CHAPTER 8
FLEXIBLE BUDGETS, OVERHEAD COST VARIANCES, AND MANAGEMENT CONTROL

8-1 Effective planning of variable overhead costs involves:

1. Planning to undertake only those variable overhead activities that add value for customers using the product or service, and
2. Planning to use the drivers of costs in those activities in the most efficient way.

8-2 At the start of an accounting period, a larger percentage of fixed overhead costs are locked-in than is the case with variable overhead costs. When planning fixed overhead costs, a company must choose the appropriate level of capacity or investment that will benefit the company over a long time. This is a strategic decision.

8-3 The key differences are how direct costs are traced to a cost object and how indirect costs are allocated to a cost object:

	Actual Costing	**Standard Costing**
Direct costs	Actual prices × Actual inputs used	Standard prices × Standard inputs allowed for actual output
Indirect costs	Actual indirect rate × Actual inputs used	Standard indirect cost-allocation rate × Standard quantity of cost-allocation base allowed for actual output

8-4 Steps in developing a budgeted variable-overhead cost rate are

1. Choose the period to be used for the budget.
2. Select the cost-allocation bases to use in allocating variable overhead costs to the output produced.
3. Identify the variable overhead costs associated with each cost-allocation base.
4. Compute the rate per unit of each cost-allocation base used to allocate variable overhead costs to output produced.

8-5 Two factors affect the spending variance for variable manufacturing overhead:

a. price changes of individual inputs (such as energy and indirect materials) included in variable overhead relative to budgeted prices

b. percentage change in the actual quantity used of individual items included in variable overhead cost pool, relative to the percentage change in the quantity of the cost driver of the variable overhead cost pool

8-6 Possible reasons for a favorable variable-overhead efficiency variance include:

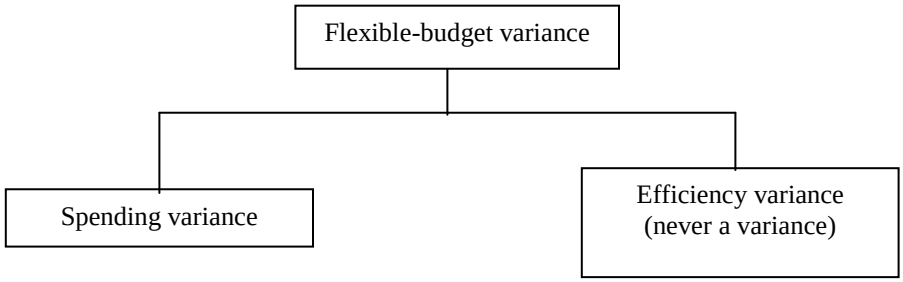
- Workers are more skillful in using machines than budgeted.
- Production scheduler was able to schedule jobs better than budgeted, resulting in lower-than-budgeted machine-hours.
- Machines operated with fewer slowdowns than budgeted.
- Machine time standards were overly lenient.

8-7 A direct materials efficiency variance indicates whether more or less direct materials were used than was budgeted for the actual output achieved. A variable manufacturing overhead efficiency variance indicates whether more or less of the chosen allocation base was used than was budgeted for the actual output achieved.

8-8 Steps in developing a budgeted fixed-overhead rate are

1. Choose the period to use for the budget.
2. Select the cost-allocation base to use in allocating fixed overhead costs to output produced.
3. Identify the fixed-overhead costs associated with each cost-allocation base.
4. Compute the rate per unit of each cost-allocation base used to allocate fixed overhead costs to output produced.

8-9 The relationship for fixed-manufacturing overhead variances is:



There is never an efficiency variance for fixed overhead because managers cannot be more or less efficient in dealing with an amount that is fixed regardless of the output level. The result is that the flexible-budget variance amount is the same as the spending variance for fixed-manufacturing overhead.

8-10 For planning and control purposes, fixed overhead costs are a lump sum amount that is not controlled on a per-unit basis. In contrast, for inventory costing purposes, fixed overhead costs are allocated to products on a per-unit basis.

8-11 An important caveat is what change in selling price might have been necessary to attain the level of sales assumed in the denominator of the fixed manufacturing overhead rate. For example, the entry of a new low-price competitor may have reduced demand below the denominator level if the budgeted selling price was maintained. An unfavorable production-volume variance may be small relative to the selling-price variance had prices been dropped to attain the denominator level of unit sales.

