 test tubes @ \$1.50 per tube)	\$ 3
Direct labor (1 hour @ \$25 per hour)	25
Variable overhead (1 hour @ \$5 per hour)	5
Fixed overhead (1 hour @ \$10 per hour)	10
Total standard cost per test	\$43

The lab does not maintain an inventory of test tubes. Therefore, the tubes purchased each month are used that month. Actual activity for the month of November 2010, when 1,500 tests were conducted, resulted in the following:

Direct materials (3,050 test tubes)	\$ 4,270
Direct labor (1,600 hours)	36,800
Variable overhead	7,400
Fixed overhead	14,000

Monthly budgeted fixed overhead is \$14,000. Revenues for the month were \$75,000, and selling and administrative expenses were \$4,000.

Instructions

- (a) Compute the price and quantity variances for direct materials and direct labor.
- (b) Compute the total overhead variance.
- (c) Prepare an income statement for management.
- (d) Provide possible explanations for each unfavorable variance.

***P25-6A** Adcock Corporation uses standard costs with its job order cost accounting system. In January, an order (Job No. 12) for 1,900 units of Product B was received. The standard cost of one unit of Product B is as follows.

Journalize and post standard cost entries, and prepare income statement.

(SO 4, 5, 7, 9)

Direct materials	3 pounds at \$1.00 per pound	\$ 3.00
Direct labor	1 hour at \$8.00 per hour	8.00
Overhead	2 hours (variable \$4.00 per machine hour; fixed \$2.25 per machine hour)	12.50
Standard cost per unit		\$23.50



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Normal capacity for the month was 4,200 machine hours. During January, the following transactions applicable to Job No. 12 occurred.

1. Purchased 6,250 pounds of raw materials on account at \$1.06 per pound.
2. Requisitioned 6,250 pounds of raw materials for Job No. 12.
3. Incurred 2,100 hours of direct labor at a rate of \$7.75 per hour.
4. Worked 2,100 hours of direct labor on Job No. 12.
5. Incurred manufacturing overhead on account \$25,800.
6. Applied overhead to Job No. 12 on basis of standard machine hours allowed.
7. Completed Job No. 12.
8. Billed customer for Job No. 12 at a selling price of \$70,000.
9. Incurred selling and administrative expenses on account \$2,000.

Instructions

- (a) Journalize the transactions.
- (b) Post to the job order cost accounts.
- (c) Prepare the entry to recognize the total overhead variance.
- (d) Prepare the January 2010 income statement for management.

Compute overhead controllable and volume variances.

(SO 10)

***P25-7A** Using the information in P25-1A, compute the overhead controllable variance and the overhead volume variance.

Compute overhead controllable and volume variances.

(SO 10)

***P25-8A** Using the information in P25-2A, compute the overhead controllable variance and the overhead volume variance.

Compute overhead controllable and volume variances.

(SO 10)

***P25-9A** Using the information in P25-3A, compute the overhead controllable variance and the overhead volume variance.

Compute overhead controllable and volume variances.

(SO 10)

***P25-10A** Using the information in P25-5A, compute the overhead controllable variance and the overhead volume variance.

PROBLEMS: SET B

Compute variances.

(SO 4, 5)

P25-1B Maris Corporation manufactures a single product. The standard cost per unit of product is as follows.

Direct materials—2 pounds of plastic at \$5 per pound	\$10
Direct labor—2 hours at \$12 per hour	24
Variable manufacturing overhead	8
Fixed manufacturing overhead	6
Total standard cost per unit	\$48

The master manufacturing overhead budget for the month based on normal productive capacity of 20,000 direct labor hours (10,000 units) shows total variable costs of \$80,000 (\$4 per labor hour) and total fixed costs of \$60,000 (\$3 per labor hour). Normal productive capacity is 20,000 direct labor hours. Overhead is applied on the basis of direct labor hours. Actual costs for November in producing 9,700 units were as follows.

