

Standard Costing –The Direct and Indirect Costs Variances

The purpose of standard cost accounting is to control costs and promote efficiency. This system is not another accounting method for accumulating manufacturing costs, but it is used in conjunction with such methods as job order, process, or backflush costing. Standard costing is based on a predetermination of what it should cost to manufacture a product, and the inventory accounts are debited for these standard costs. A comparison is then made between these standard costs and the actual costs that were incurred. Any deviation from the standards can be quickly detected and responsibility pinpointed so that the company can take appropriate action to eliminate inefficiencies or take advantage of efficiencies. This is known as management by exception, where both significant unfavorable and favorable differences from standard are the focal point of management attention. Surveys have indicated that 76% of U.S. manufacturers and 90% of Japanese manufacturers use standard costing.¹ Even service businesses such as McDonald's and Sears have standards for tasks, such as how long it should take to service a customer in the drive-through line or how long it should take to replace a muffler, respectively. **Standard costs** are usually determined for a period of one year and should be revised annually. However, if cost analyses during the year indicate that a standard is incorrect, or if a significant change has occurred in the costs to acquire materials or labor or in the production process, then management should not hesitate to adjust the standard to better reflect the current reality.

- **Standard Cost:** (CIMA) “Standard cost is the pre-determined cost based on the technical estimates for materials, labor and overhead for a selected period of time for a prescribed set of working conditions.”
- **Standard Costing:** (CIMA) “the preparation of standard costs and applying them to measure the variations from the actual costs and analyzing the causes of variations with a view to maintain maximum efficiency of the operations so that any remedial action may be taken immediately.

Types of standards

A **standard** is a norm against which the actual performance can be measured. The objective of setting standards is to measure efficiency and to monitor costs by assigning responsibility for deviations from the

standards. Also, a standard can motivate employees by providing a goal for achievement. But a question that often arises is, “What is the proper standard to use?” A company can estimate materials, labor, and factory overhead usage and costs, but what about the unforeseen costs, such as spoilage, lost time, and equipment breakdowns? Should these items be considered in determining the standard cost to manufacture a product? Some companies set their standards at the maximum degree of efficiency. Using such an **ideal standard**, they determine costs by considering estimated materials, labor, and overhead costs; the condition of the factory and machinery; and time for rest periods, holidays, and vacations—but make no allowances for inefficient conditions such as lost time, waste, or spoilage. This **ideal standard** can be achieved only under the most efficient operating conditions; therefore, it is practically unattainable, generally giving rise to unfavorable variances. Companies using this type of standard feel that it provides a maximum objective for which to strive in the attempt to improve efficiency. There is, however, a psychological disadvantage—factory personnel may become discouraged and lose their incentive to meet standards that are usually impossible to attain except under perfect operating conditions. Recognizing this potential problem, most companies set **attainable (normal) standards** that include such factors as lost time and normal waste and spoilage. These companies realize that some inefficiencies cannot be completely eliminated, so they design standards that can be met or even bettered in efficient production situations. The primary concern of the manufacturer should be to set standards that are high enough to provide motivation and promote efficiency, yet not so high that they are unattainable and, thus, bad for worker morale. **Basic or fixed standards** are used only when they are likely to remain constant or unaltered over long period. According to this standard, a base year is chosen for comparison purposes in the same way as statisticians use price indices.

Features of standard costing

This is a good place to summarize some features of standard cost accounting:

1. The company does not determine the actual per-unit cost of manufacturing a product for input into the accounting system.
2. The fact that standards are based on estimates does not make them unreliable. A close examination of variances will quickly gauge the efficiency of the manufacturing operation and the reasonableness of the standards.

3. Standards will change as conditions change. Permanent changes in prices and processes may indicate the need for the standards to be adjusted.

4. The purpose of using a standard cost accounting system is to provide continual incentive for factory personnel to keep costs and performance in line with predetermined management objectives. As mentioned earlier in the chapter, comparisons between actual costs and predetermined standards are much more effective than comparisons between current actual costs and actual costs of prior periods.

5. A standard cost system, through the recording and analysis of manufacturing cost variances, helps focus management's attention on the following questions and their causes: a. Were materials purchased at prices above or below standard? b. Were materials used in quantities above or below standard? c. Is labor being paid at rates above or below standard? d. Is labor being used in amounts above or below standard?

6. Although the discussion in this text suggests that variances are determined at the end of the month, most manufacturing companies calculate variances on a weekly (or even daily) basis to allow for more timely action in correcting inefficiencies or taking advantage of efficiencies. The variances for the month, however, are still recorded in the accounts at the end of the month.

Steps in Standard Costing

1- Set the standard cost

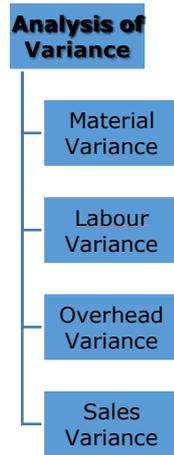
- A standard quantity is predetermined and standard price per unit is estimated.
- Budgeted cost is calculated by using standard cost.

2- Record the actual cost

Calculate actual quantity and cost incurred giving full details.

3- Variance Analysis

- ✓ Comparison of the actual cost with the budgeted cost.
- ✓ The cost variance is used in controlling cost.
- ✓ Take suitable corrective action.
- ✓ Fix responsibilities to ensure compliance
- ✓ Create effective control system.
- ✓ Resetting the budget, if required.

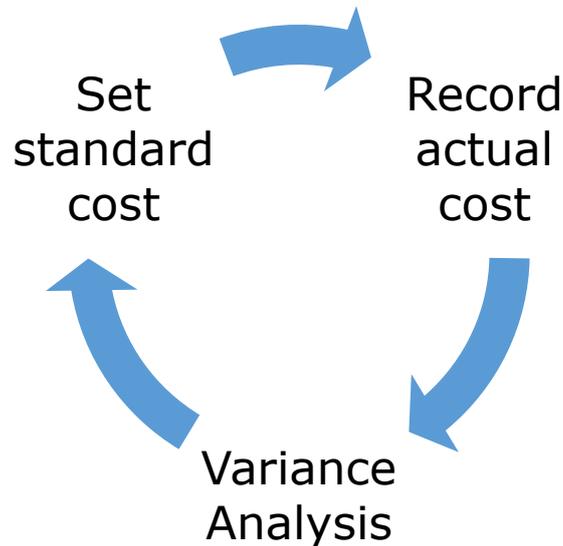


Favorable & Unfavorable Variances.

