

# Chapter 11

## Flexible Budgets and Overhead Analysis

### Solutions to Questions

**11-1** A static budget is a budget geared toward a single level of activity. A static budget remains unchanged even if the activity level changes.

**11-2** A flexible budget can be adjusted to any desired level of activity. By contrast, a static budget is geared for only one activity level.

**11-3**

1. The activity base and overhead cost should be causally related.
2. The activity base should not be expressed in dollars.
3. The activity base should be simple and easy to understand.

**11-4** If budgeted data are based on actual hours worked, then only a spending variance will be produced on the performance report. Both a spending and an efficiency variance will be produced if budgeted data are based on both actual hours and standard hours.

**11-5** Standard hours allowed means the time that should have been taken to complete the period's output.

**11-6** The materials price variance consists entirely of differences in price paid from standard. The variable overhead spending variance consists of two elements. One element is like a price variance and results from differences between actual and standard prices for variable overhead inputs. The other element is like a quantity variance and results from differences between the amount of variable overhead inputs that should have been used and the amounts that were actually used. Ordinarily these two elements are not separated.

**11-7** The overhead efficiency variance does not really measure efficiency in the use of overhead. It actually measures efficiency in the use of the base underlying the flexible budget. This base could be direct labor-hours, machine-hours, or some other measure of activity.

**11-8** The flexible budget provides the data needed (cost and activity) to compute the predetermined overhead rate, which is used in product costing.

**11-9** The denominator level of activity is the denominator in the predetermined overhead rate.

**11-10** A normal costing system was used in Chapter 3, whereas in Chapter 11 a standard cost system is used. Standard costing ensures that the same amount of overhead is applied to a product regardless of the actual amount of the application base (such as machine-hours or direct labor-hours) that is used during a period.

**11-11** In a standard cost system both a budget variance and a volume variance are computed for fixed manufacturing overhead cost.

**11-12** The fixed overhead budget variance is the difference between total budgeted fixed overhead cost and the total amount of fixed overhead cost incurred. If actual costs exceed budgeted costs, the variance is labeled unfavorable.

**11-13** The volume variance is favorable when the activity for a period, at standard, is greater than the denominator activity level. Conversely, if the activity level, at standard, is less than the denominator level of activity, the volume variance is unfavorable. The variance does not measure deviations in spending. It measures

deviations in actual activity from the denominator level of activity.

**11-14** If fixed costs are expressed on a per unit basis, managers may be misled into thinking that they are really variable. This can lead to faulty predictions concerning cost behavior and to bad decisions and erroneous performance evaluations.

**11-15** Under- or overapplied overhead can be factored into variable overhead spending and efficiency variances and the fixed overhead budget and volume variances.

**11-16** The total overhead variances would be favorable, since overapplied overhead is equivalent to a favorable variance.

**Exercise 11-1** (15 minutes)AutoPutz, GmbH  
Flexible Budget

<i>Overhead Costs</i>	<i>Cost</i>	<i>Activity (cars)</i>		
	<i>Formula</i> <i>(per car)</i>	<i>7,000</i>	<i>8,000</i>	<i>9,000</i>
Variable overhead costs:				
Cleaning supplies .....	€ 0.75	€ 5,250	€ 6,000	€ 6,750
Electricity .....	0.60	4,200	4,800	5,400
Maintenance .....	<u>0.15</u>	<u>1,050</u>	<u>1,200</u>	<u>1,350</u>
Total variable overhead costs .....	<u>€ 1.50</u>	<u>10,500</u>	<u>12,000</u>	<u>13,500</u>
Fixed overhead costs:				
Operator wages .....		10,000	10,000	10,000
Depreciation .....		20,000	20,000	20,000
Rent.....		<u>8,000</u>	<u>8,000</u>	<u>8,000</u>
Total fixed overhead costs.....		<u>38,000</u>	<u>38,000</u>	<u>38,000</u>
Total overhead costs.....		<u>€ 48,500</u>	<u>€ 50,000</u>	<u>€ 51,500</u>

**Exercise 11-2** (10 minutes)

AutoPutz, GmbH  
Static Budget  
For the Month Ended August 31

Budgeted number of cars .....	<u>8,200</u>
Budgeted variable overhead costs:	
Cleaning supplies (@ € 0.75 per car) ...	€ 6,150
Electricity (@ € 0.60 per car) .....	4,920
Maintenance (@ € 0.15 per car) .....	<u>1,230</u>
Total variable overhead costs .....	<u>12,300</u>
Budgeted fixed overhead costs:	
Operator wages .....	10,000
Depreciation .....	20,000
Rent .....	<u>8,000</u>
Total fixed overhead costs .....	<u>38,000</u>
Total budgeted overhead costs .....	<u>€ 50,300</u>

**Exercise 11-3** (15 minutes)

AutoPutz, GmbH  
Flexible Budget Performance Report  
For the Month Ended August 31

Budgeted number of cars .....	8,200
Actual number of cars .....	8,300

<i>Overhead Costs</i>	<i>Cost Formula (per car)</i>	<i>Actual Costs Incurred for 8,300 Cars</i>	<i>Budget Based on 8,300 Cars</i>	<i>Variance</i>
Variable overhead costs:				
Cleaning supplies .....	€ 0.75	€ 6,350	€ 6,225	€ 125 U
Electricity .....	0.60	4,865	4,980	115 F
Maintenance .....	<u>0.15</u>	<u>1,600</u>	<u>1,245</u>	<u>355 U</u>
Total variable overhead costs ...	<u>€ 1.50</u>	<u>12,815</u>	<u>12,450</u>	<u>365 U</u>
Fixed overhead costs:				
Operator wages .....		10,050	10,000	50 U
Depreciation .....		20,200	20,000	200 U
Rent.....		<u>8,000</u>	<u>8,000</u>	<u>-</u>
Total fixed overhead costs.....		<u>38,250</u>	<u>38,000</u>	<u>250 U</u>
Total overhead costs.....		<u>€ 51,065</u>	<u>€ 50,450</u>	<u>€ 615 U</u>

Students may question the variances for fixed costs. Operator wages can differ from what was budgeted for a variety of reasons including an unanticipated increase in the wage rate; changes in the mix of workers between those earning lower and higher wages; changes in the number of operators on duty; and overtime. Depreciation may have increased because of the acquisition of new equipment or because of a loss on equipment that must be scrapped—perhaps due to poor maintenance. (This assumes that the loss flows through the depreciation account on the performance report.)

**Exercise 11-4** (15 minutes)Swan Company  
Flexible Budget

<i>Overhead Costs</i>	<i>Cost Formula per MH</i>	<i>Machine-Hours</i>		
		<i>8,000</i>	<i>9,000</i>	<i>10,000</i>
Variable:				
Supplies.....	\$0.20	\$ 1,600	\$ 1,800	\$ 2,000
Indirect labor .....	0.25	2,000	2,250	2,500
Utilities .....	0.15	1,200	1,350	1,500
Maintenance .....	<u>0.10</u>	<u>800</u>	<u>900</u>	<u>1,000</u>
Total variable overhead cost .....	<u>\$0.70</u>	<u>5,600</u>	<u>6,300</u>	<u>7,000</u>
Fixed:				
Indirect labor .....		10,000	10,000	10,000
Maintenance .....		7,000	7,000	7,000
Depreciation .....		<u>8,000</u>	<u>8,000</u>	<u>8,000</u>
Total fixed overhead cost .....		<u>25,000</u>	<u>25,000</u>	<u>25,000</u>
Total overhead cost.....		<u>\$30,600</u>	<u>\$31,300</u>	<u>\$32,000</u>

**Exercise 11-5** (20 minutes)

1. Whaley Company  
 Variable Manufacturing Overhead Performance Report

Budgeted machine-hours ..... 18,000  
 Actual machine-hours worked ..... 16,000

	<i>Actual</i> <i>16,000</i> <i>hours</i>	<i>Budget</i> <i>16,000</i> <i>hours</i>	<i>Spending</i> <i>Variance</i>
Variable overhead costs:			
Utilities.....	\$20,000	\$19,200	\$ 800 U
Supplies .....	4,700	4,800	100 F
Maintenance.....	35,100	38,400	3,300 F
Rework time.....	<u>12,300</u>	<u>9,600</u>	<u>2,700 U</u>
Total variable overhead cost ....	<u>\$72,100</u>	<u>\$72,000</u>	<u>\$ 100 U</u>

2. Favorable variances can be as much a matter of managerial concern as unfavorable variances. In this case, the favorable maintenance variance undoubtedly would require investigation. Efforts should be made to determine if maintenance is not being carried out. In terms of percentage deviation from budgeted allowances, the rework time variance is even more significant (equal to 28% of the budget allowance). It may be that this unfavorable variance in rework time is a result of poor maintenance of machines. Some may say that if the two variances are related, then the trade-off is a good one, since the savings in maintenance cost is greater than the added cost of rework time. But this is shortsighted reasoning. Poor maintenance can reduce the life of equipment, as well as decrease overall output. These long-run costs may swamp any short-run savings.