Direct materials (20,000 pounds)	\$ 98,000
Direct labor (19,600 hours)	239,120
Variable overhead	79,100
Fixed overhead	59,000
Total manufacturing costs	\$475,220

The purchasing department normally buys the quantities of raw materials that are expected to be used in production each month. Raw materials inventories, therefore, can be ignored.

Instructions

- (a) Compute all of the materials and labor variances.
- (b) Compute the total overhead variance.

Compute variances, and prepare income statement.

(SO 4, 5, 7)



P25-2B Sanchez Manufacturing Company uses a standard cost accounting system to account for the manufacture of exhaust fans. In July 2010, it accumulates the following data relative to 1,800 units started and finished.

<u>Cost and Production Data</u>	<u>Actual</u>	<u>Standard</u>
Raw materials		
Units purchased	21,000	
Units used	21,000	22,000
Unit cost	\$3.40	\$3.00
Direct labor		
Hours worked	3,450	3,600
Hourly rate	\$11.80	\$12.50
Manufacturing overhead		
Incurred	\$101,500	
Applied		\$108,000

Manufacturing overhead was applied on the basis of direct labor hours. Normal capacity for the month was 3,400 direct labor hours. At normal capacity, budgeted overhead costs were \$20 per labor hour variable and \$10 per labor hour fixed. Total budgeted fixed overhead costs were \$34,000.

Jobs finished during the month were sold for \$280,000. Selling and administrative expenses were \$25,000.

Instructions

- (a) Compute all of the variances for (1) direct materials and (2) direct labor.
- (b) Compute the total overhead variance.
- (c) Prepare an income statement for management. Ignore income taxes.

P25-3B Sadler Clothiers manufactures women’s business suits. The company uses a standard cost accounting system. In March 2010, 15,700 suits were made. The following standard and actual cost data applied to the month of March when normal capacity was 20,000 direct labor hours. All materials purchased were used in production.


Compute and identify significant variances.

(SO 4, 5, 6)

<u>Cost Element</u>	<u>Standard (per unit)</u>	<u>Actual</u>
Direct materials	5 yards at \$6.80 per yard	\$547,200 for 76,000 yards (\$7.20 per yard)
Direct labor	1.0 hours at \$11.50 per hour	\$166,880 for 14,900 hours (\$11.20 per hour)
Overhead	1.0 hours at \$9.30 per hour (fixed \$6.30; variable \$3.00)	\$120,000 fixed overhead \$49,000 variable overhead

Overhead is applied on the basis of direct labor hours. At normal capacity, budgeted fixed overhead costs were \$126,000, and budgeted variable overhead costs were \$60,000.

Instructions

- (a) Compute the total, price, and quantity variances for (1) materials and (2) labor.
- (b) Compute the total overhead variance.
- (c)  Which of the materials and labor variances should be investigated if management considers a variance of more than 5% from standard to be significant?

P25-4B Dobbs Manufacturing Company uses a standard cost accounting system. In 2010, 50,000 units were produced. Each unit took several pounds of direct materials and 2 standard hours of direct labor at a standard hourly rate of \$12.00. Normal capacity was 96,000 direct labor hours. During the year, 200,000 pounds of raw materials were purchased at \$1.00 per pound. All materials purchased were used during the year.

Answer questions about variances.

(SO 4, 5)

Instructions

- (a) If the materials price variance was \$8,000 unfavorable, what was the standard materials price per pound?
- (b) If the materials quantity variance was \$24,000 favorable, what was the standard materials quantity per unit?
- (c) What were the standard hours allowed for the units produced?
- (d) If the labor quantity variance was \$10,800 unfavorable, what were the actual direct labor hours worked?
- (e) If the labor price variance was \$25,225 favorable, what was the actual rate per hour?

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- (f) If total budgeted manufacturing overhead was \$792,000 at normal capacity, what was the predetermined overhead rate per direct labor hour?
- (g) What was the standard cost per unit of product?
- (h) How much overhead was applied to production during the year?
- (i) Using selected answers above, what were the total costs assigned to work in process?

Compute variances, prepare an income statement, and explain unfavorable variances.