Controllable & Uncontrollable Variances

- **Favorable variances (F)** arise when actual costs are less than budgeted costs or actual sales/profit exceed budgeted.
- **Un favorable variances (U)** arise when actual costs exceed budgeted or actual sales/profit are less than budgeted.

	Profit	Revenue	Costs
Actual > Expected	F	F	U
Actual < Expected	U	U	F



Standard cost procedures

Standard cost accounting is based on the following procedures:

1. Standard costs are determined for the three elements of cost: direct materials, direct labor, and factory overhead.
2. The standard costs, the actual costs, and the variances between the actual and standard costs are recorded in appropriate accounts.
3. 3. Significant variances are analyzed and investigated and then appropriate action is taken.

Determination of standard costs for direct materials and labor

The first step, the determination of standard costs for a product, is a complex task that requires considerable experience and familiarity with manufacturing operations as well as the cooperation of the departmental employees. The accounting department is often consulted to help determine historical costs, to point out cost trends, and to assist in establishing the standards. A materials cost standard is based on estimates of the quantity of materials required for a unit of product and the unit cost to purchase the materials used. In setting a materials cost standard, management may consult the production engineering department to determine the amounts and types of materials needed, and the purchasing agent should provide information regarding suppliers' prices. A labor cost standard is based on estimates of the labor hours required to produce a unit of product and the cost of labor per unit. In establishing a labor cost standard, the heads of various departments contribute their knowledge of the processing operations. The manufacturer may use the services of time-study engineers to establish the time necessary to perform each operation, and the human resources manager should be consulted regarding prevailing wage rates for the various types of labor needed.

In setting standards for materials and labor, a variety of factors should be considered:

1. The trend of prices for raw materials
2. The use of different types of materials due to new production processes or market developments
3. The effect of negotiations with labor unions on labor rates; and
4. the possible saving of labor time due to the use of more modern machinery and equipment or the learning effect, which occurs when employees become more proficient at complex production processes the more often they perform.

Determination of variances

A variance represents the difference between the actual and the standard costs of materials, labor, and overhead. Variances measure efficiencies or inefficiencies in usage (quantity of materials used or number of labor hours worked) and price (cost of materials and wage rates). Note that although the variances computed here are for a manufacturer, they could just as well be computed for a service business, such as food cost and labor cost variances for a Wendy's restaurant. Also, a manufacturer can compute variances for nonmanufacturing items such as marketing costs that would explain, for example, why delivery employees' actual wages differ from budgeted wages.

1- Direct Material Cost Variances

A- Total Direct Material Cost Variance = (Actual quantity AQ x Actual price per unit AP) - (Standard quantity for the actual output SQ x Standard price per unit SP) *or* Actual direct materials cost AC - Standard direct materials cost SC ,

Where,

SQ = Standard quantity for the actual output, SP = Standard price per unit of material, AQ = Actual quantity, AP = Actual price per unit of material, AC = Actual materials cost, SC = Standard materials cost.

B- Material Price Variance = (Actual price per unit AP – Standard price per unit SP) x Actual quantity AQ

Where,

SP = Standard price per unit of material, AQ = Actual quantity, AP = Actual price per unit of material.

C- Material Usage Variance = (Actual quantity AQ – Standard quantity for the actual output SQ) x Standard price per unit SP

Where,

AQ = Actual quantity, SQ = Standard quantity for the actual output, SP = Standard price per unit of material.

Example 1. A furniture company uses sunmica tops for tables. It provides the following data:

Standard Quantity for sunmica per table	4 sq. ft
Standard price per sq. ft of sunmica	Rs. 5

Opening stock of material Nil
 Closing stock of material 500 units
 Finished production during the period 80 units

Required: Calculate Material variances.

Solution:-

St. price	x	St. Quantity	2	x	2000	=	4000
St. price	x	Actual Quantity	2	x	2500	=	5000
Actual							
Price	x	Actual Quantity	3	x	2500	=	7500
		Material Cost Variance			3500	F	
		Material Usage Variance			1000	F	
		Material Price Variance			2500	F	

2- Direct Labor Cost Variances

A- Total Labor Cost Variance = (Actual hours *AH** Actual rate per hour *AR*) - (Standard hours for the actual output *SH** Standard rate per hour *SR*) *or* Actual direct labor cost *AC*- Standard direct labor cost *SC*,

Where,

SH = Standard hours for the actual output, *SR* = Standard rate per hour of labor, *AH* = Actual hours, *AR* = Actual rate per hour of labor, *AC* = Actual labor cost, *SC* = Standard labor cost.

B- Labor Rate Variance =(Actual rate per hour *AR*- Standard rate per hour *SR*)* Actual hours *AH*

Where,

SR = Standard rate per hour of labor, *AH* = Actual hours, *AR* = Actual rate per hour of labor.

C- Labor Usage/Efficiency Variance = (Actual hours *AH*- Standard hours for the actual output *SH*)* Standard rate per hour *SR*

Where,

AH = Actual hours, *SH* = Standard hours for the actual output, *SR* = Standard rate per hour of labor.

Example 4. A firm gives you the following data:

Standard time per unit 2.5 hours

Actual hours worked 2,000 hours
Standard rate of pay Rs. 2 per hour
Actual output 1,000 units
Actual wages Rs. 4,500

Required: Calculate all labor variances.