8-12 A strong case can be made for writing off an unfavorable production-volume variance to cost of goods sold. The alternative is prorating it among inventories and cost of goods sold, but this would "penalize" the units produced (and in inventory) for the cost of unused capacity, i.e., for the units *not* produced. But, if we take the view that the denominator level is a "soft" number—i.e., it is only an estimate, and it is never expected to be reached exactly—then it makes more sense to prorate the production volume variance—whether favorable or not—among the inventory stock and cost of goods sold. Prorating a favorable variance is also more conservative: It results in a lower operating income than if the favorable variance had all been

written off to cost of goods sold. Finally, prorating also dampens the efficacy of any steps taken by company management to manage operating income through manipulation of the production volume variance. In sum, a production-volume variance need not always be written off to cost of goods sold.

8-13 The four variances are

- Variable manufacturing overhead costs
  - spending variance
  - efficiency variance
- Fixed manufacturing overhead costs
  - spending variance
  - production-volume variance

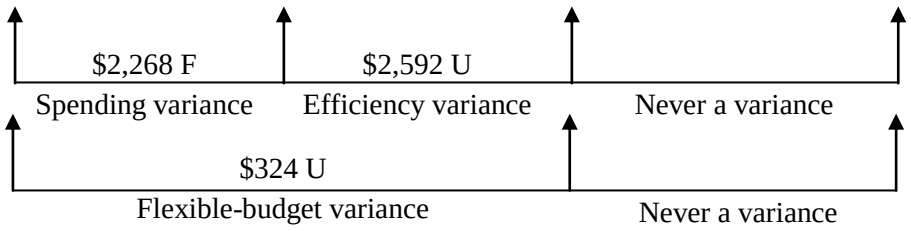
8-14 Interdependencies among the variances could arise for the spending and efficiency variances. For example, if the chosen allocation base for the variable overhead efficiency variance is only one of several cost drivers, the variable overhead spending variance will include the effect of the other cost drivers. As a second example, interdependencies can be induced when there are misclassifications of costs as fixed when they are variable and vice versa.

8-15 Flexible-budget variance analysis can be used in the control of costs in an activity area by isolating spending and efficiency variances at different levels in the cost hierarchy. For example, an analysis of batch costs can show the price and efficiency variances from being able to use longer production runs in each batch relative to the batch size assumed in the flexible budget.

8-16 (20 min.) **Variable manufacturing overhead, variance analysis.**

1. Variable Manufacturing Overhead Variance Analysis for Esquire Clothing for June 2014

Actual Costs Incurred Actual Input Qty. × Actual Rate (1)	**Actual Input Qty. × Budgeted Rate (2)**	**Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (3)**	**Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)**
(4,536 × $11.50)	(4,536 × $12)	(4 × 1,080 × $12)	(4 × 1,080 × $12)
$52,164	$54,432	$51,840	$51,840



2. Esquire had a favorable spending variance of $2,268 because the actual variable overhead rate was $11.50 per direct manufacturing labor-hour versus $12 budgeted. It had an unfavorable

efficiency variance of $2,592 U because each suit averaged 4.2 labor-hours (4,536 hours ÷ 1,080 suits) versus 4.0 budgeted labor-hours.

8-17 (20 min.) **Fixed-manufacturing overhead, variance analysis (continuation of 8-16).**

1 & 2.

$$\text{Budgeted fixed overhead rate per unit of allocation base} = \frac{\$62{,}400}{1{,}040 \times 4} = \frac{\$62{,}400}{4{,}160} = \$15 \text{ per hour}$$

Fixed Manufacturing Overhead Variance Analysis for Esquire Clothing for June 2014

Actual Costs Incurred (1)	**Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level (2)**	**Flexible Budget: Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level (3)**	**Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)**
			(4 × 1,080 × $15)
$63,916	$62,400	$62,400	$64,800
	$1,516 U		$2,400 F
	Spending variance	Never a variance	Production-volume variance
	$1,516 U		$2,400 F
	Flexible-budget variance		Production-volume variance

The fixed manufacturing overhead spending variance and the fixed manufacturing flexible budget variance are the same—$1,516 U. Esquire spent $1,516 more than the $62,400 budgeted amount for June 2014.

The production-volume variance is $2,400 F. This arises because Esquire utilized its capacity more intensively than budgeted (the actual production of 1,080 suits exceeds the budgeted 1,040 suits). This results in overallocated fixed manufacturing overhead of $2,400 (4 × 40 × $15). Esquire would want to understand the reasons for a favorable production-volume variance. Is the market growing? Is Esquire gaining market share? Will Esquire need to add capacity?