**Exercise 11-6** (15 minutes)

San Juan Bank  
Check-Clearing Office  
Variable Overhead Performance Report  
For the Month Ended October 31

Budgeted labor-hours.....	865
Actual labor-hours.....	860
Standard labor-hours allowed for the actual number of checks processed .....	880

		(1) <i>Actual Costs</i>	(2)	(3)		<i>Breakdown of the Total Variance</i>	
	<i>Cost Formula (per labor- hour)</i>	<i>Incurred for 860 Labor- Hours (AH × AR)</i>	<i>Budget Based on 860 Labor- Hours (AH × SR)</i>	<i>Budget Based on 880 Labor- Hours (SH × SR)</i>	<i>Total Variance (1) – (3)</i>	<i>Spending Variance (1) – (2)</i>	<i>Efficiency Variance (2) – (3)</i>
<i>Overhead costs</i>							
Variable overhead costs:							
Office supplies .....	\$0.15	\$ 146	\$ 129	\$ 132	\$14 U	\$17 U	\$ 3 F
Staff coffee lounge .....	0.05	124	43	44	80 U	81 U	1 F
Indirect labor .....	<u>3.25</u>	<u>2,790</u>	<u>2,795</u>	<u>2,860</u>	<u>70 F</u>	<u>5 F</u>	<u>65 F</u>
Total .....	<u>\$3.45</u>	<u>\$3,060</u>	<u>\$2,967</u>	<u>\$3,036</u>	<u>\$24 U</u>	<u>\$93 U</u>	<u>\$69 F</u>



**Exercise 11-7** (20 minutes)

1. Overall rate:  $\frac{\$33,200}{8,000 \text{ MHs}} = \$4.15 \text{ per MH}$

Variable rate:  $\frac{\$8,400}{8,000 \text{ MHs}} = \$1.05 \text{ per MH}$

Fixed rate:  $\frac{\$24,800}{8,000 \text{ MHs}} = \$3.10 \text{ per MH}$

2. The standard hours per unit of product are:  
 $8,000 \text{ MHs} \div 3,200 \text{ units} = 2.5 \text{ MHs per unit}$

The standard hours allowed for the actual production would be:  
 $3,500 \text{ units} \times 2.5 \text{ MHs per unit} = 8,750 \text{ MHs}$

3. Variable overhead  
spending variance  $= (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR})$   
 $= (\$9,860) - (8,500 \text{ MHs} \times \$1.05 \text{ per MH})$   
 $= (\$9,860) - (\$8,925)$   
 $= \$935 \text{ U}$

Variable overhead  
efficiency variance  $= \text{SR} (\text{AH} - \text{SH})$   
 $= \$1.05 \text{ per MH} (8,500 \text{ MHs} - 8,750 \text{ MHs})$   
 $= \$262.50 \text{ F}$

**Exercise 11-7** (continued)

Fixed overhead budget and volume variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$25,100</u>	<u>\$24,800*</u>	<u>8,750 standard MHs</u> × \$3.10 per MH = \$27,125
	Budget Variance, \$300 U	Volume Variance, \$2,325 F
	Total Variance, \$2,025 F	

\*8,000 denominator MHs × \$3.10 per MH = \$24,800.

Alternative approach to the budget variance:

$$\begin{aligned} \text{Budget Variance} &= \text{Actual Fixed Overhead Cost} - \text{Budgeted Fixed Overhead Cost} \\ &= \$25,100 - \$24,800 = \$300 \text{ U} \end{aligned}$$

Alternative approach to the volume variance:

$$\begin{aligned} \text{Volume Variance} &= \text{Fixed Portion of the Predetermined Overhead Rate} \left( \frac{\text{Denominator Hours}}{\text{Standard Hours Allowed}} \right) \\ &= \$3.10 \text{ per MH} (8,000 \text{ MHs} - 8,750 \text{ MHs}) = \$2,325 \text{ F} \end{aligned}$$

**Exercise 11-8** (15 minutes)

## 1. Predetermined overhead rate:

$$\frac{\text{Total overhead from the flexible budget at the denominator activity level}}{\text{Denominator activity}} = \frac{\$122,400}{24,000 \text{ DLHs}} = \$5.10 \text{ per DLH}$$

Variable element:  $\$38,400 \div 24,000 \text{ DLHs} = \$1.60 \text{ per DLH}$

Fixed element:  $\$84,000 \div 24,000 \text{ DLHs} = \$3.50 \text{ per DLH}$

2. Direct materials, 2 pounds @ \$4.20 per pound.....	\$ 8.40
Direct labor, 3 DLHs* @ \$12.60 per DLH.....	37.80
Variable overhead, 3 DLHs @ \$1.60 per DLH.....	4.80
Fixed overhead, 3 DLHs @ \$3.50 per DLH .....	<u>10.50</u>
Total standard cost per unit .....	<u>\$61.50</u>

\*24,000 DLHs  $\div$  8,000 units = 3 DLHs per unit.

**Exercise 11-9** (15 minutes)

1. 10,000 units  $\times$  0.8 DLH per unit = 8,000 DLHs.

2. and 3.

<u>Actual Fixed Overhead Cost</u>	<u>Budgeted Fixed Overhead Cost</u>	<u>Fixed Overhead Cost Applied to Work in Process</u>
\$45,600*	\$45,000	8,000 standard DLHs $\times$ \$6 per DLH* = \$48,000
	Budget Variance, \$600 U	Volume Variance, \$3,000 F*

\*Given.

$$\begin{aligned} 4. \quad \text{Fixed cost element of the} &= \frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}} \\ \text{predetermined overhead rate} &= \frac{\$45,000}{\text{Denominator activity}} = \$6 \text{ per DLH} \end{aligned}$$

Therefore, the denominator activity was 7,500 direct labor-hours.

**Exercise 11-10** (15 minutes)

1. Actual fixed overhead costs incurred .....	\$79,000
Add favorable budget variance .....	<u>1,000</u>
Budgeted fixed overhead cost .....	<u>\$80,000</u>

$$\frac{\text{Budgeted fixed overhead cost}}{\text{Denominator hours}} = \frac{\$80,000}{20,000 \text{ MHs}} = \$4 \text{ per MH}$$

2.  $9,500 \text{ units} \times 2 \text{ MHs per unit} = 19,000 \text{ MHs}$

3. 
$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\left( \frac{\text{Denominator Hours}}{\text{Standard Hours Allowed}} \right)}$$

$$= \$4 \text{ per MH} (20,000 \text{ MHs} - 19,000 \text{ MHs}) = 4,000 \text{ U}$$

Alternative solutions to parts 1-3:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$79,000*</u>	<u>\$80,000<sup>a</sup></u>	<u>19,000 MHs<sup>b</sup> × \$4 per MH<sup>c</sup> = \$76,000</u>
↑	↑	↑
	Budget Variance, \$1,000 F*	Volume Variance, \$4,000 U

\*Given.

<sup>a</sup>\$79,000 + \$1,000 = \$80,000.

<sup>b</sup>9,500 units × 2 MHs per unit = 19,000 MHs

<sup>c</sup>\$80,000 ÷ 20,000 denominator MHs = \$4 per MH.

**Exercise 11-11** (10 minutes)

- Company X: This company has an unfavorable volume variance since the standard direct labor-hours allowed for the actual output are less than the denominator activity.
- Company Y: This company has an unfavorable volume variance since the standard direct labor-hours allowed for the actual output are less than the denominator activity.
- Company Z: This company has a favorable volume variance since the standard direct labor-hours allowed for the actual output are greater than the denominator activity.

**Problem 11-12** (30 minutes)

1. The reports as presently prepared are of little use to the company. The problem is that the company is using a static budget approach, and is comparing budgeted performance at one level of activity to actual performance at another level of activity. Although the reports do a good job of showing whether or not the budgeted level of activity was attained, they do not tell whether costs were controlled for the period.
2. The company should use a flexible budget approach to evaluate control over costs. Under the flexible budget approach, the actual costs incurred during the quarter in working 25,000 hours should be compared to budgeted costs at that activity level.

3. **Shipley Company**  
**Overhead Performance Report—Milling Department**  
**For the Quarter Ended June 30**

Budgeted machine-hours ..... 30,000 MHs  
 Actual machine-hours ..... 25,000 MHs

<i>Overhead Costs</i>	<i>Cost Formula (per MH)</i>	<i>Actual 25,000 hours</i>	<i>Budget 25,000 hours</i>	<i>Spending or Budget Variance</i>
Variable overhead costs:				
Indirect labor .....	\$0.75	\$ 20,000	\$ 18,750	\$1,250 U
Supplies.....	0.20	5,400	5,000	400 U
Utilities .....	1.00	27,000	25,000	2,000 U
Rework time .....	<u>0.50</u>	<u>14,000</u>	<u>12,500</u>	<u>1,500</u> U
Total variable costs .....	<u>\$2.45</u>	<u>66,400</u>	<u>61,250</u>	<u>5,150</u> U
Fixed overhead costs:				
Maintenance .....		61,900	60,000	1,900 U
Inspection .....		<u>90,000</u>	<u>90,000</u>	<u>—</u>
Total fixed costs .....		<u>151,900</u>	<u>150,000</u>	<u>1,900</u> U
Total overhead costs .....		<u>\$218,300</u>	<u>\$211,250</u>	<u>\$7,050</u> U

**Problem 11-13** (30 minutes)

1. Direct materials, 4 pounds at \$2.60 per pound .....	\$10.40
Direct labor, 2 DLHs at \$9.00 per DLH .....	18.00
Variable manufacturing overhead, 2 DLHs at \$3.80 per DLH* ....	7.60
Fixed manufacturing overhead, 2 DLHs at \$7.00 per DLH** .....	<u>14.00</u>
Standard cost per unit .....	<u>\$50.00</u>

\*  $\$34,200 \div 9,000 \text{ DLHs} = \$3.80 \text{ per DLH}$

\*\*  $\$63,000 \div 9,000 \text{ DLHs} = \$7.00 \text{ per DLH}$

2. Materials variances:

Materials Price Variance =  $AQ (AP - SP)$

30,000 pounds ( $\$2.50 \text{ per pound} - \$2.60 \text{ per pound}$ ) = \$3,000 F

Materials Quantity Variance =  $SP (AQ - SQ)$

$\$2.60 \text{ per pound} (20,000 \text{ pounds} - 19,200 \text{ pounds}^*) = \$2,080 \text{ U}$

$^*4,800 \text{ units} \times 4 \text{ pounds per unit} = 19,200 \text{ pounds}$

Labor variances:

Labor Rate Variance =  $AH (AR - SR)$

10,000 DLHs ( $\$8.60 \text{ per DLH} - \$9.00 \text{ per DLH}$ ) = \$4,000 F

Labor Efficiency Variance =  $SR (AH - SH)$

$\$9 \text{ per DLH} (10,000 \text{ DLHs} - 9,600 \text{ DLHs}^*) = \$3,600 \text{ U}$

