

AGENDA: STANDARD COSTS AND VARIANCES

- A. Standard costs
 - 1. Ideal vs. practical standards
 - 2. Standard cost card
 - 3. Computing variances
 - a. The general variance model
 - b. Direct materials variances
 - c. Direct labor variances
 - d. Variable manufacturing overhead variances
 - 4. Potential problems with standard costs
 - 5. (Appendix A) Predetermined overhead rates and overhead analysis in standard costing systems
 - 6. (Appendix B) Journal entries for variances

SETTING STANDARD COSTS

- A standard is a benchmark or “norm” for measuring performance.
- Price standard: How much an input should cost.
- Quantity standard: How much of a given input should be used to make a unit of output.

IDEAL VS. PRACTICAL STANDARDS

Ideal standards allow for no machine breakdowns or work interruptions, and can be attained only by working at peak effort 100% of the time. Such standards:

- often discourage workers.
- shouldn't be used for decision making.

Practical standards allow for “normal” down time, employee rest periods, and the like. Such standards:

- are felt to motivate employees because the standards are “tight but attainable.”
- are useful for decision-making purposes because variances from standard will contain only “abnormal” elements.

DIRECT MATERIAL STANDARDS From Old TMs

Speeds, Inc. makes a popular jogging suit. The company wants to develop standards for material, labor, and variable manufacturing overhead.

The standard price per unit for direct materials should be the final, delivered cost of materials. The standard price should reflect:

- Specified quality of materials.
- Discounts for quantity purchases.
- Discounts for early payment, if any.
- Transportation (freight) costs.

EXAMPLE: A material known as verilon is used in the jogging suits. The standard price for a yard of verilon is determined as follows:

Purchase price, grade A verilon	\$5.70
Less purchase discount in 20,000 yard lots ..	(0.20)
Shipping by truck	<u>0.50</u>
Standard price per yard	<u>\$6.00</u>

DIRECT MATERIAL STANDARDS (continued) From Old TMs

The standard quantity per unit for direct materials is the amount of material that should go into each finished unit of product. The standard quantity should reflect:

- Engineered (bill of materials) requirements.
- Expected spoilage of raw materials.
- Unavoidable waste of materials in the production process.
- Materials in expected scrapped units (rejects).

EXAMPLE: The standard quantity of verilon in one jogging suit is computed as follows:

Bill of materials requirement	2.8 yards
Allowance for waste	0.6 yards
Allowance for rejects	<u>0.1</u> yards
Standard quantity per jogging suit...	<u>3.5</u> yards

Once the price and quantity standards have been set, the standard cost of materials (verilon) for one unit of finished product can be computed:

$$3.5 \text{ yards per jogging suit} \times \$6 \text{ per yard} = \$21 \text{ per jogging suit}$$

DIRECT LABOR STANDARDS From Old TMs

The standard rate per hour for direct labor should include all the costs of direct labor workers, including:

- Hourly wage rates.
- Fringe benefits.
- Employment taxes.

Many companies prepare a single standard rate for all employees in a department, based on the expected mix of high and low wage rate employees. This procedure:

- Simplifies the use of standard costs
- Allows monitoring the actual mix of employees in the department

EXAMPLE: The standard rate per hour for the expected labor mix is determined by using average wage rates, fringe benefits, and employment taxes as follows:

Average wage rate per hour	\$13
Average fringe benefits.....	4
Average employment taxes.....	<u>1</u>
Standard rate per direct labor-hour	<u><u>\$18</u></u>

DIRECT LABOR STANDARDS (continued) From Old TMs

The standard hours per unit for direct labor specifies the amount of direct labor time required to complete one unit of product. This standard time should include:

- Engineered labor time per unit.
- Allowance for breaks, personal needs, and cleanup.
- Allowance for setup and other machine downtime.
- Allowance for rejects.

EXAMPLE: The standard hours required to produce a jogging suit have been determined as follows:

Basic labor time per unit	1.4 hours
Allowance for breaks and cleanup	0.1 hours
Allowance for setup and downtime ...	0.3 hours
Allowance for rejects	<u>0.2</u> hours
Standard hours per jogging suit	<u>2.0</u> hours

Once the time and rate standards have been set, the standard cost of labor for one unit of product can be computed:

$$2.0 \text{ hours per jogging suit} \times \$18 \text{ per hour} = \$36 \text{ per jogging suit.}$$

VARIABLE OVERHEAD STANDARDS From Old TMs

There may be standards for variable overhead, as well as for direct materials and direct labor. The standards are typically expressed in terms of a "rate" and "hours," much like direct labor.