(SO 4, 5, 7)

P25-5B Moran Labs performs steroid testing services to high schools, colleges, and universities. Because the company deals solely with educational institutions, the price of each test is strictly regulated. Therefore, the costs incurred must be carefully monitored and controlled. Shown below are the standard costs for a typical test.

Direct materials (1 petrie dish @ \$2 per dish)	\$ 2.00
Direct labor (0.5 hours @ \$20 per hour)	10.00
Variable overhead (0.5 hours @ \$8 per hour)	4.00
Fixed overhead (0.5 hours @ \$4 per hour)	<u>2.00</u>
Total standard cost per test	<u>\$18.00</u>

The lab does not maintain an inventory of petrie dishes. Therefore, the dishes purchased each month are used that month. Actual activity for the month of May 2010, when 2,500 tests were conducted, resulted in the following.

Direct materials (2,530 dishes)	\$ 5,313
Direct labor (1,240 hours)	26,040
Variable overhead	10,100
Fixed overhead	5,700

Monthly budgeted fixed overhead is \$6,000. Revenues for the month were \$58,000, and selling and administrative expenses were \$2,000.

Instructions

- (a) Compute the price and quantity variances for direct materials and direct labor.
- (b) Compute the total overhead variance.
- (c) Prepare an income statement for management.
- (d) Provide possible explanations for each unfavorable variance.

Journalize and post standard cost entries, and prepare income statement.

(SO 4, 5, 7, 9)



***P25-6B** Harter Manufacturing Company uses standard costs with its job order cost accounting system. In January, an order (Job No. 84) was received for 5,500 units of Product D. The standard cost of 1 unit of Product D is as follows.

Direct materials—1.4 pounds at \$4.00 per pound	\$ 5.60
Direct labor—1 hour at \$9.00 per hour	9.00
Overhead—1 hour (variable \$7.40; fixed \$8.00)	<u>15.40</u>
Standard cost per unit	<u>\$30.00</u>

Overhead is applied on the basis of direct labor hours. Normal capacity for the month of January was 6,000 direct labor hours. During January, the following transactions applicable to Job No. 84 occurred.

1. Purchased 8,100 pounds of raw materials on account at \$3.60 per pound.
2. Requisitioned 8,100 pounds of raw materials for production.
3. Incurred 5,100 hours of direct labor at \$9.25 per hour.
4. Worked 5,100 hours of direct labor on Job No. 84.
5. Incurred \$87,650 of manufacturing overhead on account.
6. Applied overhead to Job No. 84 on the basis of direct labor hours.
7. Transferred Job No. 84 to finished goods.
8. Billed customer for Job No. 84 at a selling price of \$280,000.
9. Incurred selling and administrative expenses on account \$61,000.

Instructions

- (a) Journalize the transactions.
- (b) Post to the job order cost accounts.
- (c) Prepare the entry to recognize the total overhead variance.
- (d) Prepare the January 2010 income statement for management.

Compute overhead controllable and volume variances.

(SO 10)

***P25-7B** Using the information in P25-1B, compute the overhead controllable variance and the overhead volume variance.

***P25-8B** Using the information in P25-2B, compute the overhead controllable variance and the overhead volume variance.

Compute overhead controllable and volume variances.

***P25-9B** Using the information in P25-3B, compute the overhead controllable variance and the overhead volume variance.

(SO 10)

Compute overhead controllable and volume variances.

***P25-10B** Using the information in P25-5B, compute the overhead controllable variance and the overhead volume variance.

(SO 10)

Compute overhead controllable and volume variances.

(SO 10)



PROBLEMS: SET C

Visit the book's companion website at www.wiley.com/college/weygandt, and choose the Student Companion site, to access Problem Set C.

WATERWAYS CONTINUING PROBLEM

(This is a continuation of the Waterways Problem from Chapters 19 through 24.)

WCP25 Waterways Corporation uses very stringent standard costs in evaluating its manufacturing efficiency. These standards are not "ideal" at this point, but the management is working toward that as a goal. This problem asks you to calculate and evaluate the company's variances.



Go to the book's companion website, www.wiley.com/college/weygandt, to find the remainder of this problem.

