Learning Objective P2: Compute materials and labor variances.

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Computing Materials and Labor Variances

Learning Objective P2: Compute materials and labor variances.

G-Max Company makes golf club heads with the following standard cost information:

Direct materials (0.5 lb. per unit at $20 per lb.)	$10.00
Direct labor (1 hr. per unit at $16 per hr.)	16.00
Total standard direct cost per unit	$ 26.00

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Materials Cost Variances (1 of 3)

Learning Objective P2: Compute materials and labor variances.

During May, G-Max produced 3,500 club heads using 1,800 pounds of material. G-Max paid $21.00 per pound for the material.
Compute the material price and quantity variances.

Direct materials (0.5 lb. per unit at $20 per lb.)	$10.00
Direct labor (1 hr. per unit at $16 per hr.)	16.00
Total standard direct cost per unit	$ 26.00

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Materials Cost Variances (2 of 3)

Learning Objective P2: Compute materials and labor variances.

Use this information to compute the material price and quantity variances before you go to the next slide.

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Materials Cost Variances (3 of 3)

Learning Objective P2: Compute materials and labor variances.

Actual Cost			Standard Cost
Actual Quantity	Actual Quantity	Actual Quantity	Standard Quantity
×	×	×	×
Actual Price	Standard Price	Standard Price	Standard Price
1,800 lbs.	1,800 lbs.	1,800 lbs.	1,750 lbs.
×	×	×	×
$21.00 per lb.	$20.00 per lb.	$20.00 per lb.	$20.00 per lb.
$37,800	$36,000	$36,000	$35,000
Price Variance		Quantity Variance	
$1,800 Unfavorable		$1,000 Unfavorable	

$2,800 Total Direct Materials Variance (U)

SQ = 3,500 units × 0.5 per unit = 1,750 lbs.

 21-39

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Evaluating Materials Variances

Learning Objective P2: Compute materials and labor variances.

Who is responsible for material cost variances??

- I am not responsible for this unfavorable material quantity variance.
- You purchased cheap material, so my people had to use more of it.
- You used too much material because of poorly trained workers and poorly maintained equipment.
- Also, your poor scheduling requires me to rush order material at a higher price, causing unfavorable price variances.

 21-40

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NEED-TO-KNOW 21-2 (1 of 3)

Learning Objective P2: Compute materials and labor variances.

A manufacturing company reports the following for one of its products. Compute the direct materials (a) price variance and (b) quantity variance and indicate whether they are favorable or unfavorable.

- Direct materials standard - 8 pounds @ $6.00 per pound
- Actual direct materials used - 83,000 pounds @ $5.80 per pound
- Actual finished units produced - 10,000

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NEED-TO-KNOW 21-2 (2 of 3)

Learning Objective P2: Compute materials and labor variances.

AQ	83,000 lbs.	
AP	$5.80 per lb.	
SQ	80,000 lbs.	(10,000 units × 8 lbs. per unit)
SP	$6.00 lb.	

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NEED-TO-KNOW 21-2 (3 of 3)

Learning Objective P2: Compute materials and labor variances.

Actual Cost		AQ × SP		AQ × SP		Standard Cost
AQ × AP		83,000 × $6.00		83,000 × $6.00		SQ × SP
83,000 × $5.80		$498,000		$498,000		[10,000 × 8] × $6.00
$481,400						$480,000
	$16,600 Favorable			$18,000 Unfavorable		
	Materials Price Variance			Materials Quantity Variance		
			$1,400 Unfavorable			
			Total Direct Materials Variance			

Labor Cost Variances (1 of 3)

Learning Objective P2: Compute materials and labor variances.

Instead of price and quantity, for direct labor we use the terms rate and hours.

Actual Cost			Standard Cost
Actual Hours	Actual Hours	Actual Hours	Standard Hours
×	×	×	×
Actual Rate	Standard Rate	Standard Rate	Standard Rate
* NEW →	*Rate Variance	*Efficiency Variance	

AH(AR - SR)
AH = Actual Hours
AR = Actual Rate

SR(AH – SH)
SR = Standard Rate
SH = Standard Hours

Labor Cost Variances (2 of 3)

Learning Objective P2: Compute materials and labor variances.