8-18 (30 min.) **Variable manufacturing overhead variance analysis.**

1. Denominator level = (3,200,000 × 0.02 hours) = 64,000 hours

2.

	Actual Results	Flexible Budget Amounts
1. Output units (baguettes)	2,800,000	2,800,000
2. Direct manufacturing labor-hours	50,400	56,000[a]
3. Labor-hours per output unit (2 ÷1)	0.018	0.020
4. Variable manuf. overhead (MOH) costs	$680,400	$560,000
5. Variable MOH per labor-hour (4 ÷2)	$13.50	$10
6. Variable MOH per output unit (4 ÷1)	$0.243	$0.200

[a]2,800,000 × 0.020 = 56,000 hours

Variable Manufacturing Overhead Variance Analysis for French Bread Company for 2014:

Actual Costs Incurred Actual Input Qty. × Actual Rate (1)	**Actual Input Qty. × Budgeted Rate (2)**	**Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (3)**	**Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)**
(50,400 × $13.50)	(50,400 × $10)	(56,000 × $10)	(56,000 × $10)
$680,400	$504,000	$560,000	$560,000
	$176,400 U	$56,000 F	
	Spending variance	Efficiency variance	Never a variance
	$120,400 U		
	Flexible-budget variance		Never a variance

3. Spending variance of $176,400 U. It is unfavorable because variable manufacturing overhead was 35 percent higher than planned. A possible explanation could be an increase in energy rates relative to the rate per standard labor-hour assumed in the flexible budget.

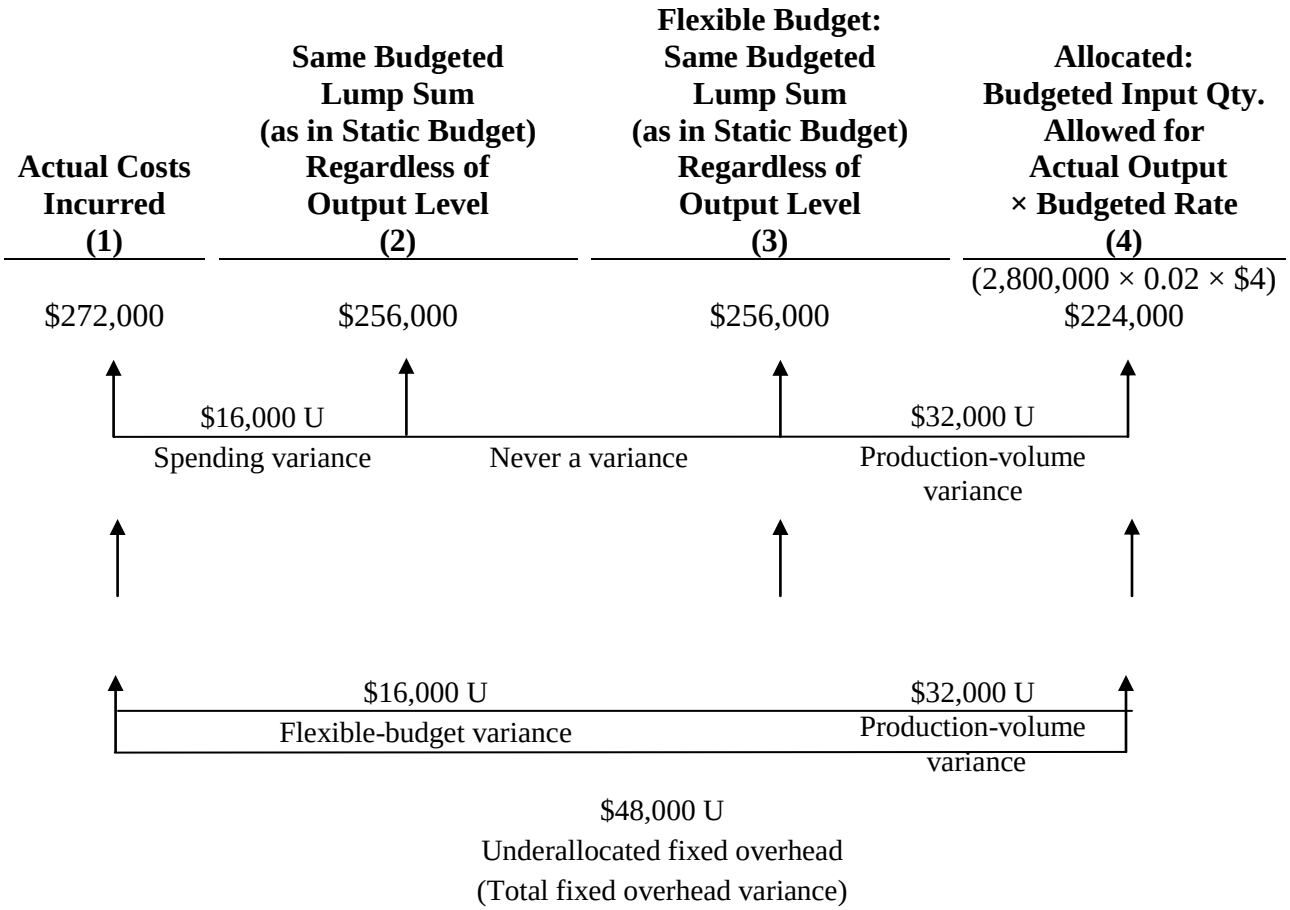
Efficiency variance of $56,000 F. It is favorable because the actual number of direct manufacturing labor-hours required was lower than the number of hours in the flexible budget. Labor was more efficient in producing the baguettes than management had anticipated in the budget. This could occur because of improved morale in the company, which could result from an increase in wages or an improvement in the compensation scheme.