Solution:-

Standard Rate 2

Standard Hours 2500

Actual Rate 2.25

Actual Hours 2000

Total Labor Cost Variance = 500 F

Labor Rate Variance = 500 U

Labor Usage/Efficiency Variance = 1000 F

Example 5. Compute the Labor variances from the information given below:

Standard time 3 hours per unit

Standard rate of wages Rs. 6 per hour

Actual production 700 units

Actual time taken 2000 hours

Actual Wages Rs. 14000

Solution:-

St. Rate 6

St. Hrs 2100

Actual Rate 7

Actual Hrs 2000

Total Labor Cost Variance = 1400 U

Labor Rate Variance = 2000 U

Labor Usage/Efficiency Variance = 600 F

Charlie's Products, Inc.
Standard Cost Summary
Product X

Materials—(1 lb @ \$4 per lb)	\$ 4.00
Labor—(1/2 hr @ \$10 per hr)	5.00
Factory overhead—40% of direct labor cost	2.00
Standard cost per unit	<u>\$ 11.00</u>
Standard materials cost (10,000 units × \$4.00)	\$ 40,000
Standard labor cost (10,000 units × \$5.00)	50,000
Standard factory overhead cost (10,000 units × \$2.00)	20,000
Total standard cost of manufacturing 10,000 units	<u>\$110,000</u>

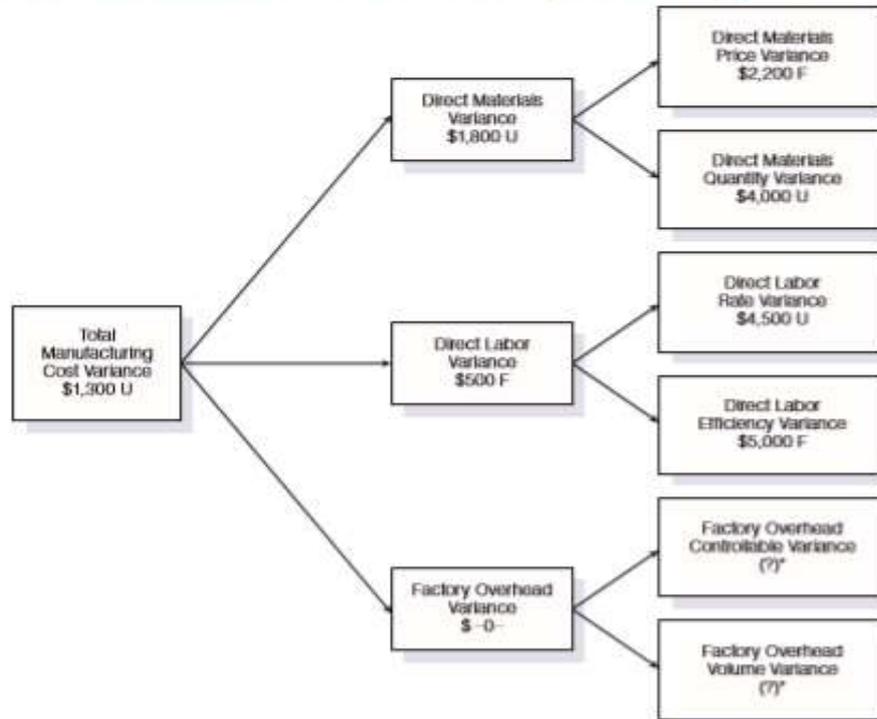
Assume that the materials requisitions, the labor time records, and the factory overhead records indicate the following actual costs to manufacture 10,000 units:

Cost of direct materials used (11,000 lb @ \$3.80)	\$ 41,800
Cost of direct labor (4,500 hr @ \$11.00)	49,500
Factory overhead	20,000
Total actual cost of manufacturing 10,000 units	<u>\$111,300</u>

The standards can now be compared to the actual costs to determine whether any variances exist. This analysis is performed as follows and is illustrated in Figure 8-3:

	Standard Cost	Actual Cost	Net Variances— Favorable (Unfavorable)
Materials	\$ 40,000	\$ 41,800	\$(1,800)
Labor	50,000	49,500	500
Factory Overhead	20,000	20,000	—
Total	<u>\$110,000</u>	<u>\$111,300</u>	<u>\$(1,300)</u>

Figure 8-3 Breakout of Difference between Actual and Budgeted Manufacturing Costs



*Could be offsetting variances equaling zero. (The Factory Overhead Variances will be explained later in this chapter.)

standards previously established. The variances indicate that the cost of materials was \$1,800 higher than it should have been and that the cost of labor was \$500 less than expected, resulting in an overall unfavorable variance of \$1,300. These figures can be of more value to cost control, however, if a further breakdown of the variances is made. The formulas used to segregate the materials and labor variances into price and usage components, along with the calculation of the variances based on the preceding data, are as follows:

1. **Materials price variance** reflects the actual unit price of materials above or below the standard unit price, multiplied by the actual quantity of materials used.

$$\begin{aligned} & (\text{Actual unit price of materials} - \text{standard unit price of materials}) \\ & \times \text{actual quantity of materials used} = \text{Materials Price Variance} \\ & (\$3.80 - \$4.00) \times 11,000 \text{ lb} = \$2,200 \text{ F}^* \end{aligned}$$

* F = favorable; U = unfavorable

2. **Materials quantity (usage) variance** represents the actual quantity of direct materials used above or below the standard quantity allowed for the actual level of production, at standard price.

$$\begin{aligned} & (\text{Actual quantity of materials used} - \text{standard quantity of materials allowed}) \\ & \times \text{standard unit price of material} = \text{Materials Quantity Variance} \\ & [11,000 \text{ lb} - (10,000 \text{ units} \times 1 \text{ lb/unit})] \times \$4.00 = \$4,000 \text{ U} \end{aligned}$$

3. **Labor rate (price) variance** represents the actual hourly rates paid above or below the standard hourly rates, multiplied by the actual number of hours worked.

$$\begin{aligned} & (\text{Actual labor rate per hour} - \text{standard labor rate per hour}) \\ & \times \text{actual number of labor hours worked} = \text{Labor Rate Variance} \\ & (\$11 - \$10) \times 4,500 \text{ hr} = \$4,500 \text{ U} \end{aligned}$$

4. **Labor efficiency (usage) variance** indicates the number of actual direct labor hours worked above or below the standard hours allowed for the actual level of production, at the standard labor rate.