During May, G-Max produced 3,500 club heads working 3,400 hours. G-Max paid an average of $16.50 per hour for the hours worked.
Compute the labor rate and efficiency variances.

Direct materials (0.5 lb. per unit at $20 lb.)	$10.00
Direct labor 1 hr. per unit at $16 per hr.)	16.00
Total standard direct cost per unit	$26.00

Use this information to compute the labor rate and efficiency variances before you go to the next slide.

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Labor Cost Variances (3 of 3)

Learning Objective P2: Compute materials and labor variances.

Actual Cost		Standard Cost	
Actual Hours	Actual Hours	Actual Hours	Standard Hours
×	×	×	×
Actual Rate	Standard Rate	Standard Rate	Standard Rate
3,400 hours	3,400 hours	3,400 hours	3,500 hours
×	×	×	×
$16.50 per hr.	$16.00 per hr.	$16.00 per hr.	$16.00 per hr.
$56,100	$54,400	$54,400	$56,000
Rate Variance		Efficiency Variance	
$1,700 Unfavorable		$1,600 Favorable	
+			

$100 Total Cost Variance (U)

SQ = 3,500 units × 1.0 hour per unit = 3,500 hours.

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Evaluating Labor Variances

Learning Objective P2: Compute materials and labor variances.

- **Evaluating Labor Cost Variances**
  - One possible explanation of G-Max's labor rate and efficiency variances is the use of workers with different skill levels.
- **High skill, high rate → Low skill, low rate**
  - Using highly paid skilled workers to perform unskilled tasks results in an unfavorable rate variance.
  - However, fewer labor hours might be required for the work resulting in a favorable efficiency variance.

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Labor Cost Variances

Learning Objective P2: Compute materials and labor variances.

Who is responsible for material cost variances??

Production managers who make work assignments are generally responsible for labor cost variances.

- I am not responsible for the unfavorable labor efficiency variance.
- You purchased cheap material, so it took more time to process it.
- You used too much time because of poorly trained workers and poor supervision.

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NEED-TO-KNOW 21-3 (1 of 2)

Learning Objective P2: Compute materials and labor variances.

The following information is available for York Company.

Actual direct labor cost (6,250 hours @$13.10 per hour)	$81,875
Standard direct labor hours per unit	2.0 hours
Standard direct labor rate per hour	$13.00
Actual production (units)	2,500
Budgeted production (units)	3,000

SQ (2,500 units × 2 hrs. per unit = 5,000 standard hrs.)

 21-49

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NEED-TO-KNOW 21-3 (2 of 2)

Learning Objective P2: Compute materials and labor variances.

Actual Cost			Standard Cost
AQ × AR	AQ × SR	AQ × SR	SQ × SR
6,250 × $13.10	6,250 × $13.00	6,250 × $13.00	(2,500 × 2) × $13.00
$81,875	$81,250	$81,250	$65,000
	$625 Unfavorable Labor Rate Variance	$16,250 Unfavorable Labor Efficiency Variance	

$16,875 Unfavorable Total Direct Labor Variance

 21-50

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Learning Objective P3: Compute overhead spending and efficiency variances.

 21-51

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Overhead Standards and Variances

Learning Objective P3: Compute overhead spending and efficiency variances.

Recall that overhead costs are assigned to products and services using a **predetermined overhead rate (POHR):**

$$\textbf{POHR} = \frac{\text{Estimated total overhead costs}}{\text{Estimated activity}}$$

$$\text{Assigned Overhead} = \textbf{POHR} \times \text{Standard Activity}$$

 21-52

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Standard Overhead Rate (1 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

- *Standard overhead costs are the overhead amounts expected to occur at a certain activity level.*
- To allocate overhead costs to products or services, management needs to establish the standard overhead cost rate. Uses a three-step process:

 21-53

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Standard Overhead Rate (2 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

- Standard Overhead Rate
  - **Step 1:** Determine an Allocation Base
  - **Step 2:** Choose a Predicted Activity Level
  - **Step 3:** Compute the Standard Overhead Rate
- Flexible budgets, showing budgeted amount of overhead for various levels of activity, are used to analyze overhead costs.