$^*4,800 \text{ units} \times 2 \text{ DLHs per unit} = 9,600 \text{ DLHs}$



**Problem 11-13** (continued)

## 3. Variable manufacturing overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>\$35,900</u>	<u>10,000 DLHs × \$3.80 per DLH = \$38,000</u>	<u>9,600 DLHs × \$3.80 per DLH = \$36,480</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> ↑ Spending Variance, \$2,100 F </div> <div style="text-align: center;"> ↑ Efficiency Variance, \$1,520 U </div> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 5px;"> Total Variance, \$580 F </div>		

Alternative solution for the variable overhead variances:

$$\text{Variable Overhead Spending Variance} = (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR})$$

$$(\$35,900) - (10,000 \text{ DLHs} \times \$3.80 \text{ per DLH}) = \$2,100 \text{ F}$$

$$\text{Variable Overhead Efficiency Variance} = \text{SR} (\text{AH} - \text{SH})$$

$$\$3.80 \text{ per DLH} (10,000 \text{ DLHs} - 9,600 \text{ DLHs}) = \$1,520 \text{ U}$$

Fixed manufacturing overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$64,800</u>	<u>\$63,000</u>	<u>9,600 DLHs × \$7 per DLH = \$67,200</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> ↑ Budget Variance, \$1,800 U </div> <div style="text-align: center;"> ↑ Volume Variance, \$4,200 F </div> </div>		

### Problem 11-13 (continued)

Alternative approach to the budget variance:

$$\begin{aligned}\text{Budget Variance} &= \text{Actual Fixed Overhead Cost} - \text{Budgeted Fixed Overhead Cost} \\ &= \$64,800 - \$63,000 = \$1,800 \text{ U}\end{aligned}$$

Alternative approach to the volume variance:

$$\begin{aligned}\text{Volume Variance} &= \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed}) \\ &= \$7 \text{ per DLH} (9,000 \text{ DLHs} - 9,600 \text{ DLHs}) = \$4,200 \text{ F}\end{aligned}$$

4. The choice of a denominator activity level affects standard unit costs in that the higher the denominator activity level chosen, the lower standard unit costs will be. The reason is that the fixed portion of overhead costs is spread more thinly as the denominator activity figure rises.

The volume variance cannot be controlled by controlling spending. Rather, the volume variance simply reflects whether actual activity was greater or less than the denominator activity. Thus, the volume variance is controllable only through activity.

**Problem 11-14** (30 minutes)

1. The cost formulas in the flexible budget below report were obtained by dividing the costs on the static budget in the problem statement by the budgeted level of activity (600 liters). The fixed costs are carried over from the static budget.

KGV Blood Bank  
Flexible Budget Performance Report  
For the Month Ended September 30

Budgeted activity (in liters) .....	600
Actual activity (in liters) .....	780

<i>Costs</i>	<i>Cost Formula (per liter)</i>	<i>Actual Costs Incurred for 780 Liters</i>	<i>Budget Based on 780 Liters</i>	<i>Variance</i>
Variable costs:				
Medical supplies .....	\$11.85	\$ 9,252	\$ 9,243	\$ 9 U
Lab tests .....	14.35	10,782	11,193	411 F
Refreshments for donors ..	1.60	1,186	1,248	62 F
Administrative supplies ....	<u>0.25</u>	<u>189</u>	<u>195</u>	<u>6</u> F
Total variable costs .....	<u>\$28.05</u>	<u>21,409</u>	<u>21,879</u>	<u>470</u> F
Fixed costs:				
Staff salaries .....		13,200	13,200	—
Equipment depreciation ...		2,100	1,900	200 U
Rent .....		1,500	1,500	—
Utilities .....		<u>324</u>	<u>300</u>	<u>24</u> U
Total fixed costs .....		<u>17,124</u>	<u>16,900</u>	<u>224</u> U
Total costs .....		<u>\$38,533</u>	<u>\$38,779</u>	<u>\$246</u> F

### **Problem 11-14** (continued)

2. The overall variance is favorable and none of the unfavorable variances is particularly large. Nevertheless, the large favorable variance for lab tests is worrisome. Perhaps the blood bank has not been doing all of the lab tests for HIV, hepatitis, and other blood-transmittable diseases that it should be doing. This is well worth investigating and points out that favorable variances may warrant attention as much as unfavorable variances.

Some may wonder why there is a variance for depreciation. Fixed costs can change; they just don't vary with the level of activity. Depreciation may have increased because of the acquisition of new equipment or because of a loss on equipment that must be scrapped. (This assumes that the loss flows through the depreciation account on the performance report.)

**Problem 11-15** (45 minutes)

## 1. Direct materials price and quantity variances:

Direct Materials Price Variance =  $AQ (AP - SP)$   
 78,000 yards ( $\$3.75$  per yard –  $\$3.50$  per yard) =  $\$19,500$  U

Direct Materials Quantity Variance =  $SP (AQ - SQ)$   
 $\$3.50$  per yard (78,000 yards – 80,000 yards\*) =  $\$7,000$  F

\*20,000 units  $\times$  4 yards per unit = 80,000 yards

## 2. Direct labor rate and efficiency variances:

Direct Labor Rate Variance =  $AH (AR - SR)$   
 32,500 DLHs ( $\$11.80$  per DLH –  $\$12.00$  per DLH) =  $\$6,500$  F

Direct Labor Efficiency Variance =  $SR (AH - SH)$   
 $\$12.00$  per DLH (32,500 DLHs – 30,000 DLHs\*) =  $\$30,000$  U

\*20,000 units  $\times$  1.5 DLHs per unit = 30,000 DLHs

## 3. a. Variable manufacturing overhead spending and efficiency variances:

Actual Hours of Input, at the Actual Rate (AH $\times$ AR)	Actual Hours of Input, at the Standard Rate (AH $\times$ SR)	Standard Hours Allowed for Output, at the Standard Rate (SH $\times$ SR)
<hr/>	<hr/>	<hr/>
\$68,250	32,500 DLHs $\times$ \$2 per DLH = \$65,000	30,000 DLHs $\times$ \$2 per DLH = \$60,000
	↑	↑
	Spending Variance, \$3,250 U	Efficiency Variance, \$5,000 U

## Alternative solution:

Variable Overhead Spending Variance =  $(AH \times AR) - (AH \times SR)$   
 $(\$68,250) - (32,500 \text{ DLHs} \times \$2.00 \text{ per DLH}) = \$3,250$  U

Variable Overhead Efficiency Variance =  $SR (AH - SH)$   
 $\$2.00$  per DLH (32,500 DLHs – 30,000 DLHs) =  $\$5,000$  U

**Problem 11-15** (continued)

b. Fixed overhead budget and volume variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$148,000</u>	<u>\$150,000</u>	<u>30,000 DLHs × \$6 per DLH = \$180,000</u>
	Budget Variance, \$2,000 F	Volume Variance, \$30,000 F

Alternative approach to the budget variance:

$$\begin{aligned} \text{Budget Variance} &= \text{Actual Fixed Overhead Cost} - \text{Flexible Budget Fixed Overhead Cost} \\ \$148,000 - \$150,000 &= \$2,000 \text{ F} \end{aligned}$$

Alternative approach to the volume variance:

$$\begin{aligned} \text{Volume Variance} &= \text{Fixed Portion of the Predetermined Overhead Rate} \left( \frac{\text{Denominator Hours}}{\text{Standard Hours Allowed}} \right) \\ \$6.00 \text{ per DLH} (25,000 \text{ DLHs} - 30,000 \text{ DLHs}) &= \$30,000 \text{ F} \end{aligned}$$

### Problem 11-15 (continued)

4. The total of the variances would be:

Direct materials variances:		
Price variance .....	\$19,500	U
Quantity variance.....	7,000	F
Direct labor variances:		
Rate variance.....	6,500	F
Efficiency variance .....	30,000	U
Variable manufacturing overhead variances:		
Spending variance.....	3,250	U
Efficiency variance .....	5,000	U
Fixed manufacturing overhead variances:		
Budget variance.....	2,000	F
Volume variance .....	<u>30,000</u>	F
Total of variances .....	<u>\$12,250</u>	U

Notice that the total of the variances agrees with the \$12,250 unfavorable variance mentioned by the vice president.

It appears that not everyone should be given a bonus for good cost control. The materials price variance and the labor efficiency variance are 7.1% and 8.3%, respectively, of the standard cost allowed and thus would warrant investigation. In addition, the variable overhead spending variance is 5.0% of the standard cost allowed.

The reason the company's large unfavorable variances (for materials price and labor efficiency) do not show up more clearly is that they are offset for the most part by the company's favorable volume variance for the year. This favorable volume variance is the result of the company operating at an activity level that is well above the denominator activity level used to set predetermined overhead rates. (The company operated at an activity level of 30,000 standard DLHs; the denominator activity level set at the beginning of the year was 25,000 DLHs.) As a result of the large favorable volume variance, the unfavorable price and efficiency variances have been concealed in a small "net" figure. Finally, the large favorable volume variance may have been achieved by building up inventories.