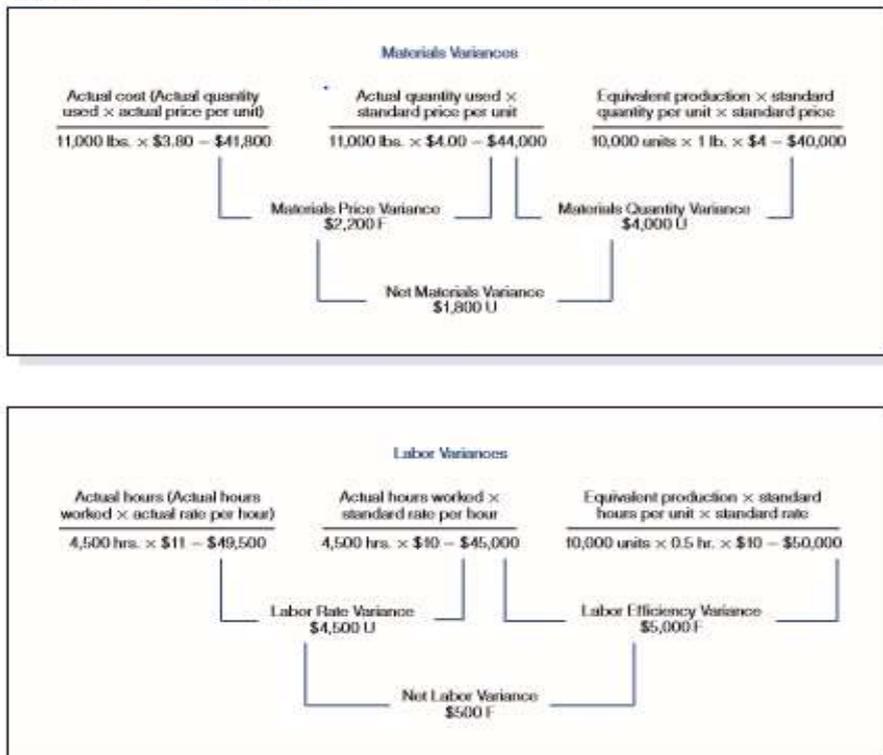
$$\begin{aligned} & (\text{Actual number of labor hours worked} - \text{standard number of labor hours allowed}) \\ & \times \text{standard labor rate per hour} = \text{Labor Efficiency Variance} \\ & [4,500 \text{ hr} - (10,000 \text{ units} \times 0.5 \text{ hr/unit})] \times \$10 = \$5,000 \text{ F} \end{aligned}$$

A *debit balance* in a variance account indicates an **unfavorable variance**; that is, actual costs have exceeded the established standard cost. A *credit balance* reflects a **favorable variance**, indicating that actual costs were less than the standard cost. In management terminology, an unfavorable variance means

That a charge (debit) has been added that increases the cost beyond the standard established, thereby reducing the expected profitability of the product. A favorable variance (credit) would add to a product's anticipated profitability because it reduces the cost set for the product below the standard established. When a company uses a standard cost system, it usually considers the product's standard cost to be the cost for setting its selling price. Therefore, any movement of cost above or below the standard will have a direct effect on profitability. Figure 8-4 shows an alternative format, sometimes referred to as the "goalpost diagram," for calculating the materials and labor variances, using the data previously presented for materials and labor. Whichever format you choose, this analysis shows the specific variances as quantity and price deviations from the established standards. The required manufacturing effort

exceeded the established materials standard for 10,000 units; this, given a standard price of \$4.00 per pound, created an unfavorable materials quantity variance of \$4,000 (1,000 pounds used in excess of standard allowed \$4.00). The variance was partially offset by the fact that the 11,000 pounds of materials used were obtained at a below standard cost of \$3.80 per pound, thereby creating a favorable price variance of \$2,200 (11,000 pounds used at a saving of \$0.20 per pound). Note that the combined effect of the two variances is the unfavorable net materials variance of \$1,800. It can also be obtained by subtracting the \$40,000 standard cost in the right post of the “goalpost” diagram from the \$41,800 actual cost shown in the left post. The calculation of labor variances indicates a favorable labor efficiency variance of \$5,000, because the 4,500 actual hours worked was 500 hours below the standard hours allowed for the production of 10,000 units. During the period, however, the company paid an actual labor rate of \$11 per hour, which was higher than the standard labor rate of \$10 per hour, creating an unfavorable rate variance of \$4,500. Note that the combined effect of the two variances is a favorable net labor variance of \$500. It can also be obtained by subtracting the \$49,500 actual cost shown in the left post of the “goalpost” diagram from the \$50,000 standard cost shown in the right post. It is important to understand that the terms favorable and unfavorable indicate only a deviation of the actual cost below or above standard. Further analysis and investigation may indicate that the unfavorable variance does not necessarily reflect an inefficiency; nor does the favorable variance always indicate a desirable situation. An apparently unfavorable condition may be more than offset by a favorable situation. For example, a favorable materials price variance that results from buying less expensive materials than called for by the standards may more than offset an unfavorable materials quantity variance that results from additional spoilage due to the use of cheaper materials. In any event, all significant variances, favorable or unfavorable, should be analyzed to determine the cause for and the effect of the deviations. Appropriate action should then be taken to improve the problem areas.

Figure 8-4 Calculating Variances



Alternative Method of Recording Materials Cost

Some companies recognize materials price variances at the time materials are purchased, rather than waiting until they are used, by recording a **materials purchase price variance**. This variance represents the deviation of the actual purchase price from the standard purchase price on all the materials purchased, whether or not they were used in production during the period. The rationale for recording this variance at the time of purchase is that the difference between actual and standard cost is known at this time, so there is no reason for delaying the recognition of this variance until the materials are used. A further reason for recording the variance at the time

of purchase is that the purchasing agent should be responsible for the price of all materials purchased, whether or not they were used in production during the period.