- The "rate" is the variable portion of the predetermined overhead rate.
- The "hours" represent whatever base is used to apply overhead cost to products. Ordinarily, this would be direct labor-hours or machine-hours.

EXAMPLE: Speeds, Inc. applies overhead cost to products on the basis of direct labor-hours. The variable portion of the predetermined overhead rate is \$4 per direct labor-hour. Using this rate, the standard cost of variable overhead for one unit of product is:

2.0 hours per jogging suit × \$4 per hour = \$8 per jogging suit.

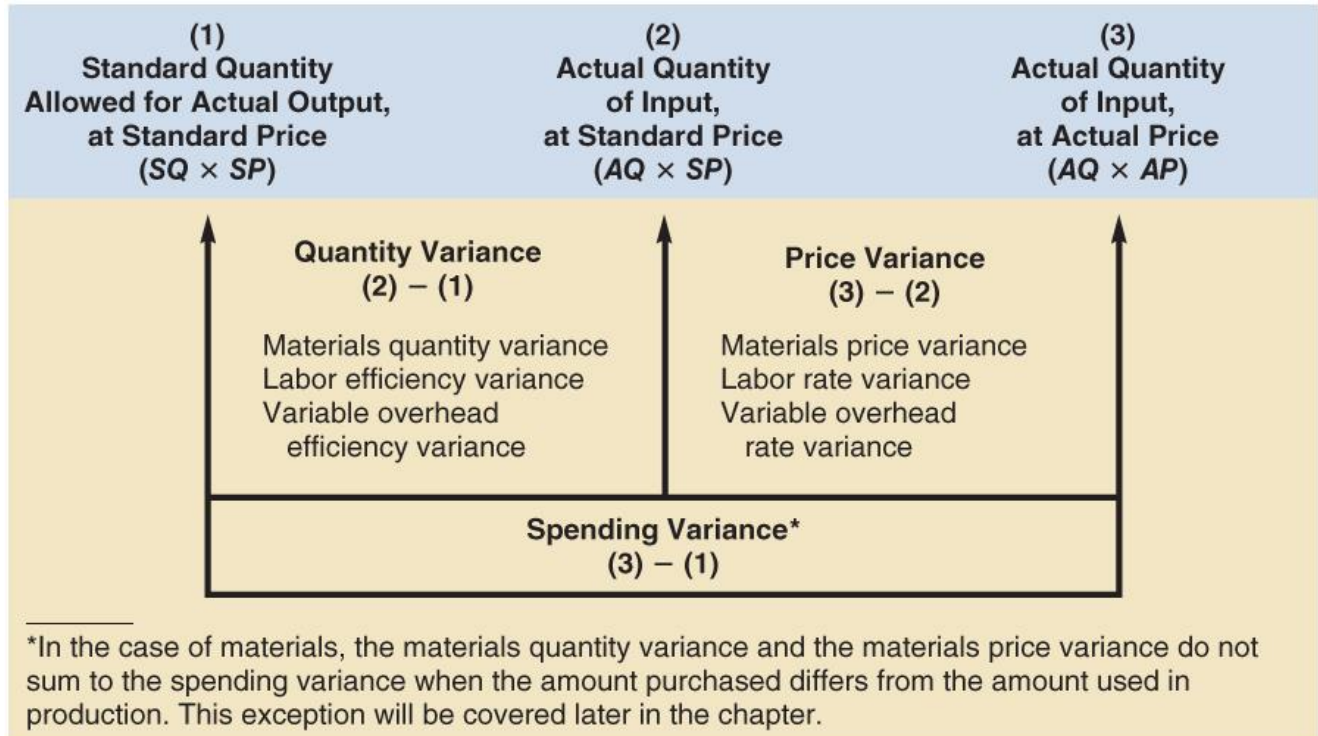
STANDARD COST CARD

After standards have been set for materials, labor, and overhead, a standard cost card is prepared. The standard cost card indicates what the cost should be for a completed unit of product.