 21-54

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Flexible Overhead Budgets (1 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

(Flexible budgets for overhead prepared at several levels of activity)

G-Max
Flexible Overhead Budgets
For the Month Ended May 31, 2017

	Variable Amount per Unit	Total Fixed Cost	Flexible Budget at Different Percentages of Monthly Capacity			
			70%	80%	90%	100%
Production in units			3,500	4,000	4,500	5,000
Total variable costs	$ 1.00		$3,500	$4,000	$4,500	$5,000
Total fixed costs		$4,000	4,000	4,000	4,000	4,000
Total factory overhead			$7,500	$8,000	$8,500	$9,000
Standard direct labor hours			3,500	4,000	4,500	5,000
Predetermined OH rate per standard direct labor hour			$ 2.14	$ 2.00	$ 1.89	$ 1.80

Flexible Overhead Budgets (2 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

- G-Max predicted an 80 percent activity level.
- This standard overhead rate will be used in computing overhead cost variances.
- Standard overhead rate is: $8,000 ÷ 4,000 DL hours = $2.00 per DL hour

Computing Overhead Cost Variances

Learning Objective P3: Compute overhead spending and efficiency variances.

The difference between the total overhead cost applied to products and the total overhead cost actually incurred is called an overhead cost variance. It's defined as:

Overhead cost variance (OCV) = Actual overhead incurred (AOI) – Standard overhead applied (SOA)

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Total Overhead Cost Variance (1 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

Ex: During May, G-Max produced 3,500 club heads working 3,400 hours.
G-Max budgeted for 4,000 units (80%).
Actual variable overhead was $3,650 and actual fixed overhead was $4,000.

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Total Overhead Cost Variance (2 of 2)

Learning Objective P3: Compute overhead spending and efficiency variances.

Overhead cost variance (OCV) = Actual overhead incurred (AOI) − Standard overhead applied (SOA)

(OCV) = $3,650 + $4,000 − 3,500 DLH × $2.00 per DLH

(OCV) = $7,650 − $7,000

(OCV) = (unfavorable) $650

To help identify factors causing the overhead cost variance, let's analyze this variance separately for *controllable* and *volume* variances.

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Controllable and Volume Variances

Learning Objective P3: Compute overhead spending and efficiency variances.

Overhead cost variance (OCV) = Actual overhead incurred (AOI) − Standard overhead applied (SOA)

Exhibit 21.15

- **Total Overhead Variance:** Actual total overhead incurred − Standard total overhead applied
  - **Overhead Controllable Variance:** Actual total overhead incurred – Budgeted total overhead.
  - **Overhead Volume Variance:** Budgeted fixed overhead – Applied fixed Overhead

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Controllable and Volume Variances for G-Max

Learning Objective P3: Compute overhead spending and efficiency variances.

Overhead Controllable Variance

Total overhead variance	$ 650
Overhead volume variance	500
Controllable variance (unfavorable)	$ 150

Overhead Volume Variance

Budgeted fixed overhead (at predicted capacity)	$ 4,000
Applied fixed overhead (3,500 DLH × $ 1.00/DLH	3,500
Volume variance (unfavorable)	$ 500

 21-61

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NEED-TO-KNOW 21-4 (1 of 4)

Learning Objective P3: Compute overhead spending and efficiency variances.

A manufacturing company uses standard costs and reports the information below for January. The company uses machine hours to allocate overhead, and the standard is two machine hours per finished unit.

Predicted activity level	1,500 units
Variable overhead rate	$2.50 per machine hour
Fixed overhead budgeted	$6,000 per month ($2.00 per machine hour at predicted activity level)
Actual activity level	1,800 units
Actual overhead costs	$15,800

 21-62

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NEED-TO-KNOW 21-4 (2 of 4)

Learning Objective P3: Compute overhead spending and efficiency variances.

Compute the total overhead cost variance, overhead controllable variance, and overhead volume variance for January. Indicate whether each variance is favorable or unfavorable.