Using the previous unit price figures and assuming that 12,000 pounds are purchased and 11,000 pounds are used, the materials purchase price variance would be computed as follows:

$$\begin{aligned} &\text{Actual unit cost of materials} - \text{Standard unit cost of materials} \\ &\quad \times \text{Actual quantity purchased} \\ &(\$3.80 - \$4.00) \times 12,000 = 2,400 \text{ F} \end{aligned}$$

Recall and Review 1

The standard operating capacity of Vermont Manufacturing, Inc., is 2,000 units. It should take three hours of direct labor time to produce one unit of product, at a standard rate of \$15 per hour. It actually took 6,500 direct labor hours to produce the 2,000 units, at an actual wage rate of \$16 per hour. Based on the information above, the labor rate variance is \$ _____, the labor efficiency variance is \$ _____, and the net labor variance is \$ _____. (Be sure to designate each variance as favorable or unfavorable.)

(After working this exercise, see page 417 for the solution.)

You should now be able to work the following:
 Questions 1–10; Exercises—8-1 to 8-5, Parts a. and b.; Exercises 8-6 to 8-9; Problems 8-1 to 8-6; and the Internet Exercise.

Illustration of Standard Cost in a Departmentalized Factory

The following example demonstrates standard cost accounting procedures in a factory having two departments.

	Machining	Assembly	Total
Materials: 5 lb @ \$1lb	\$ 5		
1 lb @ \$2 lb		\$ 2	\$ 7
Labor: 1 hr @ \$8	8		
2 hr @ \$10		20	28
Factory overhead:			
Per unit	<u>1</u>	<u>2</u>	<u>3</u>
Standard costs per unit	<u>\$14</u>	<u>\$24</u>	<u>\$38</u>

	Machining	Assembly
Beginning units in process	None	None
Units finished and transferred	2,200	1,800
Ending units in process	None	400
Stage of completion		1/2

Units pass through Machining to Assembly. In both departments, materials, labor, and overhead are added evenly throughout the process. Actual costs for the month—as determined from materials requisitions, payroll records, and factory overhead records—are as follows:

	Machining	Assembly	Total
Direct materials:			
12,000 lb @ \$0.95	\$11,400		
1,900 lb @ \$2.10		\$ 3,990	\$15,390
Direct labor:			
2,000 hr @ \$8.10	16,200		
4,100 hr @ \$9.90		40,590	56,790
Factory overhead:			
Indirect materials	\$1,400	\$2,500	
Indirect labor	<u>800</u>	<u>1,500</u>	<u>4,000</u>
	<u>\$29,800</u>	<u>\$48,500</u>	<u>\$78,300</u>

From the data given on the standard cost summary, the standard costs of production can be determined. To facilitate the comparison of these figures with actual costs and the determination of variances, a form similar to Figure 8-6 can be used.

Figure 8-6 Calculation of Variances

	A	B	C	D	E	F	G	H	I	J
			Machining		Assembly				Total	
			Equivalent Production of		Equivalent Production of					
			2,200 Units		2,000* Units					
				Net Favorable		Net Favorable				Net Favorable
			Standard	(Unfavorable)	Standard	(Unfavorable)	Standard	Actual	Actual	(Unfavorable)
			Cost	Variance	Cost	Variance	Cost	Cost	Cost	Variance
7 Materials:										
8 11,000 lb @ \$1.00		\$11,000								
9 12,000 lb @ \$0.95			\$11,400	\$(400)						
10 2,000 lb @ \$2.00					\$4,000					
11 1,900 lb @ \$2.10						\$3,990	\$10	\$15,000	\$15,390	\$(390)
12 Labor:										
13 2,200 hr @ \$8.00		17,600								
14 2,000 hr @ \$8.10			16,200	1,400						
15 4,000 hr @ \$10.00					40,000					
16 4,100 hr @ \$9.90						40,590	(590)	57,600	56,790	810
17 Factory overhead:										
18 Standard cost per										
19 unit, \$1.00		2,200								
20 Actual cost			2,200	—						
21 Standard cost per										
22 unit, \$2.00					4,000					
23 Actual cost						4,000	—	6,200	6,200	—
24 Total		<u>\$30,800</u>	<u>\$29,800</u>	<u>\$1,000</u>	<u>\$48,000</u>	<u>\$48,500</u>	<u>\$500</u>	<u>\$78,000</u>	<u>\$78,300</u>	<u>\$420</u>

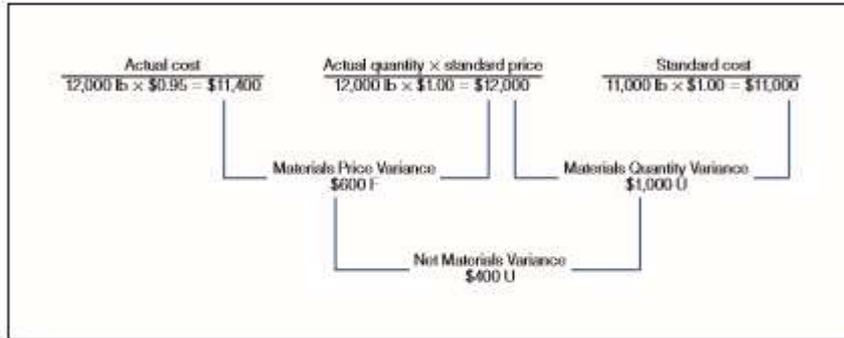
* 1,800 units finished and transferred + (400 × 1/2) equivalent production in ending inventory.

Using the data given in Figure 8-6 on page 399, we can compute the specific variances for materials using either of the following two formats.