**Problem 11-16** (45 minutes)

1. Total rate:  $\frac{£31,500 + £72,000}{18,000 \text{ MHs}} = £5.75 \text{ per MH}$

Variable element:  $\frac{£31,500}{18,000 \text{ MHs}} = £1.75 \text{ per MH}$

Fixed element:  $\frac{£72,000}{18,000 \text{ MHs}} = £4 \text{ per MH}$

2.  $16,000 \text{ standard MHs} \times £5.75 \text{ per MH} = £92,000$

3. Variable manufacturing overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>£26,500</u>	<u>15,000 MHs × £1.75 per MH = £26,250</u>	<u>16,000 MHs × £1.75 per MH = £28,000</u>
↑	↑	↑
Spending Variance, £250 U		Efficiency Variance, £1,750 F

Alternative solution:

Variable Overhead Spending Variance = (AH × AR) – (AH × SR)  
 $(£26,500) - (15,000 \text{ MHs} \times £1.75 \text{ per MH}) = £250 \text{ U}$

Variable Overhead Efficiency Variance = SR (AH – SH)  
 $£1.75 \text{ per MH} (15,000 \text{ MHs} - 16,000 \text{ MHs}) = £1,750 \text{ F}$



**Problem 11-16** (continued)

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>£70,000</u>	<u>£72,000</u>	<u>16,000 MHs × £4 per MH = £64,000</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             ↑              Budget Variance, £2,000 F           </div> <div style="text-align: center;">             ↑              Volume Variance, £8,000 U           </div> <div style="text-align: center;">             ↑           </div> </div>		

Alternative solution:

$$\text{Budget Variance} = \text{Actual Fixed Overhead Cost} - \text{Flexible Budget Fixed Overhead Cost}$$

$$£70,000 - £72,000 = £2,000 \text{ F}$$

$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed})$$

$$£4 \text{ per MH} (18,000 \text{ MHs} - 16,000 \text{ MHs}) = £8,000 \text{ U}$$

Verification of Variances:

Variable overhead spending variance.....	£ 250 U
Variable overhead efficiency variance.....	1,750 F
Fixed overhead budget variance.....	2,000 F
Fixed overhead volume variance .....	<u>8,000 U</u>
Underapplied overhead .....	<u>£4,500</u>

## Problem 11-16 (continued)

### 4. 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

*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.

**Problem 11-17** (45 minutes)

1. The cost formulas below can be developed from the data in the problem using the simple high-low method. The completed flexible budget over an activity range of 80 to 100% of capacity would be:

Elgin Company Flexible Budget				
<i>Overhead Costs</i>	<i>Cost Formulas per MH</i>	<i>Percentage of Capacity</i>		
		<i>80%</i>	<i>90%</i>	<i>100%</i>
Machine-hours .....		<u>40,000</u>	<u>45,000</u>	<u>50,000</u>
Variable overhead costs:				
Utilities.....	\$0.80	\$ 32,000	\$ 36,000	\$ 40,000
Supplies .....	0.10	4,000	4,500	5,000
Indirect labor.....	0.20	8,000	9,000	10,000
Maintenance.....	<u>0.40</u>	<u>16,000</u>	<u>18,000</u>	<u>20,000</u>
Total variable costs.....	<u>\$1.50</u>	<u>60,000</u>	<u>67,500</u>	<u>75,000</u>
Fixed overhead costs:				
Utilities.....		9,000	9,000	9,000
Maintenance.....		21,000	21,000	21,000
Supervision .....		<u>10,000</u>	<u>10,000</u>	<u>10,000</u>
Total fixed costs .....		<u>40,000</u>	<u>40,000</u>	<u>40,000</u>
Total overhead costs.....		<u>\$100,000</u>	<u>\$107,500</u>	<u>\$115,000</u>

2. The cost formula for all overhead costs would be \$40,000 per month plus \$1.50 per machine-hour.

**Problem 11-17** (continued)

3. Elgin Company  
Performance Report  
For the Month of May

Budgeted machine-hours .....	40,000
Standard machine-hours allowed .....	41,000
Actual machine-hours .....	43,000 *

<i>Overhead Costs</i>	<i>Cost Formula per MH</i>	<i>Actual Cost 43,000 MH</i>	<i>Budgeted Cost 43,000 MH</i>	<i>Spending Variance</i>
Variable overhead costs:				
Utilities.....	\$0.80	\$ 33,540 **	\$ 34,400	\$ 860 F
Supplies .....	0.10	6,450	4,300	2,150 U
Indirect labor.....	0.20	9,890	8,600	1,290 U
Maintenance.....	<u>0.40</u>	<u>14,190</u> **	<u>17,200</u>	<u>3,010 F</u>
Total variable costs .....	<u>\$1.50</u>	<u>64,070</u>	<u>64,500</u>	<u>430 F</u>
Fixed overhead costs:				
Utilities.....		9,000	9,000	—
Maintenance.....		21,000	21,000	—
Supervision .....		<u>10,000</u>	<u>10,000</u>	<u>—</u>
Total fixed costs .....		<u>40,000</u>	<u>40,000</u>	<u>—</u>
Total overhead costs.....		<u>\$104,070</u>	<u>\$104,500</u>	<u>\$ 430 F</u>

\* 86% of 50,000 MHs = 43,000 MHs

\*\* \$42,540 – \$9,000 fixed = \$33,540

\$35,190 – \$21,000 fixed = \$14,190

4. Assuming that variable overhead really should be proportional to actual machine-hours, the unfavorable spending variance could be the result either of price increases or of waste. Unlike the price variance for materials and the rate variance for labor, the spending variance for variable overhead measures both price and waste elements. This is why the variance is called a “spending” variance. Total spending can be affected as much by waste as it can by prices paid.

### Problem 11-17 (continued)

5. Efficiency Variance = SR (AH – SH)

$$\$1.50 \text{ per MH } (43,000 \text{ MHs} - 41,000 \text{ MHs}) = \$3,000 \text{ U}$$

The overhead efficiency variance is really misnamed, since it does not measure efficiency (waste) in use of variable overhead items. The variance arises solely because of the inefficiency in the *base* underlying the incurrence of variable overhead cost. If the incurrence of variable overhead costs is directly tied to the actual machine-hours worked, then the excessive number of machine-hours worked during May has caused the incurrence of \$3,000 in variable overhead costs that would have been avoided had production been completed in the standard time allowed. In short, the overhead efficiency variance is independent of any spillage, waste, or theft of overhead supplies or other variable overhead items that may take place during a month.

**Problem 11-18** (30 minutes)

1. The company is using a static budget approach, and is comparing budgeted performance at one level of activity to actual performance at a lower level of activity. This mismatching of activity levels causes the variances to be favorable. The report in this format is not useful for measuring either operating efficiency or cost control. All it tells Mr. Arnold is that the budgeted activity level of 35,000 machine-hours was not achieved. It does not tell whether the actual output of the period was produced efficiently, nor does it tell whether overhead spending has been controlled during the month.

**Problem 11-18** (continued)

2.

Mason Company  
Performance Report—Milling Department

Budgeted machine-hours .....	35,000
Actual machine-hours .....	30,000
Standard machine-hours allowed .....	28,000*

	<i>Cost Formula (per MH)</i>	<i>Actual Costs Incurred (1)</i>	<i>Budget Based on 30,000 MHs (2)</i>	<i>Budget Based on 28,000 MHs (3)</i>	<i>Total Variance (1) – (3)</i>	<i>Spending Variance (1) – (2)</i>	<i>Efficiency Variance (2) – (3)</i>
<i>Overhead Costs</i>							
Variable costs:							
Indirect labor.....	\$0.60	\$ 19,700	\$ 18,000	\$ 16,800	\$ 2,900 U	\$1,700 U	\$1,200 U
Utilities.....	1.70	50,800	51,000	47,600	3,200 U	200 F	3,400 U
Supplies .....	0.40	12,600	12,000	11,200	1,400 U	600 U	800 U
Maintenance.....	<u>0.80</u>	<u>24,900</u>	<u>24,000</u>	<u>22,400</u>	<u>2,500 U</u>	<u>900 U</u>	<u>1,600 U</u>
Total variable costs.....	<u>\$3.50</u>	<u>108,000</u>	<u>105,000</u>	<u>98,000</u>	<u>10,000 U</u>	<u>\$3,000 U</u>	<u>\$7,000 U</u>
Fixed costs:							
Maintenance.....		52,000	52,000	52,000	—		
Supervision .....		110,000	110,000	110,000	—		
Depreciation.....		<u>80,000</u>	<u>80,000</u>	<u>80,000</u>	<u>—</u>		
Total fixed costs .....		<u>242,000</u>	<u>242,000</u>	<u>242,000</u>	<u>—</u>		
Total overhead costs...		<u>\$350,000</u>	<u>\$347,000</u>	<u>\$340,000</u>	<u>\$10,000 U</u>		

\*14,000 units × 2 MHs per unit = 28,000 MHs allowed.

**Problem 11-19** (30 minutes)

1. The Durrant Company  
Flexible Budget—Machining Department

<i>Overhead Costs</i>	<i>Cost</i>	<i>Machine-Hours</i>		
	<i>Formula</i> <i>per MH</i>	<i>10,000</i>	<i>15,000</i>	<i>20,000</i>
Variable:				
Utilities.....	\$0.70	\$ 7,000	\$ 10,500	\$ 14,000
Lubricants .....	1.00	10,000	15,000	20,000
Machine setup .....	0.20	2,000	3,000	4,000
Indirect labor.....	<u>0.60</u>	<u>6,000</u>	<u>9,000</u>	<u>12,000</u>
Total variable cost .....	<u>\$2.50</u>	<u>25,000</u>	<u>37,500</u>	<u>50,000</u>
Fixed:				
Lubricants .....		8,000	8,000	8,000
Indirect labor.....		120,000	120,000	120,000
Depreciation.....		<u>32,000</u>	<u>32,000</u>	<u>32,000</u>
Total fixed costs .....		<u>160,000</u>	<u>160,000</u>	<u>160,000</u>
Total overhead costs....		<u>\$185,000</u>	<u>\$197,500</u>	<u>\$210,000</u>



**Problem 11-19** (continued)

2. The Durrant Company  
Overhead Performance Report—Machining Department  
For the Month of March

Budgeted machine-hours ..... 20,000

Actual machine-hours ..... 18,000

<i>Overhead Costs</i>	<i>Cost Formula per MH</i>	<i>Actual 18,000 MHs</i>	<i>Budget 18,000 MHs</i>	<i>Spending Variance</i>
Variable:				
Utilities.....	\$0.70	\$ 12,000	\$ 12,600	\$ 600 F
Lubricants .....	1.00	16,500 *	18,000	1,500 F
Machine setup .....	0.20	4,800	3,600	1,200 U
Indirect labor.....	<u>0.60</u>	<u>12,500</u>	<u>10,800</u>	<u>1,700 U</u>
Total variable cost .....	<u>\$2.50</u>	<u>45,800</u>	<u>45,000</u>	<u>800 U</u>
Fixed:				
Lubricants .....		8,000	8,000	—
Indirect labor.....		120,000	120,000	—
Depreciation.....		<u>32,000</u>	<u>32,000</u>	<u>—</u>
Total fixed costs .....		<u>160,000</u>	<u>160,000</u>	<u>—</u>
Total overhead costs...		<u>\$205,800</u>	<u>\$205,000</u>	<u>\$ 800 U</u>

\* \$24,500 total lubricants – \$8,000 fixed lubricants = \$16,500 variable lubricants. The variable element of other costs is computed in the same way.