BROADENING YOUR PERSPECTIVE

Decision Making Across the Organization



BYP25-1 Colaw Professionals, a management consulting firm, specializes in strategic planning for financial institutions. Ken Comer and Mary Linden, partners in the firm, are assembling a new strategic planning model for use by clients. The model is designed for use on most personal computers and replaces a rather lengthy manual model currently marketed by the firm. To market the new model Ken and Mary will need to provide clients with an estimate of the number of labor hours and computer time needed to operate the model. The model is currently being test marketed at five small financial institutions. These financial institutions are listed below, along with the number of combined computer/labor hours used by each institution to run the model one time.

<u>Financial Institutions</u>	<u>Computer/Labor Hours Required</u>
Midland National	25
First State	45
Financial Federal	40
Pacific America	30
Lakeview National	<u>30</u>
Total	<u>170</u>
Average	<u>34</u>

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Any company that purchases the new model will need to purchase user manuals for the system. User manuals will be sold to clients in cases of 20, at a cost of \$300 per case. One manual must be used each time the model is run because each manual includes a nonreusable computer-accessed password for operating the system. Also required are specialized computer forms that are sold only by Colaw. The specialized forms are sold in packages of 250, at a cost of \$50 per package. One application of the model requires the use of 50 forms. This amount includes two forms that are generally wasted in each application due to printer alignment errors. The overall cost of the strategic planning model to clients is \$12,000. Most clients will use the model four times annually.

Colaw must provide its clients with estimates of ongoing costs incurred in operating the new planning model, and would like to do so in the form of standard costs.

Instructions

With the class divided into groups, answer the following.

- What factors should be considered in setting a standard for computer/labor hours?
- What alternatives for setting a standard for computer/labor hours might be used?
- What standard for computer/labor hours would you select? Justify your answer.
- Determine the standard materials cost associated with the user manuals and computer forms for each application of the strategic planning model.

Managerial Analysis

***BYP25-2** Ed Widner and Associates is a medium-sized company located near a large metropolitan area in the Midwest. The company manufactures cabinets of mahogany, oak, and other fine woods for use in expensive homes, restaurants, and hotels. Although some of the work is custom, many of the cabinets are a standard size.

One such non-custom model is called Luxury Base Frame. Normal production is 1,000 units. Each unit has a direct labor hour standard of 5 hours. Overhead is applied to production based on standard direct labor hours. During the most recent month, only 900 units were produced; 4,500 direct labor hours were allowed for standard production, but only 4,000 hours were used. Standard and actual overhead costs were as follows.

	Standard (1,000 units)	Actual (900 units)
Indirect materials	\$ 12,000	\$ 12,300
Indirect labor	43,000	51,000
(Fixed) Manufacturing supervisors salaries	22,000	22,000
(Fixed) Manufacturing office employees salaries	13,000	11,500
(Fixed) Engineering costs	27,000	25,000
Computer costs	10,000	10,000
Electricity	2,500	2,500
(Fixed) Manufacturing building depreciation	8,000	8,000
(Fixed) Machinery depreciation	3,000	3,000
(Fixed) Trucks and forklift depreciation	1,500	1,500
Small tools	700	1,400
(Fixed) Insurance	500	500
(Fixed) Property taxes	300	300
Total	<u>\$143,500</u>	<u>\$149,000</u>

Instructions

- Determine the overhead application rate.
- Determine how much overhead was applied to production.
- Calculate the controllable overhead variance and the overhead volume variance.
- Decide which overhead variances should be investigated.
- Discuss causes of the overhead variances. What can management do to improve its performance next month?

Real-World Focus

BYP25-3 **Glassmaster Co.** is organized as two divisions and one subsidiary. One division focuses on the manufacture of filaments such as fishing line and sewing thread; the other division

manufactures antennas and specialty fiberglass products. Its subsidiary manufactures flexible steel wire controls and molded control panels.

The annual report of Glassmaster provides the following information.