Materials – Machining:

$$\begin{aligned} \text{Materials price variance} &= (\text{Actual unit price} - \text{Standard unit price}) \\ &\quad \times \text{Actual quantity} \\ &= (\$0.95 - \$1.00) \times 12,000 \text{ lb} = \$600 \text{ F} \end{aligned}$$

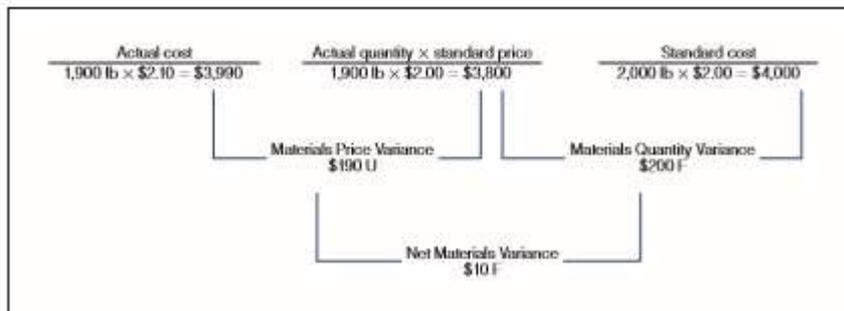
$$\begin{aligned} \text{Materials quantity variance} &= (\text{Actual quantity} - \text{Standard quantity}) \\ &\quad \times \text{Standard price} \\ &= [12,000 \text{ lb} - (2,200 \text{ units} \times 5 \text{ lb/unit})] \\ &\quad \times \$1 = \$1,000 \text{ U} \end{aligned}$$



Materials – Assembly:

$$\text{Materials price variance} = (\$2.10 - \$2.00) \times 1,900 \text{ lb} = \$190 \text{ U}$$

$$\text{Materials quantity variance} = [1,900 \text{ lb} - (2,000 \text{ units} \times 1 \text{ lb/unit})] \times \$2 = \$200 \text{ F}$$

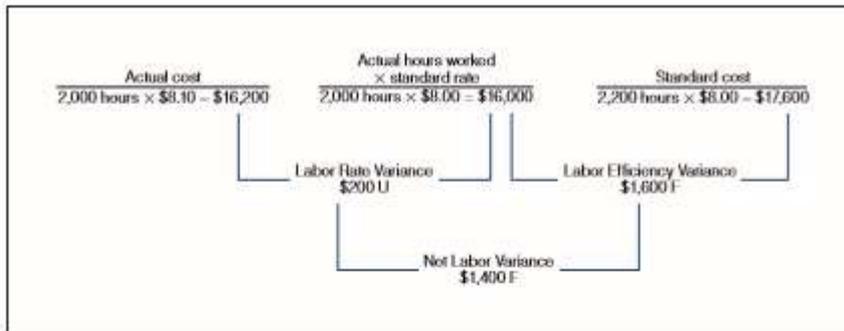


Based on the data in Figure 8-6, the specific variances for labor can be computed using either of the following formats.

Labor – Machining:

$$\begin{aligned} \text{Labor rate variance} &= (\text{Actual labor rate} - \text{Standard labor rate}) \\ &\quad \times \text{Actual hours} \\ &= (\$8.10 - \$8.00) \times 2,000 \text{ hr} = \$200 \text{ U} \end{aligned}$$

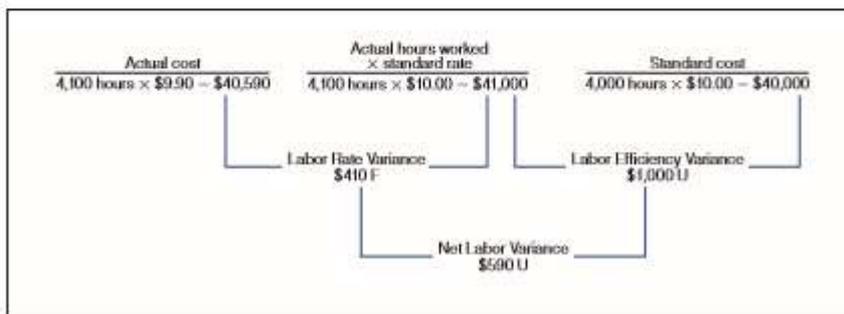
$$\begin{aligned} \text{Labor efficiency variance} &= (\text{Actual labor hours} - \text{Standard labor hours}) \\ &\quad \times \text{Standard labor rate} \\ &= [2,000 \text{ hr} - (2,200 \text{ units} \times 1 \text{ hr/unit})] \\ &\quad \times \$8 = \$1,600 \text{ F} \end{aligned}$$



Labor – Assembly:

$$\text{Labor rate variance} = (\$9.90 - \$10.00) \times 4,100 \text{ hr} = \$410 \text{ F}$$

$$\text{Labor efficiency variance} = [4,100 \text{ hr} - (2,000 \text{ units} \times 2 \text{ hr/unit})] \times \$10 = \$1,000 \text{ U}$$



Manufacturing overhead cost variances

Two – variances method of analysis

The method a company chooses to analyze factory overhead variances depends on the benefits the company derives from the detailed analysis. The cost incurred in applying the standard factory overhead to production, maintaining the necessary accounts, and analyzing the results also plays a part in the process of selecting a method. **The two-variance method** is the least complex approach; it divides the total variance into a controllable variance and a volume variance. **The controllable variance** measures the amount by which the actual factory overhead costs differ from the standard overhead costs for the level of production attained. The difference results from the behavior of the fixed and variable cost items. As discussed previously, fixed cost items tend to remain the same in total dollars despite normal fluctuations in production volume, while total variable costs tend to vary proportionately with changes in production. In the previous example, depreciation, taxes, insurance, and supervisory salaries are typical items of fixed expense, while maintenance costs and supplies are usually listed in the category of variable cost. **The volume variance** measures the difference between the budgeted fixed overhead and the fixed overhead applied to work in process. It is the result of operating at a level of production different from the standard level.