3. In order to compute an overhead efficiency variance, it would be necessary to know the standard hours allowed for the 9,000 units produced during March in the Machining Department.

**Problem 11-20** (45 minutes)

1. The Rowe Company  
Flexible Budget—Finishing Department

Budgeted direct labor-hours ..... 50,000

Item	Cost Formula per DLH	Direct Labor-Hours		
		40,000	50,000	60,000
Variable overhead costs:				
Indirect labor.....	\$0.60	\$ 24,000	\$ 30,000	\$ 36,000
Utilities.....	1.00	40,000	50,000	60,000
Maintenance.....	0.40	16,000	20,000	24,000
Total variable .....	<u>\$2.00</u>	<u>80,000</u>	<u>100,000</u>	<u>120,000</u>
Fixed overhead costs:				
Supervisory salaries .....		60,000	60,000	60,000
Insurance .....		5,000	5,000	5,000
Depreciation .....		190,000	190,000	190,000
Equipment rental .....		45,000	45,000	45,000
Total fixed.....		<u>300,000</u>	<u>300,000</u>	<u>300,000</u>
Total overhead costs.....		<u>\$380,000</u>	<u>\$400,000</u>	<u>\$420,000</u>

2. Total:  $\frac{\$400,000}{50,000 \text{ DLHs}} = \$8 \text{ per DLH}$

Variable:  $\frac{\$100,000}{50,000 \text{ DLHs}} = \$2 \text{ per DLH}$

Fixed:  $\frac{\$300,000}{50,000 \text{ DLHs}} = \$6 \text{ per DLH}$

3. a.

Manufacturing Overhead			
Actual costs	385,700	360,000 *	Applied costs
Underapplied overhead	25,700		

\*45,000 standard DLHs × \$8 per DLH = \$360,000.

**Problem 11-20** (continued)

b. Variable overhead variances:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>\$89,700</u>	<u>46,000 DLHs × \$2 per DLH = \$92,000</u>	<u>45,000 DLHs × \$2 per DLH = \$90,000</u>
	↑ Spending Variance, \$2,300 F	↑ Efficiency Variance, \$2,000 U

Alternative solution:

Variable Overhead Spending Variance = (AH × AR) – (AH × SR)  
 (\$89,700) – (46,000 DLHs × \$2 per DLH) = \$2,300 F

Variable Overhead Efficiency Variance = SR (AH – SH)  
 \$2 per DLH (46,000 DLHs – 45,000 DLHs) = \$2,000 U

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$296,000</u>	<u>\$300,000</u>	<u>45,000 DLHs × \$6 per DLH = \$270,000</u>
	↑ Budget Variance, \$4,000 F	↑ Volume Variance, \$30,000 U

**Problem 11-20** (continued)

Alternative approach to the budget variance:

$$\begin{aligned}\text{Budget} &= \text{Actual Fixed} - \text{Flexible Budget Fixed} \\ \text{Variance} & \quad \text{Overhead Cost} \quad \quad \text{Overhead Cost} \\ \$296,000 - \$300,000 &= \$4,000 \text{ F}\end{aligned}$$

Alternative approach to the volume variance:

$$\begin{aligned}\text{Volume} &= \text{Fixed Portion of} \left( \text{Denominator} - \text{Standard Hours} \right) \\ \text{Variance} & \quad \text{the Predetermined} \quad \quad \text{Hours} \quad \quad \text{Allowed} \\ & \quad \quad \text{Overhead Rate} \\ \$6 \text{ per DLH} (50,000 \text{ DLHs} - 45,000 \text{ DLHs}) &= \$30,000 \text{ U}\end{aligned}$$

The overhead variances can be summarized as follows:

Variable overhead:

Spending variance.....	\$ 2,300 F
Efficiency variance .....	2,000 U

Fixed overhead:

Budget variance.....	4,000 F
Volume variance .....	<u>30,000 U</u>
Underapplied overhead for the year .....	<u>\$25,700</u>

**Problem 11-21** (20 minutes)

Budgeted machine-hours .....	3,200
Actual machine-hours .....	2,700
Standard machine-hours allowed .....	2,800 *

\*14,000 units × 0.2 MH per unit = 2,800 MHs

		<i>Actual Costs Incurred, 2,700 MHs (1)</i>	<i>Budget Based on 2,700 MHs (2)</i>	<i>Budget Based on 2,800 MHs (3)</i>	<i>Breakdown of the Total Variance</i>		
<i>Overhead Cost</i>	<i>Cost Formula (per MH)</i>				<i>Total Variance (1) – (3)</i>	<i>Spending Variance (1) – (2)</i>	<i>Efficiency Variance (2) – (3)</i>
Supplies .....	\$0.70	\$ 1,836	\$ 1,890	\$ 1,960	\$124 F	\$ 54 F	\$ 70 F
Power .....	1.20	3,348	3,240	3,360	12 F	108 U	120 F
Lubrication .....	0.50	1,485	1,350	1,400	85 U	135 U	50 F
Wearing tools ....	<u>3.10</u>	<u>8,154</u>	<u>8,370</u>	<u>8,680</u>	<u>526 F</u>	<u>216 F</u>	<u>310 F</u>
Total .....	<u>\$5.50</u>	<u>\$14,823</u>	<u>\$14,850</u>	<u>\$15,400</u>	<u>\$577 F</u>	<u>\$ 27 F</u>	<u>\$550 F</u>

**Problem 11-22** (45 minutes)

1. and 2.

	<i>Per Direct Labor-Hour</i>		
	<i>Variable</i>	<i>Fixed</i>	<i>Total</i>
Denominator of 40,000 DLHs:			
\$100,000 ÷ 40,000 DLHs .....	\$2.50		\$ 2.50
\$320,000 ÷ 40,000 DLHs .....		\$8.00	<u>8.00</u>
Total predetermined rate .....			<u>\$10.50</u>
Denominator of 50,000 DLHs:			
\$125,000 ÷ 50,000 DLHs .....	\$2.50		\$ 2.50
\$320,000 ÷ 50,000 DLHs .....		\$6.40	<u>6.40</u>
Total predetermined rate .....			<u>\$ 8.90</u>

<i>Denominator Activity:</i> <i>40,000 DLHs</i>		<i>Denominator Activity:</i> <i>50,000 DLHs</i>	
Direct materials, 3 yards			
@ \$5.00 per yard.....	\$15.00	Same .....	\$15.00
Direct labor, 2.5 DLHs @			
\$10.00 per DLH .....	25.00	Same .....	25.00
Variable overhead, 2.5			
DLHs @ \$2.50 per DLH ...	6.25	Same .....	6.25
Fixed overhead, 2.5 DLHs		Fixed overhead, 2.5 DLHs	
@ \$8.00 per DLH.....	<u>20.00</u>	@ \$6.40 per DLH.....	<u>16.00</u>
Total standard cost per		Total standard cost per	
unit.....	<u>\$66.25</u>	unit .....	<u>\$62.25</u>

4. a.  $18,500 \text{ units} \times 2.5 \text{ DLHs per unit} = 46,250 \text{ standard DLHs}$

Manufacturing Overhead			
Actual costs	446,500	485,625 *	Applied costs
		39,125	Overapplied overhead

\* $46,250 \text{ standard DLHs} \times \$10.50 \text{ per DLH} = \$485,625$

**Problem 11-22** (continued)

c. Variable Overhead Spending Variance =  $(AH \times AR) - (AH \times SR)$   
 $(\$124,800) - (48,000 \text{ DLHs} \times \$2.50 \text{ per DLH}) = \$4,800 \text{ U}$

Variable Overhead Efficiency Variance =  $SR (AH - SH)$   
 $\$2.50 \text{ per DLH} (48,000 \text{ DLHs} - 46,250 \text{ DLHs}) = \$4,375 \text{ U}$

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$321,700</u>	<u>\$320,000*</u>	<u>46,250 standard DLHs × \$8.00 per DLH = \$370,000</u>
	Budget Variance, \$1,700 U	Volume Variance, \$50,000 F

\*40,000 denominator DLHs × \$8 per DLH = \$320,000.

Alternative approach to the budget and volume variances:

Budget Variance:

$$\text{Budget Variance} = \text{Actual Fixed Overhead Cost} - \text{Flexible Budget Fixed Overhead Cost}$$

$$\$321,700 - \$320,000 = \$1,700 \text{ U}$$

Volume Variance:

$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed})$$

$$\$8.00 \text{ per DLH} (40,000 \text{ DLHs} - 46,250 \text{ DLHs}) = \$50,000 \text{ F}$$

### Problem 11-22 (continued)

Summary of variances:

Variable overhead spending .....	\$ 4,800 U
Variable overhead efficiency .....	4,375 U
Fixed overhead budget .....	1,700 U
Fixed overhead volume .....	<u>50,000 F</u>
Overapplied overhead .....	<u>\$39,125</u>

5. The major disadvantage of using normal activity as the denominator in the predetermined rate is the large volume variance that ordinarily results. This occurs because the denominator activity used to compute the predetermined overhead rate is different from the activity level that is anticipated for the period. In the case at hand, the company has used the normal activity of 40,000 direct labor-hours to compute the predetermined overhead rate, whereas activity for the period was expected to be 50,000 DLHs. This has resulted in a huge favorable volume variance that may be difficult for management to interpret. In addition, the large favorable volume variance in this case has masked the fact that the company did not achieve the budgeted level of activity for the period. The company had planned to work 50,000 DLHs, but managed to work only 46,250 DLHs (at standard). This unfavorable result is concealed due to using a denominator figure that is out of step with current activity.