EXAMPLE: Referring back to the standard costs computed for materials, labor, and overhead, the standard cost for one jogging suit would be:

<i>Standard Cost Card for Jogging Suits</i>			
	<i>(1)</i>	<i>(2)</i>	<i>(1) × (2)</i>
	<i>Standard</i>	<i>Standard</i>	
	<i>Quantity</i>	<i>Price</i>	<i>Standard</i>
	<i>or Hours</i>	<i>or Rate</i>	<i>Cost</i>
Direct materials.....	3.5 yards	\$6 per yard	\$21
Direct labor.....	2.0 hours	\$18 per hour	36
Variable manufacturing overhead.....	2.0 hours	\$4 per hour	<u>8</u>
Total standard cost per suit...			<u>\$65</u>

THE GENERAL VARIANCE MODEL



The standard quantity allowed (standard hours allowed in the case of labor and overhead) is the amount of materials (or labor) that should have been used to complete the output of the period.

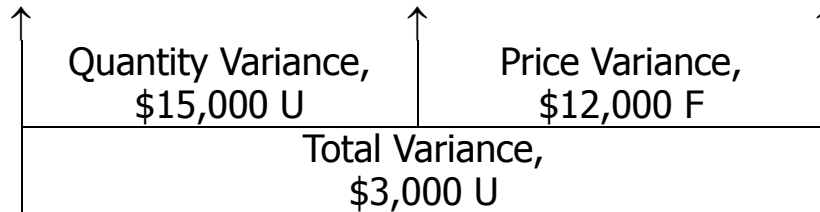
DIRECT MATERIAL VARIANCES

To illustrate variance analysis, refer to the standard cost card for Speeds, Inc.'s jogging suit. The following data are for last month's production:

Number of suits completed	5,000 units
Cost of material purchased	
(20,000 yards × \$5.40 per yard) .	\$108,000
Yards of material used.....	20,000 yards

Using these data and the data from the standard cost card, the material price and quantity variances are:

Standard Quantity Allowed for Output, at Standard Price (SQ × SP)	Actual Quantity of Input, at Standard Price (AQ × SP)	Actual Quantity of Input, at Actual Price (AQ × AP)
17,500 yards* × \$6.00 per yard = \$105,000	20,000 yards × \$6.00 per yard = \$120,000	20,000 yards × \$5.40 per yard = \$108,000



- * 5,000 suits × 3.5 yards per suit = 17,500 yards
- F = Favorable
- U = Unfavorable

DIRECT MATERIAL VARIANCES (continued)

The direct material variances can also be computed as follows:

MATERIAL QUANTITY VARIANCE:

- *Method one:*

$$\begin{aligned} \text{MQV} &= (\text{AQ} \times \text{SP}) - (\text{SQ} \times \text{SP}) \\ &= (20,000 \text{ yards} \times \$6.00 \text{ per yard}) - \\ &\quad (17,500 \text{ yards}^* \times \$6.00 \text{ per yard}) \\ &= \$15,000 \text{ U} \end{aligned}$$

*5,000 suits \times 3.5 yards per suit = 17,500 standard yards

- *Method two:*

$$\begin{aligned} \text{MQV} &= (\text{AQ} - \text{SQ}) \text{ SP} \\ &= (20,000 \text{ yards} - 17,500 \text{ yards}) \$6.00 \text{ per yard} \\ &= \$15,000 \text{ U} \end{aligned}$$

MATERIAL PRICE VARIANCE:

- *Method one:*

$$\begin{aligned} \text{MPV} &= (\text{AQ} \times \text{AP}) - (\text{AQ} \times \text{SP}) \\ &= (\$108,000) - (20,000 \text{ yards} \times \$6.00 \text{ per yard}) \\ &= \$12,000 \text{ F} \end{aligned}$$

- *Method two:*

$$\begin{aligned} \text{MPV} &= \text{AQ} (\text{AP} - \text{SP}) \\ &= 20,000 \text{ yards} (\$5.40 \text{ per yard} - \$6.00 \text{ per yard}) \\ &= \$12,000 \text{ F} \end{aligned}$$

The material price variance should be recorded at the time materials are purchased. This permits:

- Early recognition of the variance.
- Recording materials at standard cost.