Actual Overhead	—	Overhead Applied based on Standard Hours Allowed	=	Total Overhead Variance
Actual Overhead	—	Overhead Budgeted based on Standard Hours Allowed	=	Overhead Controllable Variance
Overhead Budgeted based on Standard Hours Allowed	—	Overhead Applied based on Standard Hours Allowed	=	Overhead Volume Variance

Three – variances method of analysis

The three-variance method of factory overhead analysis, though not as common as the two-variance method, is frequently used by manufacturers. This method separates actual and applied overhead into three variances: (1) **budget (spending)**, (2) **capacity**, and (3) **efficiency**. **The budget**

variance, or spending variance, reflects the difference between the actual costs of overhead and the budgeted amount calculated for the actual hours worked. The saving or overspending is chargeable to the manager or departmental supervisor responsible for the costs. These budget variances should not be confused with those for the two variance method. The calculations are different and result in a sharper distinction in variances. The primary difference between the two methods of variance analysis is that the three-variance method determines the budget allowances based on actual hours worked rather than on the standard number of hours allowed for the units produced. **The capacity variance** indicates that the volume of production was either more or less than normal. It reflects an under- or over application of fixed costs and measures the difference between actual hours worked (multiplied by the standard overhead rate) and the budget allowance based on actual hours worked. This variance is considered the responsibility of management and can be due to expected seasonal variations or changes in the volume of production (caused by poor scheduling, improper use of labor, strikes, or other factors). **The efficiency variance** measures the difference between the overhead applied (standard hours at the standard rate) and the actual hours worked multiplied by the standard rate. It shows the effect on fixed and variable overhead costs when the actual hours worked are either more or less than standard hours allowed for the production volume. Unfavorable variances may be caused by inefficiencies in the use of labor or by an excessive use of labor hours. Favorable efficiency variances indicate a more effective use of labor than was anticipated by the standards. Many accountants feel that the budget allowance for overhead is more appropriate when the base used reflects actual labor hours rather than standard labor hours.

1. overhead spending variance:

(Actual overhead– Budgeted overhead based on actual hours allowed).

2. overhead efficiency variance:

(Budgeted overhead based on actual hours allowed– Budgeted overhead based on standard hours allowed).

3. overhead volume variance:

(Budgeted overhead based on standard hours allowed– Allocated overhead).

Four – variances method of analysis

A refined management view of the two-variance method isolates the fixed and variable components that comprise the factory overhead cost and calculates separate variances for the variable costs and the fixed costs. The four-variance method recognizes two variable cost variances and two fixed cost variances. The cost variances are identified as **a variable overhead spending variance, a variable overhead efficiency variance, a fixed overhead budget variance, and a fixed overhead volume variance.** **The variable overhead spending variance** measures the effect of differences in the actual variable overhead rate and the standard variable overhead rate. **The variable overhead efficiency variance** measures the change in the variable overhead consumption that occurs because of efficient or inefficient use of the cost allocation base, such as direct labor hours. **The fixed overhead budget variance** measures the difference between the actual fixed overhead and the budgeted fixed overhead. **The fixed overhead volume variance** is the difference between budgeted fixed overhead and applied fixed overhead.

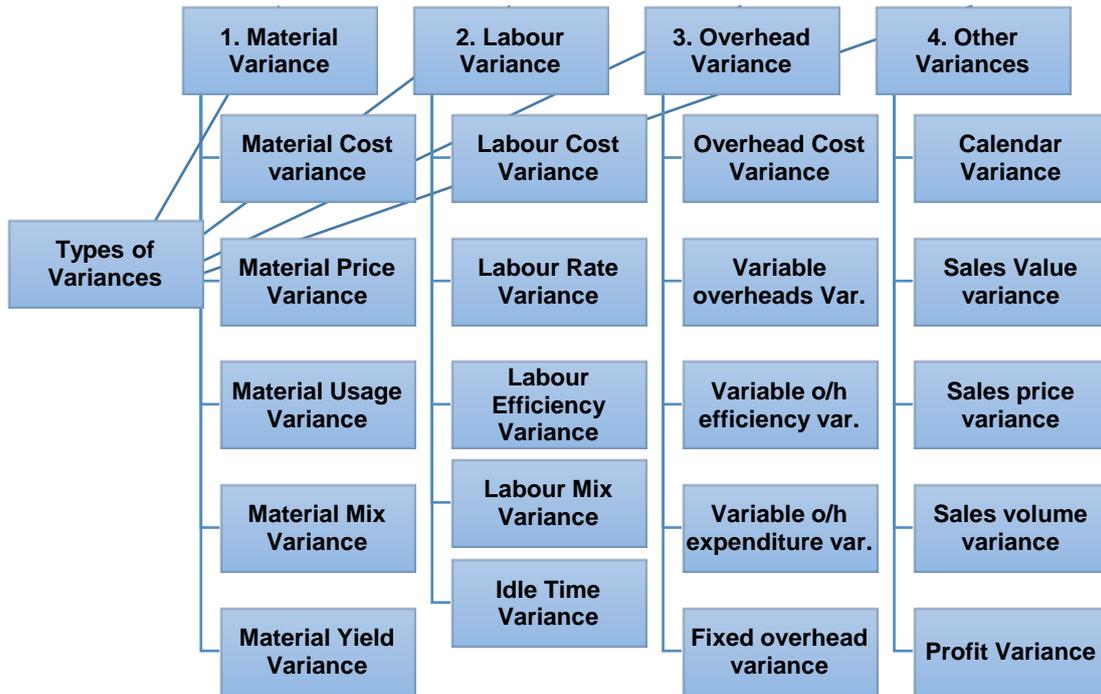
The four-variance method has two important aspects: (1) separate actual factory overhead accounts must be maintained for variable costs and fixed costs; and (2) actual direct labor hours worked must be known.

Variable overhead variances:

1. Variable overhead spending variance:
**(Actual variable overhead rate – Budgeted variable overhead rate)*
Actual hours.**
2. Variable overhead efficiency variance:
**[Actual hours – Std. hours for actual output] Budgeted variable
overhead rate**

Fixed Overhead Variance:

1. Fixed overhead spending variance
(Actual Fixed overhead– Budgeted Fixed overhead)
2. Fixed overhead volume variance
(Budgeted Fixed overhead– Allocated Fixed overhead)



SELF-STUDY PROBLEM 2

Flexible Budgets; Two-, Three-, and Four-Variance Methods of Factory Overhead Analysis

Baton Rouge Manufacturing, Inc.