On the other hand, by using normal activity as the denominator unit costs are stable from year to year. Thus, management's decisions are not clouded by unit costs that jump up and down as the activity level rises and falls.



**Problem 11-23** (45 minutes)

1. Total:  $\frac{\$240,000}{30,000 \text{ DLHs}} = \$8 \text{ per DLH}$

Variable:  $\frac{\$60,000}{30,000 \text{ DLHs}} = \$2 \text{ per DLH}$

Fixed:  $\frac{\$180,000}{30,000 \text{ DLHs}} = \$6 \text{ per DLH}$

2. Direct materials: 4 feet at \$3 per foot.....	\$12.00
Direct labor: 1.5 DLHs at \$12 per DLH.....	18.00
Variable overhead: 1.5 DLHs at \$2 per DLH .....	3.00
Fixed overhead: 1.5 DLHs at \$6 per DLH .....	<u>9.00</u>
Standard cost per unit .....	<u>\$42.00</u>

3. a. 22,000 units  $\times$  1.5 DLHs per unit = 33,000 standard DLHs.

b.

Manufacturing Overhead			
Actual costs	244,000	264,000 *	Applied costs
		20,000	Overapplied overhead

\*33,000 standard DLHs  $\times$  \$8 per DLH = \$264,000.

4. Variable overhead variances:

Actual Hours of Input, at the Actual Rate (AH $\times$ AR)	Actual Hours of Input, at the Standard Rate (AH $\times$ SR)	Standard Hours Allowed for Output, at the Standard Rate (SH $\times$ SR)
<u>\$63,000</u>	<u>35,000 DLHs <math>\times</math> \$2 per DLH = \$70,000</u>	<u>33,000 DLHs <math>\times</math> \$2 per DLH = \$66,000</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <math>\uparrow</math>            Spending Variance, \$7,000 F         </div> <div style="text-align: center;"> <math>\uparrow</math>            Efficiency Variance, \$4,000 U         </div> </div>		

### Problem 11-23 (continued)

Alternative solution:

$$\text{Variable Overhead Spending Variance} = (\text{AH} \times \text{AR}) - (\text{AH} \times \text{SR}) \\ (\$63,000) - (35,000 \text{ DLHs} \times \$2 \text{ per DLH}) = \$7,000 \text{ F}$$

$$\text{Variable Overhead Efficiency Variance} = \text{SR} (\text{AH} - \text{SH}) \\ \$2 \text{ per DLH} (35,000 \text{ DLHs} - 33,000 \text{ DLHs}) = \$4,000 \text{ U}$$

Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$181,000</u>	<u>\$180,000</u>	<u>33,000 DLHs × \$6 per DLH = \$198,000</u>
↑	Budget Variance, \$1,000 U	↑
		Volume Variance, \$18,000 F
		↑

Alternative approach to the budget variance:

$$\text{Budget Variance} = \text{Actual Fixed Overhead Cost} - \text{Flexible Budget Fixed Overhead Cost}$$

$$\$181,000 - \$180,000 = \$1,000 \text{ U}$$

Alternative approach to the volume variance:

$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed})$$

$$\$6 \text{ per DLH} (30,000 \text{ DLHs} - 33,000 \text{ DLHs}) = \$18,000 \text{ F}$$

**Problem 11-23** (continued)

Summary of variances:

Variable overhead spending variance.....	\$ 7,000 F
Variable overhead efficiency variance .....	4,000 U
Fixed overhead budget variance.....	1,000 U
Fixed overhead volume variance .....	<u>18,000 F</u>
Overapplied overhead—see part 3.....	<u>\$20,000</u>

5. Only the volume variance would have changed. It would have been unfavorable, since the standard DLHs allowed for the year's production (33,000 DLHs) would have been less than the denominator DLHs (36,000 DLHs).

**Problem 11-24** (45 minutes)

1. Total rate:  $\frac{\$153,000}{15,000 \text{ DLHs}} = \$10.20 \text{ per DLH}$

Variable rate:  $\frac{\$18,000}{15,000 \text{ DLHs}} = \$1.20 \text{ per DLH}$

Fixed rate:  $\frac{\$135,000}{15,000 \text{ DLHs}} = \$9.00 \text{ per DLH}$

2. Direct materials: 4 pounds at \$8.00 per pound.....	\$32.00
Direct labor: 2.5 DLHs at \$14.00 per DLH .....	35.00
Variable overhead: 2.5 DLHs at \$1.20 per DLH.....	3.00
Fixed overhead: 2.5 DLHs at \$9.00 per DLH .....	<u>22.50</u>
Standard cost per unit .....	<u>\$92.50</u>

3. See the graph at the end of this solution.

4. a. Fixed overhead variances:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$137,400</u>	<u>\$135,000</u>	<u>14,000 standard DLHs* × \$9 per DLH = \$126,000</u>
	Budget Variance, \$2,400 U	Volume Variance, \$9,000 U

\*5,600 units × 2.5 DLHs per unit = 14,000 DLHs

Alternative Approach:

Fixed overhead budget variance:

$$\text{Budget Variance} = \text{Actual Fixed Overhead Cost} - \text{Flexible Budget Fixed Overhead Cost}$$

$$\$137,400 - \$135,000 = \$2,400 \text{ U}$$

**Problem 11-24** (continued)

Fixed overhead volume variance:

$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed})$$

$$\$9 \text{ per DLH } (15,000 \text{ DLHs} - 14,000 \text{ DLHs}) = \$9,000 \text{ U}$$

b. See the graph on the following page.

5. a. The fixed overhead budget variance will not change. The fixed overhead volume variance will be:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$137,400</u>	<u>\$135,000</u>	<u>15,500 DLHs* × \$9 per DLH = \$139,500</u>
	Budget Variance, \$2,400 U	Volume Variance, \$4,500 F

$$*6,200 \text{ units} \times 2.5 \text{ DLHs per unit} = 15,500 \text{ DLHs.}$$

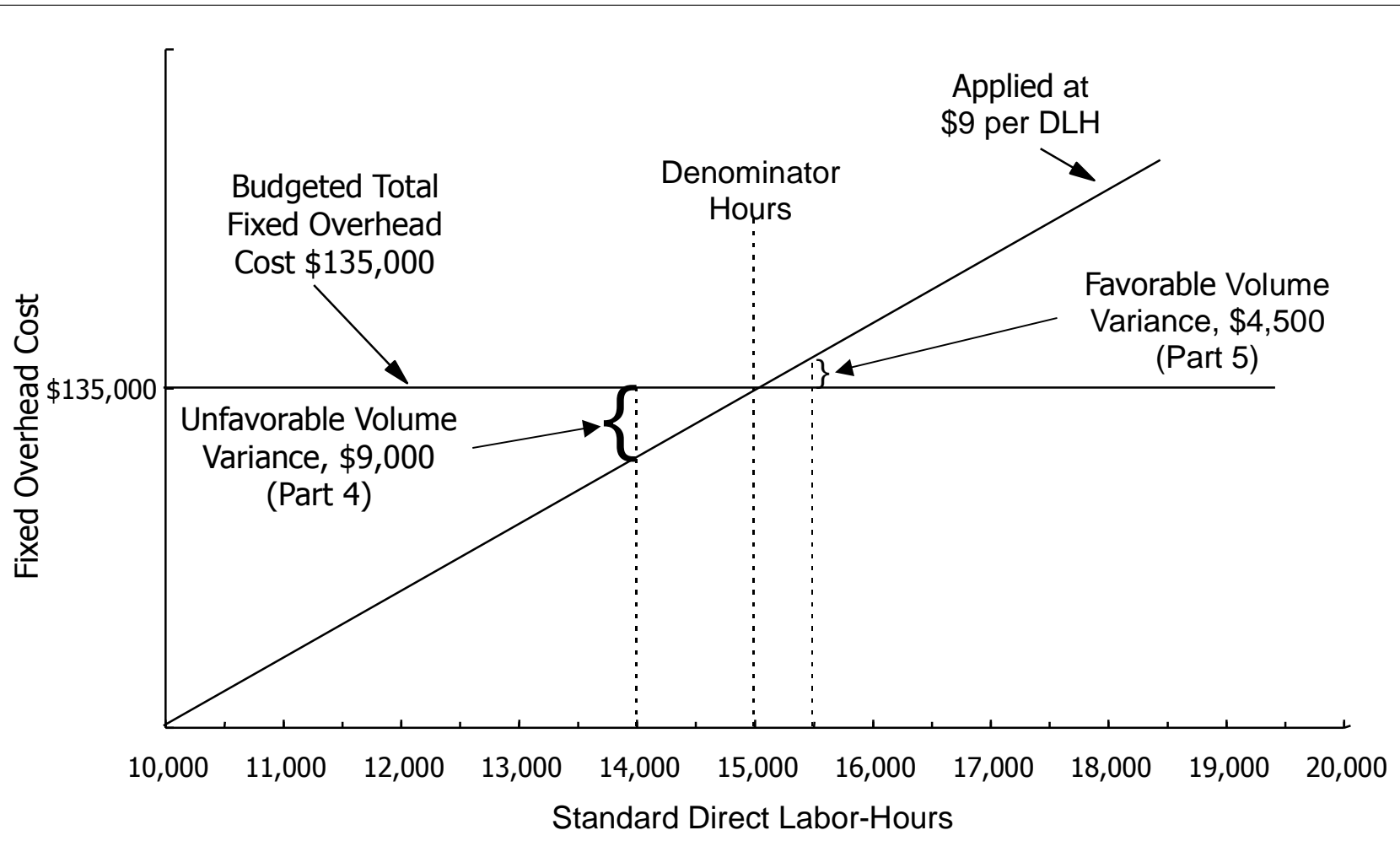
Alternative solution to the volume variance:

$$\text{Volume Variance} = \frac{\text{Fixed Portion of the Predetermined Overhead Rate}}{\text{Denominator Hours}} (\text{Denominator Hours} - \text{Standard Hours Allowed})$$

$$\$9 \text{ per DLH } (15,000 \text{ DLHs} - 15,500 \text{ DLHs}) = \$4,500 \text{ F}$$

b. See the graph on the following page.