 21-63

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NEED-TO-KNOW 21-4 (3 of 4)

Learning Objective P3: Compute overhead spending and efficiency variances.

	Flexible Budget **1,800 units**		**Flexible Budget** **1,800 units**		**Standard Cost** **SQ × SR**
Actual Overhead **$15,800**	VOH $(3{,}600 \text{ MHs} \times \$2.50)$	$9,000	VOH $(3{,}600 \text{ MHs} \times \$2.50)$	$9,000	3,600 MHs × $4.50
	FOH	6,000	FOH	6,000	$16,200
	Total Flexible Budget	$15,000	Total Flexible Budget	$15,000	
	$15,000		$15,000		
	$800 Unfavorable		**$1,200 Favorable**		
	Controllable Variance		**Overhead Volume Variance**		
	$400 Favorable				
	Total Overhead Variance				

 21-64

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NEED-TO-KNOW 21-4 (4 of 4)

Learning Objective P3: Compute overhead spending and efficiency variances.

Variable Overhead (1,800 units × 2 MHs per unit = 3,600 standard MHs. × VOH rate $2.50 per MH)

Overhead applied = 3,600 MHs × $4.50 per MH (FOH $2.00 + VOH $2.50)

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Learning Objective A1: Analyze changes in sales from expected amounts.

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Sales Variances

Learning Objective A1: Analyze changes in sales from expected amounts,

A similar analysis can be applied to sales variances. We will use two additional G-Max products, Excel golf balls and Big Bert drivers, to illustrate.

Consider the following sales data from G-Max:

	Budgeted	Actual
Sales of Excel golf balls (units).....	1,000 units	1,100 units
Sales price per Excel golf ball.....	$ 10	$ 10.50
Sales of Big Bert drivers (units).....	150 units	140 units
Sales price per Big Bert driver.....	$ 200	$ 190

 21-67

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Exhibit 21.18 Computing Sales Variances for G-Max (1 of 2)

Learning Objective A1: Analyze changes in sales from expected amounts,

	Actual Results	Flexible Budget	Flexible Budget	Fixed Budget
Excel Golf Balls	**AS × AP**	**AS × BP**	**AS × BP**	**BS × BP**
Sales dollars (balls)	(1,100 × $10.50) **$11,550**	(1,100 × $10) **$11,000**	(1,100 × $10) **$11,000**	(1,000 × $10) **$10,000**
		$550 F	$1,000 F	
	Sales Price Variance (AS × AP) − (AS × BP)		**Sales Volume Variance** (AS × BP) − (BS × BP)	
Big Bert Drivers				
Sales dollars (drivers)	(140 × $190) $26,600	(140 × $200) $28,000	(140 × $200) $28,000	(150 × $200) $30,000
		$1,400 U	$2,000 U	
	Sales Price Variance (AS × AP) − (AS × BP)		**Sales Volume Variance** (AS × BP) − (BS × BP)	
Total	**$850 U**		**$1,000 U**	

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Exhibit 21.18 Computing Sales Variances for G-Max (2 of 2)

Learning Objective A1: Analyze changes in sales from expected amounts,

*As = actual units; AP= actual sales price; BP = Budgeted sales price: BS = budgeted sales units (fixed budget).

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Learning Objective P4 (Appendix): Expanded overhead variances and standard cost accounting system.

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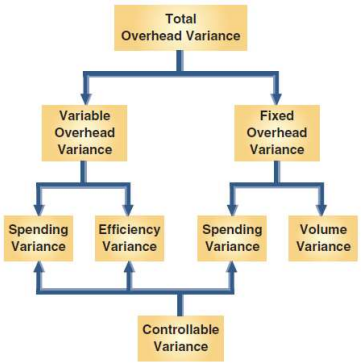
Appendix 23A: Expanded Overhead Variances and Standard Cost Accounting System

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

Exhibit 21A.1



 21-71

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Variable Overhead Variances for G-Max (1 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

Variable Overhead Variance

Actual variable overhead (given).....	$3,650
Applied variable overhead (3,500 units × I standard DLH × $1.00 VOH rate per DLH).....	3,500
Variable overhead variance (unfavorable).....	$ 150

Let's split the $150 unfavorable variance into spending and efficiency variances. . .

