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.

STANDARD COST CARD

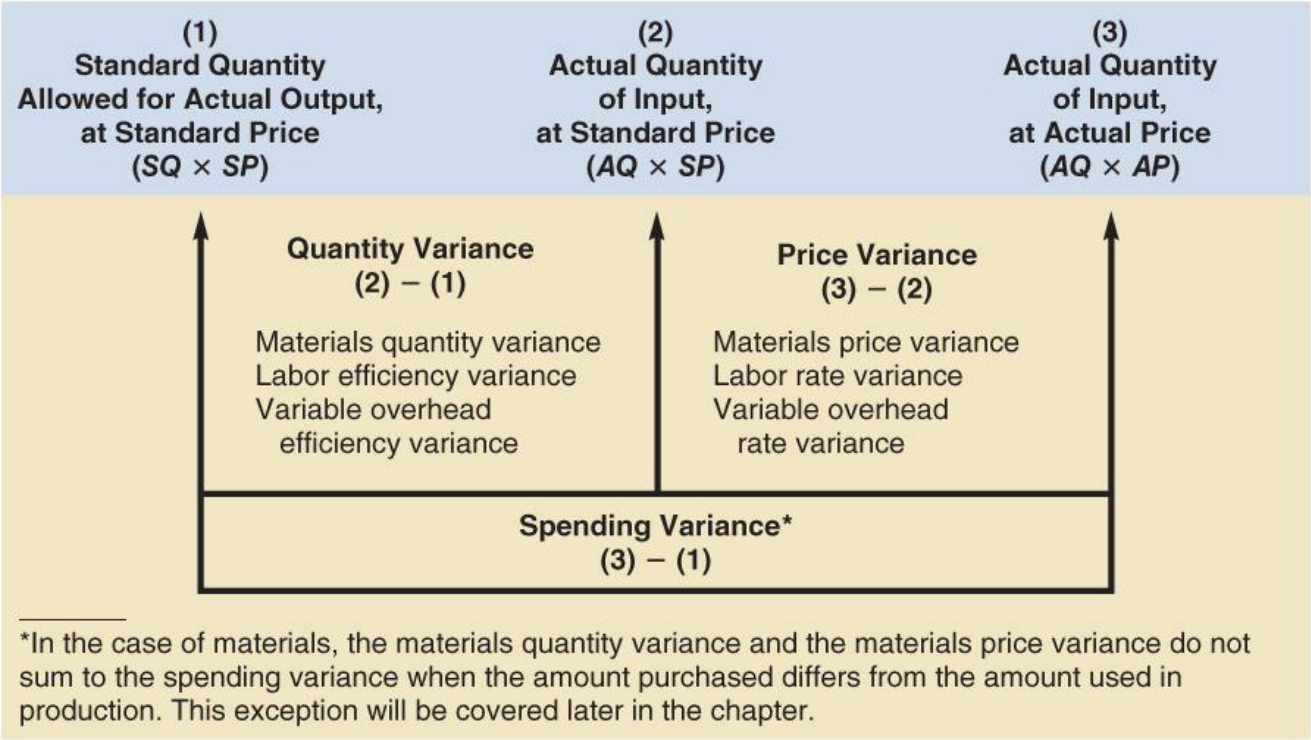
After standards have been set for materials, labor, and overhead, a standard cost card is prepared. The standard cost card indicates what the cost should be for a completed unit of product.

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

Standard Cost Card for Jogging Suits

	(1) Standard Quantity or Hours	*(2) Standard Price or Rate*	*(1) × (2) Standard Cost*
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	8
Total standard cost per suit...			$65

THE GENERAL VARIANCE MODEL



*In the case of materials, the materials quantity variance and the materials price variance do not sum to the spending variance when the amount purchased differs from the amount used in production. This exception will be covered later in the chapter.

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

Quantity Variance, $15,000 U	Price Variance, $12,000 F
Total Variance, $3,000 U	

* 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:*

MQV = (AQ × SP) – (SQ × SP)

= (20,000 yards × $6.00 per yard) –
(17,500 yards* × $6.00 per yard)

= $15,000 U

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

- *Method two:*

MQV = (AQ – SQ) SP

= (20,000 yards – 17,500 yards) $6.00 per yard

= $15,000 U

MATERIAL PRICE VARIANCE:

- *Method one:*

MPV = (AQ × AP) – (AQ × SP)

= ($108,000) – (20,000 yards × $6.00 per yard)

= $12,000 F

- *Method two:*

MPV = AQ (AP – SP)

= 20,000 yards ($5.40 per yard – $6.00 per yard)

= $12,000 F

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

Efficiency Variance, $9,000 U	Rate Variance, $21,000 U
Total Variance, $30,000 U	

* 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:*

LEV = (AH × SR) – (SH × SR)
= (10,500 hours × $18 per hour)
– (10,000 hours* × $18 per hour)
= $9,000 U