**Problem 11-24** (continued)



**Problem 11-25** (60 minutes)

1. The computations of the cost formulas appear below.

	<i>Cost</i>	<i>Variable with respect to</i>	<i>Activity level</i>	<i>Cost per unit of activity</i>
Actors and directors' wages .....	\$144,000	performances	60	\$2,400
Stagehands' wages .....	27,000	performances	60	450
Ticket booth personnel and ushers' wages.....	10,800	performances	60	180
Scenery, costumes, and props .....	43,000	productions	5	8,600
Theater hall rent.....	45,000	performances	60	750
Printed programs .....	10,500	performances	60	175
Publicity .....	13,000	productions	5	2,600
Administrative expenses (15%) .....	6,480	productions	5	1,296
Administrative expenses (10%) .....	4,320	performances	60	72
Fixed administrative expenses (75%).....	32,400	—	—	—

**Problem 11-25** (continued)

2. The performance report is clearest when it is organized by cost behavior. The costs that are variable with respect to the number of productions come first, then the costs that are variable with respect to performances, then the administrative expenses as a special category.

The Munchkin Theater  
Flexible Budget Performance Report

Actual number of productions .....	4
Actual number of performances per production.....	16
Actual total number of performances .....	64

The performance report is continued on the next page.



**Problem 11-25** (continued)

<i>Costs</i>	<i>Cost Formula Per Unit of Activity</i>	<i>Actual Costs Incurred</i>	<i>Budget Based on Actual Activity</i>	<i>Variance</i>
Variable costs of productions: (Flexible budget based on 4 productions)				
Scenery, costumes, and props.....	\$ 8,600	\$ 39,300	\$ 34,400	\$4,900 U
Publicity.....	<u>2,600</u>	<u>12,000</u>	<u>10,400</u>	<u>1,600</u> U
Total variable cost per production*.....	<u>\$11,200</u>	<u>51,300</u>	<u>44,800</u>	<u>6,500</u> U
Variable costs of performances: (Flexible budget based on 64 performances)				
Actors and directors' wages .....	\$2,400	148,000	153,600	5,600 F
Stagehands' wages.....	450	28,600	28,800	200 F
Ticket booth personnel and ushers' wages.....	180	12,300	11,520	780 U
Theater hall rent .....	750	49,600	48,000	1,600 U
Printed programs .....	<u>175</u>	<u>10,950</u>	<u>11,200</u>	<u>250</u> F
Total variable cost per performance*.....	<u>\$3,955</u>	<u>249,450</u>	<u>253,120</u>	<u>3,670</u> F
Administrative expenses:				
Variable per production .....	\$1,296		5,184	
Variable per performance.....	72		4,608	
Fixed .....			<u>32,400</u>	
Total administrative expenses .....		<u>41,650</u>	<u>42,192</u>	<u>542</u> F
Total cost.....		<u>\$342,400</u>	<u>\$340,112</u>	<u>\$2,288</u> U

\*Excluding variable portion of administrative expenses

### **Problem 11-25** (continued)

3. The overall unfavorable variance is a very small percentage of the total cost, about 0.7%, which suggests that costs are under control. In addition, the largest unfavorable variance is for scenery, costumes, and props. This may indicate waste, but it may also indicate that more money was spent on these items, which are highly visible to theatergoers, to ensure higher-quality productions.
4. The average costs may not be very good indicators of the additional costs of any particular production or performance. The averages gloss over considerable variations in costs. For example, a production of Peter the Rabbit may require only half a dozen actors and actresses and fairly simple costumes and props. On the other hand, a production of Cinderella may require dozens of actors and actresses and very elaborate and costly costumes and props. Consequently, both the production costs and the cost per performance will be much higher for Cinderella than for Peter the Rabbit. Managers of theater companies know that they must estimate the costs of each new production individually—average costs are of little use for this purpose.

### Case 11-26 (30 minutes)

It is difficult to imagine how Lance Prating could ethically agree to go along with reporting the favorable \$6,000 variance for industrial engineering on the final report, even if the bill were not actually received by the end of the year. It would be misleading to include all of the original contract price of \$160,000 on the report, but to exclude part of the final cost of the contract. Collaborating in this attempt to mislead corporate headquarters would appear to be a violation of three of the Standards of Ethical Conduct for Management Accountants: Competence, Integrity, and Objectivity. These three violations are discussed below:

*Competence* The competence standard requires that management accountants “prepare complete and clear reports and recommendations after appropriate analyses of relevant and reliable information.” A report that omits mentioning the entire amount owed on the industrial engineering contract could hardly be called complete.

*Integrity* The integrity standard requires that management accountants “communicate unfavorable as well as favorable information...” Withholding unfavorable information such as the entire amount owed on the industrial engineering contract violates this standard.

*Objectivity* The objectivity standard requires that management accountants “disclose fully all relevant information that could reasonably be expected to influence the user's understanding of the reports, comments, and recommendations presented.” Failing to disclose the entire amount owed on the industrial engineering contract violates this standard.

Individuals will differ in how they think Prating should handle this situation. In our opinion, he should firmly state that he is willing to call Maria, but even if the bill does not arrive, he is ethically bound to properly accrue the expenses on the report—which will mean an unfavorable variance for industrial engineering and an overall unfavorable variance. This would require a great deal of personal courage. If the general manager insists on keeping the misleading \$6,000 favorable variance on the report, Prating would have little choice under the Standards of Ethical Conduct. He would have to take the dispute to the next higher managerial level in the company.

### **Case 11-26** (continued)

It is important to note that the problem may be a consequence of inappropriate use of performance reports by corporate headquarters. If the performance report is being used as a way of “beating up” managers, corporate headquarters may be creating a climate in which managers such as the general manager at the Colorado Springs plant will feel like they must always turn in positive reports. This creates pressure to bend the truth since reality isn’t always positive.

Some students may suggest that Prating redo the performance report to recognize efficiency variances. This might make the performance look better, or it might make the performance look worse; we cannot tell from the data in the case. Moreover, it is unlikely that corporate headquarters would permit a performance report that does not follow the usual format, which apparently does not recognize efficiency variances.

**Case 11-27** (60 minutes)

1. The number of units produced can be computed by using the total standard cost applied for the period for *any* input (materials, labor, or overhead), or it can be computed by using the total standard cost applied for all inputs together. Using only the standard cost applied for materials, we have:

$$\frac{\text{Total standard cost applied}}{\text{Standard cost per unit}} = \frac{\$608,000}{\$32 \text{ per unit}} = 19,000 \text{ units}$$

Alternatively, the number of units can be obtained by dividing the \$608,000 total standard cost applied by the \$16 standard price per yard for materials, and then dividing the answer by the 2 yards standard quantity per unit:

$$\begin{aligned} \$608,000 \div \$16 \text{ per yard} &= 38,000 \text{ yards;} \\ 38,000 \text{ yards} \div 2 \text{ yards per unit} &= 19,000 \text{ units.} \end{aligned}$$

The same answer can be obtained by using any other cost input.

2. 40,000 yards; see below for a detailed analysis.
3. \$15.71 per yard; see below for a detailed analysis.
4. 61,000 DLHs; see below for a detailed analysis.
5. \$5.14 per DLH; see below for a detailed analysis.
6. Standard variable overhead cost applied ... \$171,000  
 Add: Overhead efficiency variance..... 12,000 U (see analysis  
 Deduct: Overhead spending variance..... 3,700 F below)  
 Actual variable overhead cost incurred..... \$179,300
7. Standard fixed overhead cost applied ..... \$456,000  
 Add: Unfavorable volume variance..... 24,000 U  
 Budgeted fixed overhead cost..... \$480,000
8. Budgeted fixed overhead cost (a)..... \$480,000  
 Fixed portion of the predetermined overhead rate (b).... \$8 per DLH  
 Denominator activity (a) ÷ (b) ..... 60,000 DLHs

## Case 11-27 (continued)

Direct materials analysis:

Actual Quantity of Inputs, at Actual Price (AQ × AP)	Actual Quantity of Inputs, at Standard Price (AQ × SP)	Standard Quantity Allowed for Output, at Standard Price (SQ × SP)
40,000 yards × \$15.71 per yard*** = \$628,400	40,000 yards** × \$16 per yard = \$640,000	38,000 yards* × \$16 per yard = \$608,000
↑	↑	↑
Price Variance, \$11,600 F		Quantity Variance, \$32,000 U
Total Variance, \$20,400 U		

\* 19,000 units × 2 yards per unit = 38,000 yards

\*\* \$640,000 ÷ \$16 per yard = 40,000 yards

\*\*\* \$628,400 ÷ 40,000 yards = \$15.71 per yard

Direct labor analysis:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
61,000 DLHs × \$5.14 per DLH*** = \$313,540	61,000 DLHs** × \$5 per DLH = \$305,000	57,000 DLHs* × \$5 per DLH = \$285,000
↑	↑	↑
Rate Variance, \$8,540 U		Efficiency Variance, \$20,000 U
Total Variance, \$28,540 U		

\* 19,000 units × 3 DLHs per unit = 57,000 DLHs

\*\* \$305,000 ÷ \$5 per DLH = 61,000 DLHs

\*\*\* \$313,540 ÷ 61,000 DLHs = \$5.14 per DLH

**Case 11-27** (continued)

Variable overhead analysis:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>\$179,300**</u>	<u>61,000 DLHs × \$3 per DLH = \$183,000*</u>	<u>57,000 DLHs × \$3 per DLH = \$171,000</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> ↑ Spending Variance, \$3,700 F </div> <div style="text-align: center;"> ↑ Efficiency Variance, \$12,000 U </div> </div> <div style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 5px;"> Total Variance, \$8,300 U </div>		

\* Computed using 61,000 actual DLHs at the \$3 per DLH standard rate.