 21-72

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Variable Overhead Variances for G-Max (2 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- Spending Variance
  - Actual Variable Overhead Incurred
    - AH × AVR
  - Flexible Budget for Variable Overhead at Actual Hours
    - AH × SVR
- Efficiency Variance
  - Flexible Budget for Variable Overhead at Actual Hours
    - AH × SVR
  - Applied Variable Overhead at Standard Hours
    - SH × SVR

 21-73

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Variable Overhead Variances for G-Max (3 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

AH = Actual Hours of Activity
AVR = Actual Variable Overhead Rate
SVR = Standard Variable Overhead Rate
SH = Standard Hours Allowed

 21-74

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Variable Overhead Variances for G-Max (4 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- Recall the G-Max information for May:
- During May, G-Max produced 3,500 club heads working 3,400 hours. G-Max budgeted for 4,000 units (80%).
- Actual variable overhead was $3,650 and actual fixed overhead was $4,000.
- **Compute the variable overhead spending and efficiency variances**

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Variable Overhead Variances for G-Max (5 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

Actual Variable Overhead Incurred	Flexible Budget for Variable Overhead at Actual Hours	Flexible Budget for Variable Overhead at Actual Hours	Applied Variable Overhead at Standard Hours
AH × AVR	3,400 hrs. × $1.00	3,400 hrs. × $1.00	3,500 hrs. × $1.00
$3,650	$3,400	$3,400	$3,500
	Spending Variance $250 Unfavorable	Efficiency Variance $100 Favorable	
		Variable OH Variance $150 Unfavorable	

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Fixed Overhead Variances for G-Max (1 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

Fixed Overhead Variance

Actual fixed overhead (given).....	$4,000
Applied fixed overhead (3,500 units × I standard DLH × $1.00 FOH rate per DLH).....	3,500
Fixed overhead variance (unfavorable).....	$ 500

 21-77

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Fixed Overhead Variances for G-Max (2 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- Spending Variance
  - Actual Fixed Overhead (Given)
    - AH × AVR
  - Budgeted Fixed Overhead (Flexible Budget)
    - AH × SVR
- Volume Variance
  - Budgeted Fixed Overhead (Flexible Budget)
    - AH × SVR
  - Applied Variable Overhead at Standard Hours
    - SH × SVR

 21-78

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Fixed Overhead Variances for G-Max (3 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- SFR = Standard Fixed Overhead Rate
- SH = Standard Hours Allowed
- Let's split the $500 unfavorable variance into spending and volume variances. . .

 21-79

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Fixed Overhead Variances for G-Max (4 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- Recall the G-Max information for May:
- During May, G-Max produced 3,500 club heads working 3,400 hours. G-Max budgeted for 4,000 units (80%). Actual variable overhead was $3,650 and actual fixed overhead was $4,000.
- **Compute the fixed overhead spending and volume variances.**

 21-80

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Fixed Overhead Variances for G-Max (5 of 5)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

Actual Fixed Overhead (Given)	Budgeted Fixed Overhead (Flexible Budget)	Budgeted Fixed Overhead (Flexible Budget)	Applied Fixed Overhead at Standard Hours
AH × AVR	AH × SVR	AH × SVR	3,500 hrs × $1.00
$4,000	$4,000	$4,000	$3,500
Spending Variance		Efficiency Variance	
$0		$500 Unfavorable	
Fixed OH Variance			
$500 Unfavorable			

 21-81

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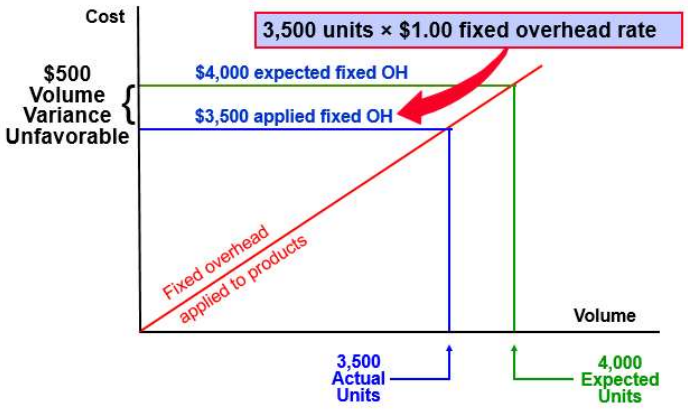
Fixed Overhead Cost Variances

Learning Objective P4: Expanded overhead variances and standard cost accounting system.