Flexible-budget variance of $120,400 U. It is unfavorable because the favorable efficiency variance was not large enough to compensate for the large unfavorable spending variance.

8-19 (30 min.) **Fixed manufacturing overhead variance analysis (continuation of 8-18).**

1. Budgeted standard direct manufacturing labor used = 0.02 per baguette
Budgeted output = 3,200,000 baguettes
Budgeted standard direct manufacturing labor-hours
= 3,200,000 × 0.02
= 64,000 hours
Budgeted fixed manufacturing overhead costs
= 64,000 × $4.00 per hour
= $256,000
Actual output = 2,800,000 baguettes
Allocated fixed manufacturing overhead
= 2,800,000 × 0.02 × $4
= $224,000

Fixed Manufacturing Overhead Variance Analysis for French Bread Company for 2014



2. The fixed manufacturing overhead is underallocated by $48,000.

3. The production-volume variance of $32,000 U captures the difference between the budgeted 3,200,0000 baguettes and the lower actual 2,800,000 baguettes produced—the fixed cost capacity not used. The spending variance of $16,000 U means that the actual aggregate of fixed costs ($272,000) exceeds the budget amount ($256,000). For example, monthly leasing rates for baguette-making machines may have increased above those in the budget for 2014.

8-20 (30–40 min.) **Manufacturing overhead, variance analysis.**

1. The summary information is:

The Principles Corporation (June 2014)	**Actual**	**Flexible Budget**	**Static Budget**
Outputs units (number of assembled units)	225	225	110
Hours of assembly time	360	450	220[a]
Assembly hours per unit	1.60[b]	2.00	2.00
Variable mfg. overhead cost per hour of assembly time	$ 33.15[d]	$ 32.00	$ 32.00
Variable mfg. overhead costs	$11,933	$14,400[e]	$ 7,040[f]
Fixed mfg. overhead costs	$12,180	$10,780	$10,780
Fixed mfg. overhead costs per hour of assembly time	$ 33.83[g]		$ 49.00[h]