GLASSMASTER COMPANY

Management Discussion

Gross profit margins for the year improved to 20.9% of sales compared to last year's 18.5%. All operations reported improved margins due in large part to improved operating efficiencies as a result of cost reduction measures implemented during the second and third quarters of the fiscal year and increased manufacturing throughout due to higher unit volume sales. Contributing to the improved margins was a favorable materials price variance due to competitive pricing by suppliers as a result of soft demand for petrochemical-based products. This favorable variance is temporary and will begin to reverse itself as stronger worldwide demand for commodity products improves in tandem with the economy. Partially offsetting these positive effects on profit margins were competitive pressures on sales prices of certain product lines. The company responded with pricing strategies designed to maintain and/or increase market share.

Instructions

- Is it apparent from the information whether Glassmaster utilizes standard costs?
- Do you think the price variance experienced should lead to changes in standard costs for the next fiscal year?

Exploring the Web

BYP25-4 The **Balanced Scorecard Institute** (www.balancedscorecard.org) is a great resource for information about implementing the balanced scorecard. One item of interest provided at its website is an example of a balanced scorecard for a regional airline.

Address: http://www.balancedscorecard.org/files/Regional_Airline.pdf, or go to www.wiley.com/college/veygandt

Instructions

Go to the address above and answer the following questions.

- What are the objectives identified for the airline for each perspective?
- What measures are used for the objective in the customer perspective?
- What initiatives are planned to achieve the objective in the learning perspective?

Communication Activity

BYP25-5 The setting of standards is critical to the effective use of standards in evaluating performance.

Instructions

Explain the following in a memo to your instructor.

- The comparative advantages and disadvantages of ideal versus normal standards.
- The factors that should be included in setting the price and quantity standards for direct materials, direct labor, and manufacturing overhead.

Ethics Case

BYP25-6 At Camden Manufacturing Company, production workers in the Painting Department are paid on the basis of productivity. The labor time standard for a unit of production is established through periodic time studies conducted by the Lowery Management Department. In a time study, the actual time required to complete a specific task by a worker is observed. Allowances are then made for preparation time, rest periods, and clean-up time. Ron Orlandi is one of several veterans in the Painting Department.



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Ron is informed by Lowery Management that he will be used in the time study for the painting of a new product. The findings will be the basis for establishing the labor time standard for the next 6 months. During the test, Ron deliberately slows his normal work pace in an effort to obtain a labor time standard that will be easy to meet. Because it is a new product, the Lowery Management representative who conducted the test is unaware that Ron did not give the test his best effort.

Instructions

- (a) Who was benefited and who was harmed by Ron's actions?
- (b) Was Ron ethical in the way he performed the time study test?
- (c) What measure(s) might the company take to obtain valid data for setting the labor time standard?



"All About You" Activity

BYP25-7 From the time you first entered school many years ago, instructors have been measuring and evaluating you by imposing standards. In addition, many of you will pursue professions that administer professional examinations to attain recognized certification. Recently a federal commission presented proposals suggesting all public colleges and universities should require standardized tests to measure their students' learning.

Instructions

Read the following article at www.signonsandiego.com/uniontrib/20060811/news_1n11colleges.html, and answer the following questions.

- (a) What areas of concern did the panel's recommendations address?
- (b) What are possible advantages of standard testing?
- (c) What are possible disadvantages of standard testing?
- (d) Would you be in favor of standardized tests?



Answers to Insight and Accounting Across the Organization Questions

p. 1115 How Can We Make Susan's Chili Profitable?

Q: How might management use this raw material cost information?

A: *Management might decide to increase the price of its chili. Or it might revise its recipes to use cheaper ingredients. Or it might eliminate some products until ingredients are available at costs closer to standard.*

p. 1126 It May Be Time to Fly United Again

Q: Which of the perspectives of a balanced scorecard were the focus of United's CEO?

A: *Improving on-time flight departures is an objective within the internal process perspective. Customer intent to fly United again is an objective within the customer perspective.*

Answers to Self-Study Questions

1. c 2. b 3. d 4. a 5. b 6. c 7. b 8. a 9. d 10. a 11. b 12. d 13. c
14. d *15. c *16. c