\*\* \$183,000 – \$3,700 = \$179,300.

Fixed overhead analysis:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$478,500**</u>	<u>\$480,000*</u>	<u>57,000 DLHs × \$8 per DLH = \$456,000</u>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> ↑ Budget Variance, \$1,500 F </div> <div style="text-align: center;"> ↑ Volume Variance, \$24,000 U </div> </div>		

\* \$456,000 + \$24,000 = \$480,000.

\*\* \$480,000 – \$1,500 = \$478,500.

**Case 11-28** (45 minutes)

- Flexible budgets would allow Mark Fletcher to directly compare SoftGro's actual selling expenses (based on the current month's actual activity) with the budgeted selling expenses. In general, flexible budgets:
  - provide management with the tools to evaluate the effects of varying levels of activity on costs, profits, and cash position.
  - enable management to improve planning and decision making.
  - improve the analysis of actual results.

2. Softgro, Inc.  
Revised Monthly Selling Expense Report  
November

Budgeted unit sales .....	280,000
Budgeted dollar sales.....	\$11,200,000
Budgeted orders processed .....	6,500
Budgeted salespersons .....	90

	<i>Actual</i>	<i>Flexible Budget Allowance</i>	<i>Variance</i>
Unit sales.....	310,000	310,000	—
Dollar sales .....	\$12,400,000	\$12,400,000	—
Orders processed .....	5,800	5,800	—
Salespersons.....	96	96	—
Advertising expense.....	\$ 1,660,000	\$ 1,650,000	\$10,000 U
Staff salaries expense .....	125,000	125,000	—
Sales salaries expense <sup>1</sup> .....	115,400	115,200	200 U
Commissions expense <sup>2</sup> .....	496,000	496,000	—
Per diem expense <sup>3</sup> .....	162,600	158,400	4,200 U
Office expense <sup>4</sup> .....	358,400	366,000	7,600 F
Shipping expense <sup>5</sup> .....	976,500	992,500	16,000 F
Total .....	<u>\$ 3,893,900</u>	<u>\$ 3,903,100</u>	<u>\$ 9,200 F</u>



### Case 11-28 (continued)

Supporting computations:

<sup>1</sup>Monthly salary for salesperson:

$$\$108,000 \div 90 \text{ salespersons} = \$1,200 \text{ per salesperson}$$

or

$$\$1,296,000 \div 12 \div 90 \text{ salespersons} = \$1,200 \text{ per salesperson}$$

Budgeted amount:

$$\$1,200 \text{ per salesperson} \times 96 \text{ salespersons} = \$115,200$$

<sup>2</sup>Commission rate:

$$\$3,200,000 \div \$80,000,000 = 0.04$$

or

$$\$448,000 \div \$11,200,000 = 0.04$$

Budgeted amount for commissions:

$$\$12,400,000 \times 0.04 = \$496,000$$

<sup>3</sup> $(\$148,500 \div 90 \text{ salespersons}) \div 15 \text{ days per salesperson} =$

$$\$110 \text{ per day}$$

or

$$(\$1,782,000 \div 12 \div 90 \text{ salespersons}) \div 15 \text{ days per salesperson} =$$

$$\$110 \text{ per day}$$

$$(\$110 \text{ per day} \times 15 \text{ days per salesperson}) \times 96 \text{ salespersons} =$$

$$\$158,400$$

<sup>4</sup> $(\$4,080,000 - \$3,000,000) \div 54,000 \text{ orders} = \$20 \text{ per order}$

$$(\$3,000,000 \div 12) + (\$20 \text{ per order} \times 5,800 \text{ orders}) = \$366,000$$

<sup>5</sup> $[\$6,750,000 - (\$3 \text{ per unit} \times 2,000,000 \text{ units})] \div 12 =$

$$\$62,500 \text{ monthly fixed expense}$$

$$\$62,500 + (\$3 \text{ per unit} \times 310,000 \text{ units}) = \$992,500$$

**Case 11-29** (45 minutes for each company; 90 minutes in total)

(Note to the Instructor: You may wish to assign only one company.)

<i>Item</i>	<i>Company X</i>	<i>Company Y</i>
1. Denominator activity in machine-hours .....	18,000*	30,000
2. Standard machine-hours allowed for units produced .....	19,500	28,000*
3. Actual machine-hours worked .....	20,000	27,500*
4. Flexible budget variable overhead per machine-hour .....	\$ 1.60*	\$ 2.00
5. Budgeted fixed overhead (total) .....	72,000	135,000
6. Actual variable overhead cost .....	30,000*	55,275*
7. Actual fixed overhead cost .....	72,500*	134,600*
8. Variable overhead cost applied to production .....	31,200*	56,000
9. Fixed overhead cost applied to production ...	78,000	126,000*
10. Variable overhead spending variance .....	2,000F	275U
11. Variable overhead efficiency variance .....	800U*	1,000F*
12. Fixed overhead budget variance .....	500U*	400F
13. Fixed overhead volume variance .....	6,000F	9,000U*
14. Variable portion of the predetermined overhead rate .....	1.60	2.00
15. Fixed portion of the predetermined overhead rate .....	4.00	4.50
16. Underapplied or (overapplied) overhead .....	(6,700)	7,875

\*Given.

**Case 11-29** (continued)*Company X:*

Variable overhead data:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>\$30,000*</u>	<u>20,000 MHs × \$1.60 per MH* = \$32,000</u>	<u>19,500 MHs × \$1.60 per MH* = \$31,200*</u>
	↑ Spending Variance, \$2,000 F	↑ Efficiency Variance, \$800 U*

\*Given.

Fixed overhead data:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$72,500*</u>	<u>\$72,000</u>	<u>19,500 MHs × \$4 per MH = \$78,000</u>
	↑ Budget Variance, \$500 U*	↑ Volume Variance, \$6,000 F

\*Given.

Computation of the fixed overhead rate:

$$\frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}} = \frac{\$72,000}{18,000 \text{ MHs}} = \$4 \text{ per MH}$$

Overapplied overhead:

Variable overhead spending variance .....	\$2,000	F
Variable overhead efficiency variance .....	800	U
Fixed overhead budget variance .....	500	U
Fixed overhead volume variance .....	<u>6,000</u>	F
Overapplied overhead .....	<u>\$6,700</u>	

**Case 11-29** (continued)*Company Y:*

Variable overhead data:

Actual Hours of Input, at the Actual Rate (AH × AR)	Actual Hours of Input, at the Standard Rate (AH × SR)	Standard Hours Allowed for Output, at the Standard Rate (SH × SR)
<u>\$55,275*</u>	<u>27,500 MHs* ×</u>	<u>28,000 MHs* ×</u>
	\$2 per MH	\$2 per MH
	= \$55,000	= \$56,000
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             ↑              Spending Variance,              \$275 U           </div> <div style="text-align: center;">             ↑              Efficiency Variance,              \$1,000 F*           </div> <div style="text-align: center;">             ↑           </div> </div>		

Fixed overhead data:

Actual Fixed Overhead Cost	Budgeted Fixed Overhead Cost	Fixed Overhead Cost Applied to Work in Process
<u>\$134,600*</u>	<u>\$135,000</u>	<u>28,000 MHs* ×</u>
		\$4.50 per MH
		= \$126,000*
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">             ↑              Budget Variance,              \$400 F           </div> <div style="text-align: center;">             ↑              Volume Variance,              \$9,000 U*           </div> <div style="text-align: center;">             ↑           </div> </div>		

Denominator activity in hours:

$$\begin{aligned}
 \text{Fixed portion of the pre-determined overhead rate} &= \frac{\text{Budgeted fixed overhead cost}}{\text{Denominator activity}} \\
 &= \frac{\$135,000}{\text{Denominator activity}} = \$4.50 \text{ per MH}
 \end{aligned}$$

Therefore, the denominator activity is:

$$\$135,000 \div \$4.50 \text{ per MH} = 30,000 \text{ MHs.}$$

\*Given.

**Case 11-29** (continued)

Underapplied overhead:

Variable overhead spending variance .....	\$ 275 U
Variable overhead efficiency variance ....	1,000 F
Fixed overhead budget variance .....	400 F
Fixed overhead volume variance.....	<u>9,000 U</u>
Underapplied overhead .....	<u><u>\$7,875</u></u>

## Group Exercise 11-30

1. The tighter standards for fixed manufacturing costs are a consequence of spreading fixed costs over more units, resulting in a smaller standard cost per unit. Unless the plant operates at practical capacity, the volume variance will be unfavorable.
  - a. The possible negative behavioral effects include:
    - Employees may view the standards as unreasonable.
    - Employees may react negatively to the change, feeling that it has been imposed by the accounting department with little input from those who would be most affected.
    - Motivation may suffer if employees feel increased pressure to meet the tighter standards.
    - General resistance to change.
  - b. To reduce the negative behavioral effects, management could:
    - Explain what is expected and why this change will further the company's objectives.
    - Adjust the performance evaluation system to reflect this change. For example, production managers may not be held responsible for volume variances so long as demand is satisfied and orders are shipped on time.
2. Tight standards can have positive behavioral effects because:
  - Employees may be energized by the challenge.
  - Tight standards may encourage teamwork.
  - Tight standards may foster problem-solving and creative thinking.
3. Representatives of all the parts of the organization that will be affected by the change should participate in setting standards. This would certainly include anyone whose performance evaluation is affected by a change in standards.

Employee participation in standard setting should result in better goal congruence. The individuals who will be affected by the standards have first-hand operating knowledge, which should be invaluable in the standard setting process. In addition, their participation in standard setting will increase the likelihood that they will be committed to meeting the standards once they have been set.

(CMA unofficial solution, adapted)

### **Group Exercise 11-31**

The solution will depend on the particular college or university that the students investigate.