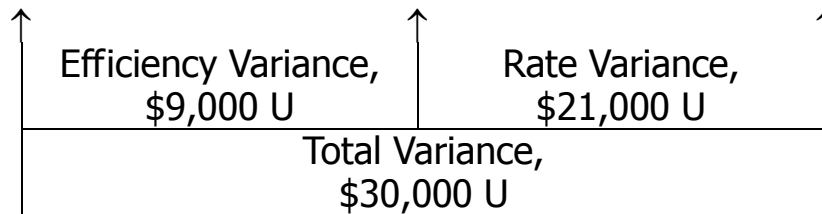
DIRECT LABOR VARIANCES

The following data are for last month's production:

Number of suits completed (as before)	5,000 units
Cost of direct labor	
(10,500 hours @ \$20 per hour)	\$210,000

Using these data and the data from the standard cost card, the labor rate and efficiency variances are:

Standard Hours Allowed for Output, at the Actual Rate (SH × SR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Actual Hours of Input, at the Actual Rate (AH × AR)
10,000 hours* × \$18 per hour = \$180,000	10,500 hours × \$18 per hour = \$189,000	10,500 hours × \$20 per hour = \$210,000



* 5,000 suits × 2.0 hours per suit = 10,000 hours.

F = Favorable

U = Unfavorable

DIRECT LABOR VARIANCES (continued)

The direct labor variances can also be computed as follows:

LABOR EFFICIENCY VARIANCE:• *Method one:*

$$\begin{aligned} \text{LEV} &= (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) \\ &= (10,500 \text{ hours} \times \$18 \text{ per hour}) \\ &\quad - (10,000 \text{ hours}^* \times \$18 \text{ per hour}) \\ &= \$9,000 \text{ U} \end{aligned}$$

$$*5,000 \text{ suits} \times 2.0 \text{ hours per suit} = 10,000 \text{ hours}$$

• *Method two:*

$$\begin{aligned} \text{LEV} &= (\text{AH} - \text{SH}) \text{SR} \\ &= (10,500 \text{ hours} - 10,000 \text{ hours}) \$18 \text{ per hour} \\ &= \$9,000 \text{ U} \end{aligned}$$

LABOR RATE VARIANCE:• *Method one:*

$$\begin{aligned} \text{LRV} &= (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) \\ &= (\$210,000) - (10,500 \text{ hours} \times \$18 \text{ per hour}) \\ &= \$21,000 \text{ U} \end{aligned}$$

• *Method two:*

$$\begin{aligned} \text{LRV} &= \text{AH} (\text{AR} - \text{SR}) \\ &= 10,500 \text{ hours} (\$20 \text{ per hour} - \$18 \text{ per hour}) \\ &= \$21,000 \text{ U} \end{aligned}$$

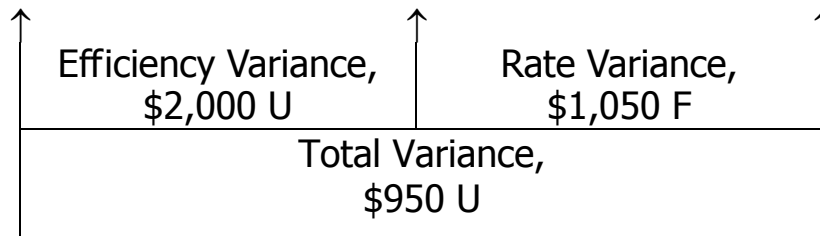
VARIABLE MANUFACTURING OVERHEAD VARIANCES

The following data are for last month's production:

Number of suits completed (as before).....	5,000 units
Actual direct labor-hours (as before)	10,500 hours
Variable overhead costs incurred.....	\$40,950

Using these data and the data from the standard cost card, the variable overhead variances are:

Standard Hours Allowed for Output, Standard Rate (SH × SR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Actual Hours of Input, at the Actual Rate (AH × AR)
10,000 hours* × \$4 per hour = \$40,000	10,500 hours × \$4 per hour = \$42,000	\$40,950



* 5,000 suits × 2.0 hours per suit = 10,000 hours.