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

- *Method two:*

LEV = (AH – SH) SR
= (10,500 hours – 10,000 hours) $18 per hour
= $9,000 U

LABOR RATE VARIANCE:

- *Method one:*

LRV = (AH × AR) – (AH × SR)
= ($210,000) – (10,500 hours × $18 per hour)
= $21,000 U

- *Method two:*

LRV = AH (AR – SR)
= 10,500 hours ($20 per hour – $18 per hour)
= $21,000 U

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

Efficiency Variance, $2,000 U	Rate Variance, $1,050 F
Total Variance, $950 U	

* 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:*

VOEV = (AH × SR) – (SH × SR)
= (10,500 hours × $4.00 per hour)
– (10,000 hours** × $4.00 per hour)
= $2,000 U

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

- *Method two:*

VOEV = (AH – SH) SR
= (10,500 hours – 10,000 hours) $4.00 per hour
= $2,000 U

VARIABLE OVERHEAD RATE VARIANCE:

- *Method one:*

VORV = (AH × AR) – (AH × SR)
= ($40,950) – (10,500 hours × $4.00 per hour)
= $1,050 F

- *Method two:*

VORV = AH (AR – SR)
= 10,500 hours ($3.90 per hour* – $4.00 per hour)
= $1,050 F

* $40,950 ÷ 10,500 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.

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 × Predetermined overhead rate.	Actual overhead costs incurred.	Applied overhead costs: Standard hours allowed for actual output × Predetermined 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:

$$\text{Overhead applied} = \begin{matrix}\text{Predetermined}\\ \text{overhead rate}\end{matrix} \times \begin{matrix}\text{Standard hours allowed}\\ \text{for the actual output}\end{matrix}$$

$$= \$7.50 \text{ per machine-hour} \times 40{,}000 \text{ machine-hours}$$

$$= \$300{,}000$$

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:

Volume variance = Budgeted fixed overhead – Fixed overhead applied

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

Volume variance = $300,000 – $240,000 = $60,000 U

Budget Variance:

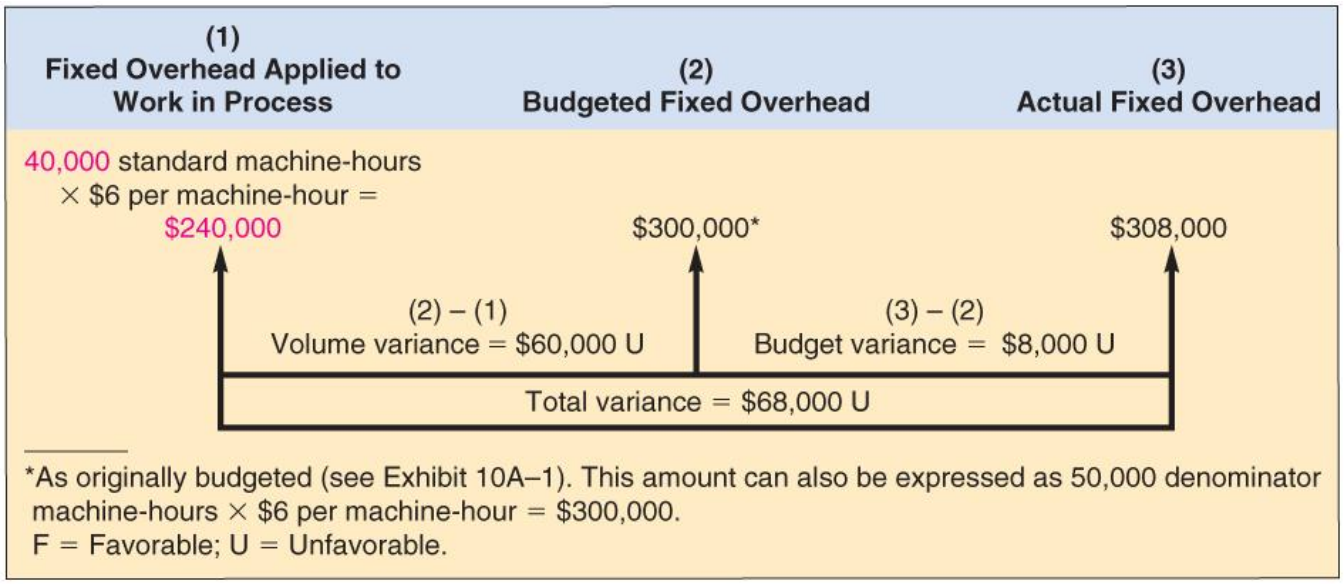
The budget variance is the difference between the actual fixed manufacturing overhead and the budgeted fixed manufacturing overhead for the period. The formula is:

Budget variance = Actual fixed overhead – Budgeted fixed overhead

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

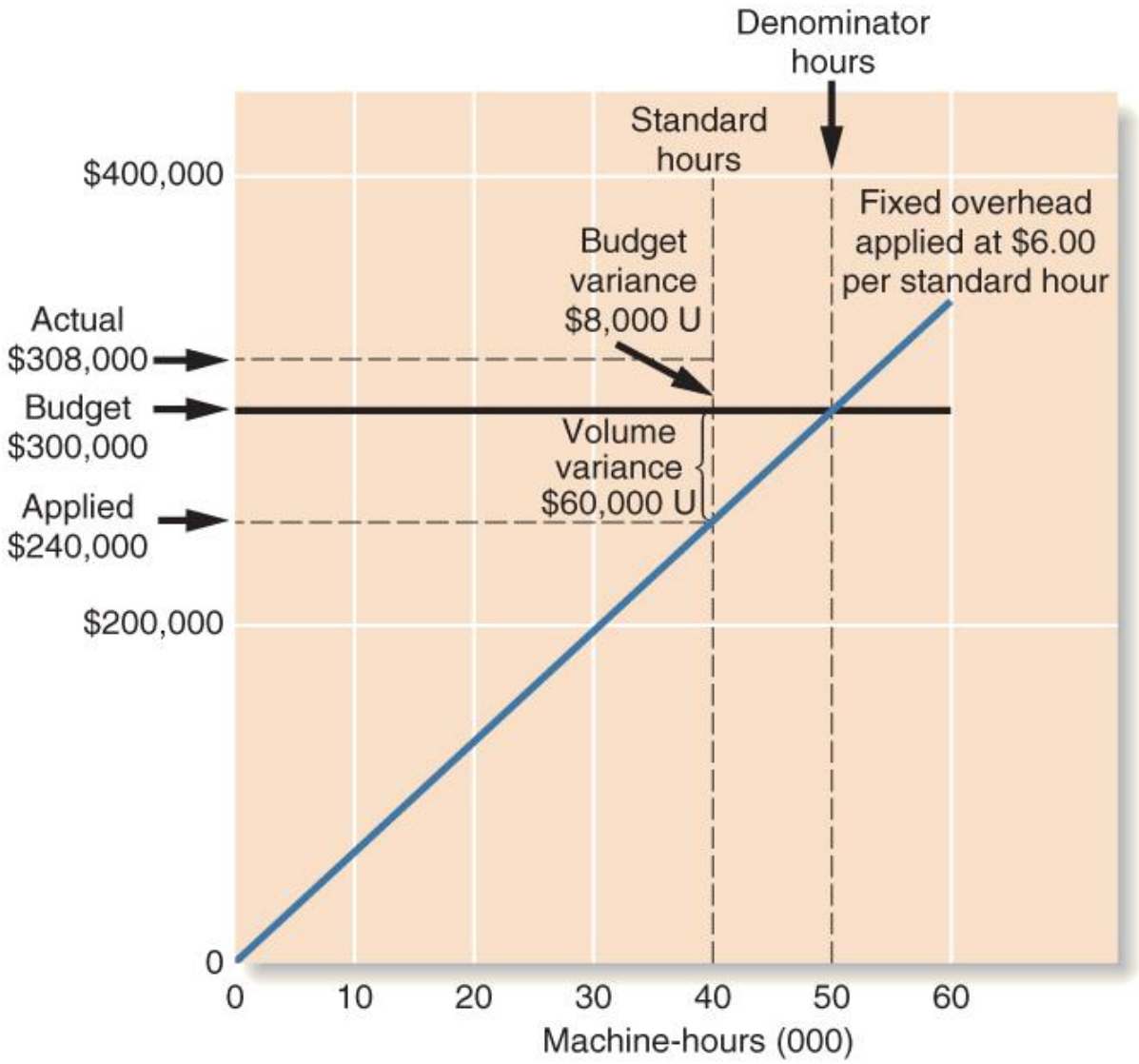
Budget variance = $308,000 – $300,000 = $8,000 U

VISUAL DEPICTION OF FIXED OVERHEAD VARIANCES



*As originally budgeted (see Exhibit 10A–1). This amount can also be expressed as 50,000 denominator machine-hours × $6 per machine-hour = $300,000.
F = Favorable; U = Unfavorable.

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 machine-hours × $1.50 per machine-hour)

VOEV= $63,000 – $60,000 = $3,000 U

Variable overhead rate variance:

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

VORV = ($71,000) – (42,000 machine-hours × $1.50 per machine-hour)

VORV = $71,000 – $63,000 = $8,000 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.....	$8,000	U
Total of the overhead variances	$79,000	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.