Baton Rouge manufactures a single product and uses a standard cost system. The factory overhead is applied on the basis of direct labor hours. A condensed version of the company's flexible budget follows:

Direct labor hours	20,000	25,000	40,000
Factory overhead costs:			
Variable costs	\$ 40,000	\$ 50,000	\$ 80,000
Fixed costs	200,000	200,000	200,000
Total	<u>\$240,000</u>	<u>\$250,000</u>	<u>\$280,000</u>

The product requires 3 pounds of materials at a standard cost per pound of \$7 and 2 hours of direct labor at a standard cost of \$6 per hour.

For the current year, the company planned to operate at 25,000 direct labor hours and to produce 12,500 units of product. Actual production and costs for the year follow:

Number of units produced	14,000
Actual direct labor hours worked	30,000
Actual variable overhead costs incurred	\$ 52,000
Actual fixed overhead costs incurred	\$208,000

Required:

1. Compute the factory overhead rate that will be used for production for the current year. Show the variable and fixed components that make up the total predetermined rate to be used.
2. Prepare a standard cost card for the product. Show the individual elements of the overhead rate as well as the total rate.
3. Compute (a) standard hours allowed for production and (b) under- or overapplied factory overhead for the year.
4. Determine the reason for any under- or overapplied factory overhead for the year by computing all variances, using each of the following methods:
 - a. Two-variance method
 - b. Three-variance method (appendix)
 - c. Four-variance method (appendix)

SOLUTION TO SELF-STUDY PROBLEM 2

Compute the Factory Overhead Rate by Variable and Fixed Elements:

1. Show the total predetermined rate that will be used during the current year.

			Per DLH
Variable rate:			
Variable costs	\$ 50,000	=	\$ 2.00
Direct labor hours	25,000		
Fixed rate:			
Fixed costs	\$200,000	=	8.00
Direct labor hours	25,000		
Total rate:			
Variable costs	\$ 50,000		
Fixed costs	<u>200,000</u>		
Total costs	\$250,000	=	<u>\$10.00</u>
Direct labor hours	25,000		

2. Prepare a standard cost card for each unit of product.

Direct materials: 3 lb @ \$7 per lb		\$21.00
Direct labor: 2 hr @ \$6 per hr		12.00
Factory overhead:		
Variable cost: 2 hr @ \$2	\$ 4.00	
Fixed cost: 2 hr @ \$8	<u>16.00</u>	<u>20.00</u>
Standard cost per unit		<u>\$53.00</u>

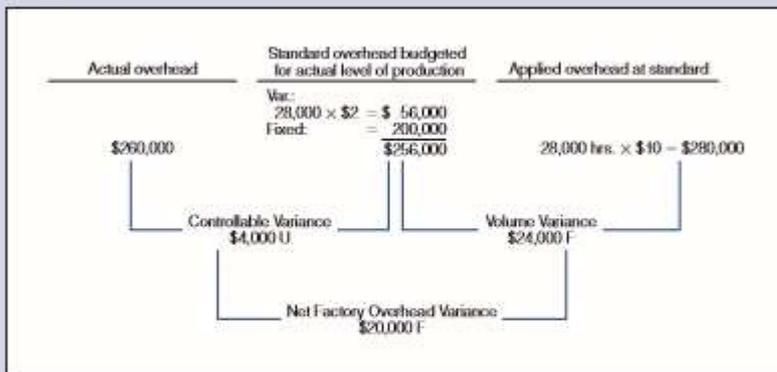
3. a. Compute the standard hours allowed for production for the year.

Actual units produced	14,000
Number of hours allowed by standard established for each unit of product ×	<u>2</u>
Total standard hours allowed	<u>28,000</u>

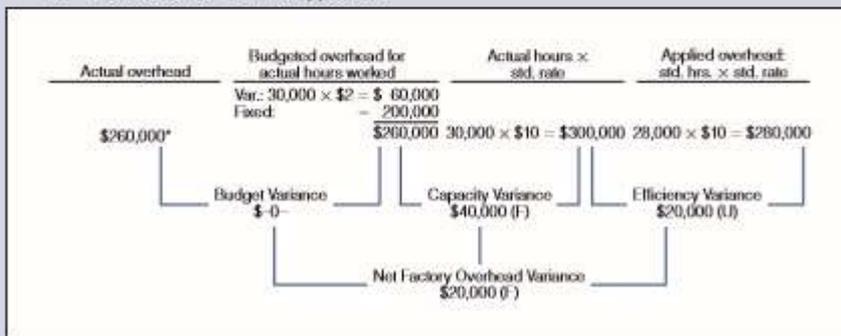
b. Compute the under- or overapplied factory overhead for the year.

Actual factory overhead incurred:	
Variable costs	\$ 52,000
Fixed costs	<u>208,000</u>
Total actual overhead costs	<u>\$260,000</u>
Factory overhead costs applied:	
Standard hours allowed × standard rate:	
28,000 hours × \$10.00	<u>280,000</u>
Overapplied factory overhead	<u>\$ 20,000</u>

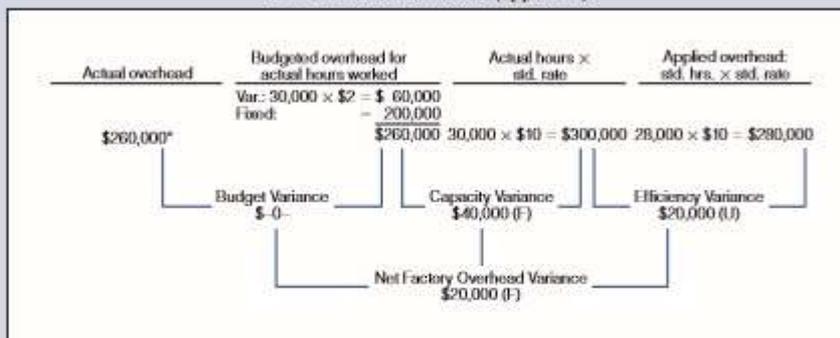
4. Calculate the reason for the overapplied factory overhead by:
a. Two-variance method:



b. Three-variance method (appendix):



c. Four-variance method (appendix):



** These total costs represent actual hours × actual rates per hour. When the total cost is given, it is not necessary to determine the specific components that make up the total cost unless you do it to understand the formulas being used.*