F = Favorable

U = Unfavorable

VARIABLE OVERHEAD VARIANCES (continued)

The variable manufacturing overhead variances can also be computed as follows:

VARIABLE OVERHEAD EFFICIENCY VARIANCE:

- *Method one:*

$$\begin{aligned} \text{VOEV} &= (\text{AH} \times \text{SR}) - (\text{SH} \times \text{SR}) \\ &= (10,500 \text{ hours} \times \$4.00 \text{ per hour}) \\ &\quad - (10,000 \text{ hours}^{**} \times \$4.00 \text{ per hour}) \\ &= \$2,000 \text{ U} \end{aligned}$$

** 5,000 suits \times 2.0 hours per suit = 10,000 hours

- *Method two:*

$$\begin{aligned} \text{VOEV} &= (\text{AH} - \text{SH}) \text{SR} \\ &= (10,500 \text{ hours} - 10,000 \text{ hours}) \$4.00 \text{ per hour} \\ &= \$2,000 \text{ U} \end{aligned}$$

VARIABLE OVERHEAD RATE VARIANCE:

- *Method one:*

$$\begin{aligned} \text{VORV} &= (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) \\ &= (\$40,950) - (10,500 \text{ hours} \times \$4.00 \text{ per hour}) \\ &= \$1,050 \text{ F} \end{aligned}$$

- *Method two:*

$$\begin{aligned} \text{VORV} &= \text{AH} (\text{AR} - \text{SR}) \\ &= 10,500 \text{ hours} (\$3.90 \text{ per hour}^* - \$4.00 \text{ per hour}) \\ &= \$1,050 \text{ F} \end{aligned}$$

* $\$40,950 \div 10,500 \text{ hours} = \3.90 per hour

POTENTIAL PROBLEMS WITH STANDARD COSTS

- Variances are often reported too late to be useful.
- If used as a tool for punishing people, standards can undermine morale.
- Labor efficiency standards encourage high output. This may lead to excessive work-in-process if a workstation is not a bottleneck.
- A favorable quantity variance may be worse than an unfavorable quantity variance.
- Quality may suffer if undue emphasis is placed on just meeting the standards.
- Just meeting standards may not be sufficient; continual improvement is often necessary.

From Old Chapter 11 P19 Answer Key

Variable overhead

Spending variance: This variance includes both price and quantity elements. The overhead spending variance reflects differences between actual and standard prices for variable overhead items. It also reflects differences between the amounts of variable overhead inputs that were actually used and the amounts that should have been used for the actual output of the period. Since the variable overhead spending variance is unfavorable, either too much was paid for variable overhead items or too many of them were used.

Efficiency variance: The term “variable overhead efficiency variance” is a misnomer, since the variance does not measure efficiency in the use of overhead items. It measures the indirect effect on variable overhead of the efficiency or inefficiency with which the activity base is utilized. In this company, machine-hours is the activity base. If variable overhead is really proportional to machine-hours, then more effective use of machine-hours has the indirect effect of reducing variable overhead. Since 1,000 fewer machine-hours were required than indicated by the standards, the indirect effect was presumably to reduce variable overhead spending by about £1,750 (£1.75 per machine-hour × 1,000 machine-hours).

Fixed overhead (coming up in the next section)

Budget variance: This variance is simply the difference between the budgeted fixed cost and the actual fixed cost. In this case, the variance is favorable, which indicates that actual fixed costs were lower than anticipated in the budget.

Volume variance: This variance occurs as a result of actual activity being different from the denominator activity that was used in the predetermined overhead rate. In this case, the variance is unfavorable, so actual activity was less than the denominator activity. It is difficult to place much of a meaningful economic interpretation on this variance. It tends to be large, so it often swamps the other, more meaningful variances if they are simply netted against each other.

PREDETERMINED OVERHEAD RATES AND OVERHEAD ANALYSIS IN A STANDARD COSTING SYSTEM (APPENDIX A)

This example illustrates how to use predetermined overhead rates in a standard costing system and how to compute fixed overhead variances.