 21-82

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Variable and Fixed Overhead Variances (1 of 2)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- **Variable Overhead**
  - **Spending Variance**
    - Results from paying more or less than expected for overhead items and from excessive usage of overhead items.
  - **Efficiency Variance**
    - A function of the selected cost driver. It does not reflect overhead control.

 21-83

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Variable and Fixed Overhead Variances (2 of 2)

Learning Objective P4: Expanded overhead variances and standard cost accounting system.

- **Fixed Overhead**
  - **Spending Variance**
    - Results from paying more or less than expected for fixed overhead items.
  - **Volume Variance**
    - Results from the inability to operate at the activity level planned for the period. It has no significance for cost control.

 21-84

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Learning Objective P5 (Appendix): Prepare journal entries for standard costs and account for price and quantity variances.

 21-85

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Standard Cost Accounting System (1 of 5)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

Standard cost systems also record costs and variances in accounts. The entries in the next few slides briefly illustrate the important aspects of this process for G-Max's standard costs and variances for May.

 21-86

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Standard Cost Accounting System (2 of 5)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

Recording G-Max material costs for May

May 31	Work in Process Inventory	35,000	
	Direct Materials Price Variance*	**1,800**	
	Direct Materials Quantity Variance	**1,000**	
	Raw Materials Inventory		37,800
	To charge production for standard quantity of materials used (1,750 lbs.) at the standard price ($20 per lb.), and to record material price and material quantity variances.		

*Many companies record the materials price variance when materials are purchased.
For simplicity, we record both the materials price and quantity variances when materials are issued to production.

Standard Cost Accounting System (3 of 5)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

Recording G-Max labor costs for May

May 31	Work in Process Inventory	56,000	
	Direct Labor Rate Variance	**1,700**	
	Direct Labor Efficiency Variance		**1,600**
	Factory Wages Payable		56,100
	Charge production with 3,500 standard hours of direct labor at the standard $16 per hour rate, and record the labor rate and efficiency variances.		

The difference between standard and actual labor costs is explained by two variances. The direct labor rate variance is unfavorable and is debited to that account. The direct labor efficiency variance is favorable and that account is credited.

Standard Cost Accounting System (4 of 5)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

Recording G-Max overhead costs for May

May 31	Work in Process Inventory	7,000	
	Volume Variance	**500**	
	Variable Overhead Spending Variance	**250**	
	Variable Overhead Efficiency Variance		**100**
	Factory Overhead		7,650
	To apply overhead at the standard rate of $2 per standard direct labor hour (3,500 hours), and to record overhead variances.		

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Standard Cost Accounting System (5 of 5)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

When Factory Overhead is applied to Goods in Process Inventory, the actual amount is credited to the Factory Overhead account. To account for the difference between actual and standard overhead costs, the entry includes a $500 debit to the Volume Variance, a $250 debit to the Variable Overhead Spending Variance, and a $100 credit to the Variable Overhead Efficiency Variance.

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NEED-TO-KNOW 21-6 (1 of 2)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

A company uses a standard cost accounting system. Prepare the journal entry to record these direct materials variances:

Direct materials cost actually incurred	$73,200
Direct materials quantity variance (favorable)	3,800
Direct materials price variance (unfavorable)	1,300

NEED-TO-KNOW 21-6 (2 of 2)

Learning Objective P5: Prepare journal entries for standard costs and account for price and quantity variances.

	General Journal	Debit	Credit
	Work in Process Inventory	75,700	
	Direct Materials Price Variance	1,300	
	Direct Materials Quantity Variance		3,800
	Raw Materials Inventory		73,200

End of Presentation