The following information pertains to MicroDrive Corporation, a company that produces miniature electric motors:

Budgeted production.....	25,000	motors
Standard machine-hours per motor.....	2	machine-hours
Budgeted machine hours.....	50,000	machine-hours
Actual production.....	20,000	motors
Standard machine hours allowed	40,000	machine-hours
Actual machine hours.....	42,000	machine-hours

Budgeted variable manufacturing overhead ..	\$75,000
Budgeted fixed manufacturing overhead	\$300,000
Total Budgeted manufacturing overhead	\$375,000
Actual variable manufacturing overhead	\$71,000
Actual fixed manufacturing overhead	\$308,000
Total actual manufacturing overhead	\$379,000

PREDETERMINED OVERHEAD RATE

Recall from the job-order costing chapter, the following formula is used to establish the predetermined overhead rate at the beginning of the period:

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total manufacturing overhead cost}}{\text{Estimated total amount of the allocation base}}$$

MicroDrive uses budgeted machine-hours as its denominator activity in its predetermined overhead rate. Therefore, the company's predetermined overhead rate would be computed as follows:

$$\text{Predetermined overhead rate} = \frac{\$375,000}{50,000 \text{ MHs}} = \$7.50 \text{ per MH}$$

This predetermined rate can be broken down into its variable and fixed components as follows:

$$\text{Variable component of the predetermined overhead rate} = \frac{\$75,000}{50,000 \text{ MHs}} = \$1.50 \text{ per MH}$$

$$\text{Fixed component of the predetermined overhead rate} = \frac{\$300,000}{50,000 \text{ MHs}} = \$6.00 \text{ per MH}$$

APPLYING OVERHEAD: NORMAL COST SYSTEMS VERSUS STANDARD COST SYSTEMS

Normal Cost System		Standard Cost System	
Manufacturing Overhead		Manufacturing Overhead	
Actual overhead costs incurred.	Applied overhead costs: Actual hours × Pre-determined overhead rate.	Actual overhead costs incurred.	Applied overhead costs: Standard hours allowed for actual output × Pre-determined overhead rate.
----- Underapplied or overapplied overhead		----- Underapplied or overapplied overhead	

Since MicroDrive uses a standard cost system, it would apply overhead to work in process as shown below:

$$\begin{aligned}
 \text{Overhead applied} &= \text{Predetermined overhead rate} \times \text{Standard hours allowed for the actual output} \\
 &= \$7.50 \text{ per machine-hour} \times 40,000 \text{ machine-hours} \\
 &= \$300,000
 \end{aligned}$$

CALCULATING BUDGET AND VOLUME VARIANCES

Two fixed manufacturing overhead variances are computed in a standard costing system—a budget variance and a volume variance.

Volume Variance:

The volume variance is the difference between the budgeted fixed manufacturing overhead and the fixed manufacturing overhead applied to work in process for the period. The formula is:

$$\text{Volume variance} = \text{Budgeted fixed overhead} - \text{Fixed overhead applied}$$

Applying this formula to MicroDrive, the volume variance is computed as follows:

$$\text{Volume variance} = \$300,000 - \$240,000 = \$60,000 \text{ U}$$

Budget Variance:

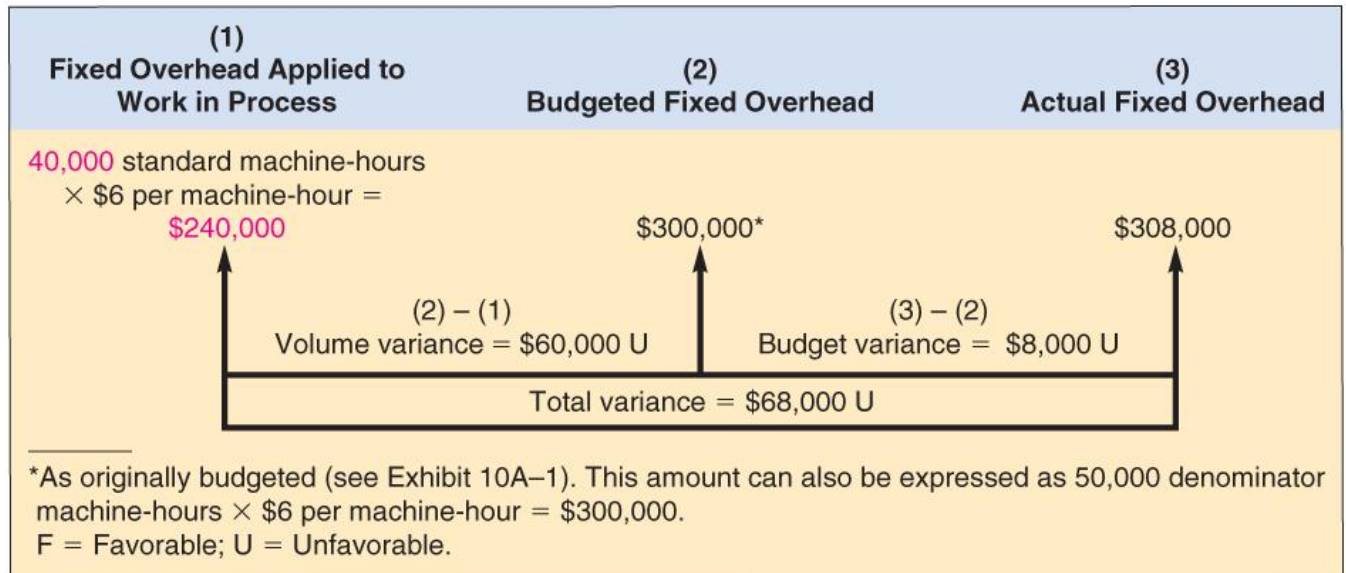
The budget variance is the difference between the actual fixed manufacturing overhead and the budgeted fixed manufacturing overhead for the period. The formula is:

$$\text{Budget variance} = \text{Actual fixed overhead} - \text{Budgeted fixed overhead}$$

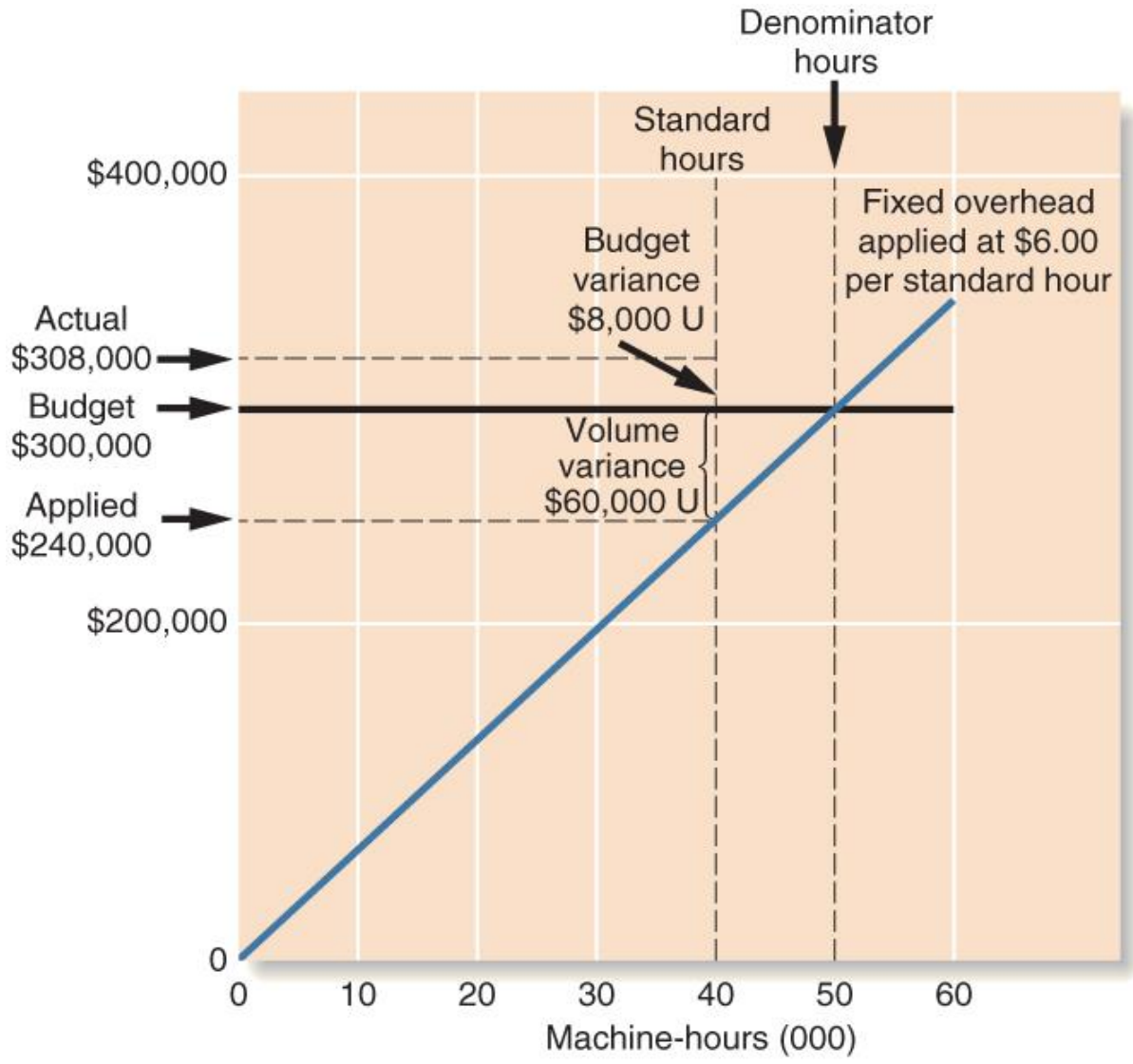
Applying this formula to MicroDrive, the budget variance is computed as follows:

$$\text{Budget variance} = \$308,000 - \$300,000 = \$8,000 \text{ U}$$

VISUAL DEPICTION OF FIXED OVERHEAD VARIANCES



GRAPHIC ANALYSIS OF FIXED OVERHEAD VARIANCES



RECONCILING OVERHEAD VARIANCES AND UNDERAPPLIED AND OVERAPPLIED OVERHEAD

The following table shows how the underapplied or overapplied overhead for MicroDrive is computed.

Predetermined overhead rate (a)	\$7.50	per machine-hour
Standard hours allowed for the actual output (b)	40,000	machine-hours
Manufacturing overhead applied (a) × (b)	\$300,000	
Actual manufacturing overhead	\$379,000	
Manufacturing overhead underapplied or overapplied	\$79,000	underapplied

VARIABLE OVERHEAD VARIANCE COMPUTATIONS

MicroDrive's variable overhead rate and efficiency variances would be computed as follows:

Variable overhead efficiency variance:

Variable overhead efficiency variance (VOEV) = $(AH \times SR) - (SH \times SR)$

VOEV = $(\$63,000) - (40,000 \text{ machine-hours} \times \$1.50 \text{ per machine-hour})$

$$\text{VOEV} = \$63,000 - \$60,000 = \$3,000 \text{ U}$$

Variable overhead rate variance:

Variable overhead rate variance (VORV) = $(AH \times AR) - (AH \times SR)$

VORV = $(\$71,000) - (42,000 \text{ machine-hours} \times \$1.50 \text{ per machine-hour})$

$$\text{VORV} = \$71,000 - \$63,000 = \$8,000 \text{ U}$$

VARIANCE RECONCILIATION

We can now compute the sum of all overhead variances as follows:

Variable overhead efficiency variance ..	\$3,000	U
Variable overhead rate variance	\$8,000	U
Fixed overhead volume variance	\$60,000	U
Fixed overhead budget variance.....	<u>\$8,000</u>	U
Total of the overhead variances	<u>\$79,000</u>	U

Note that as claimed above, the total of the overhead variances is \$79,000, which equals the underapplied overhead of \$79,000. In general, if the overhead is underapplied, the total of the standard cost overhead variances is unfavorable. If the overhead is overapplied, the total of the standard cost overhead variances is favorable.

JOURNAL ENTRIES FOR VARIANCES (Appendix 10B)

Materials, work-in-process, and finished goods are all carried in inventory at their respective standard costs in a standard costing system.

Purchase of materials:

Raw Materials (20,000 yards × \$6.00 per yard).....	120,000	
Materials Price Variance (20,000 yards × \$0.60 per yard F)		12,000
Accounts Payable (20,000 yards × \$5.40 per yard).....		108,000

Use of materials:

Work-In-Process (17,500 yards × \$6 per yard).....	105,000	
Materials Quantity Variance (2,500 yards U × \$6 per yard)		15,000
Raw Materials (20,000 yards × \$6 per yard)		120,000

Direct labor cost:

Work-In-Process (10,000 hours × \$18 per hour)	180,000	
Labor Rate Variance (10,500 hours × \$2 per hour U).	21,000	
Labor Efficiency Variance (500 hours U × \$18 per hour)		9,000
Wages Payable (10,500 hours × \$20 per hour)...		210,000

Note: Favorable variances are credit entries and unfavorable variances are debit entries.