[a] 110 units × 2 assembly hours per unit = 220 hours

[b] 360 hours ÷ 225 units = 1.60 assembly hours per unit

[c] 225 units × 2 assembly hours per unit = 450 hours

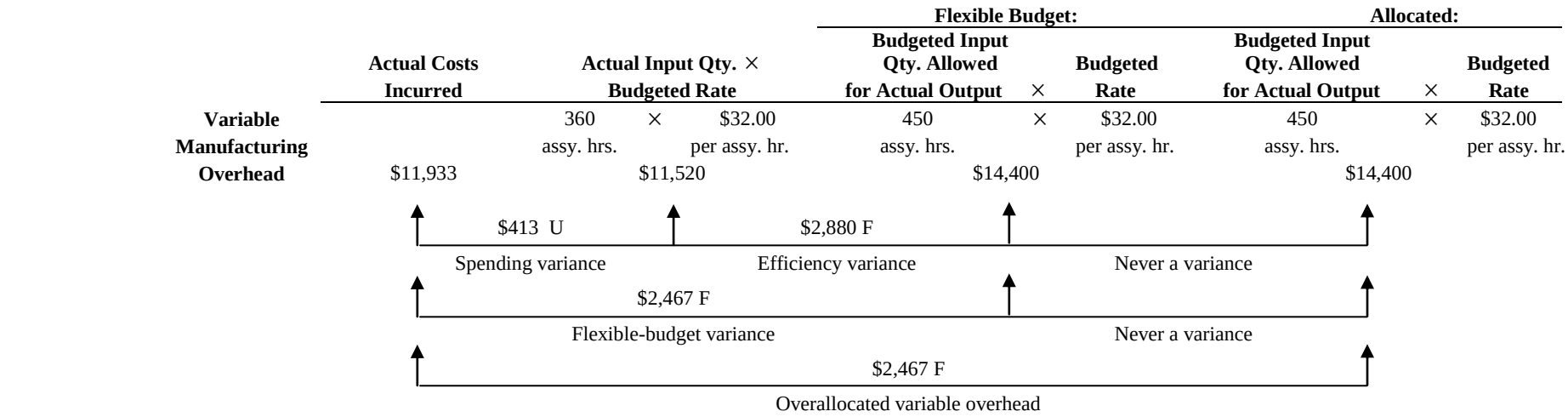
[d] $11,933 ÷ 360 assembly hours = $33.15 per assembly hour

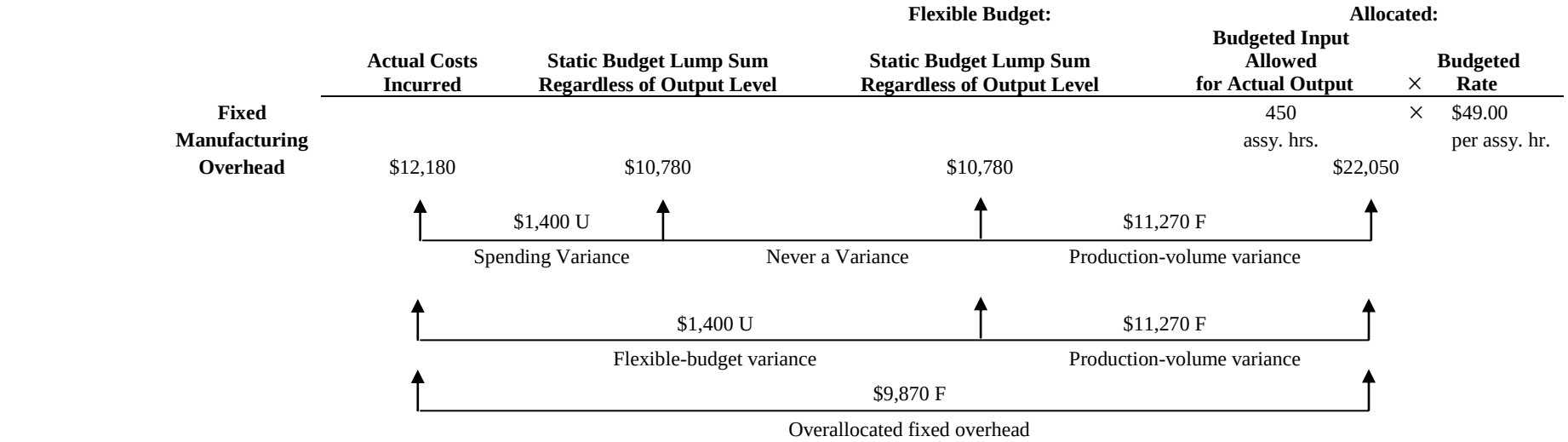
[e] 450 assembly hours × $32 per assembly hour = $14,400

[f] 220 assembly hours × $32 per assembly hour = $7,040

[g] $12,180 ÷ 360 assembly hours = $33.83 per assembly hour

[h] $10,780 ÷ 220 assembly hours = $49 per assembly hour


Flexible Budget:
Allocated:
Actual Costs Incurred
Actual Input Qty. × Budgeted Rate
Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate
Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate
Variable Manufacturing Overhead
360 assy. hrs. × $32.00 per assy. hr.
450 assy. hrs. × $32.00 per assy. hr.
450 assy. hrs. × $32.00 per assy. hr.
$11,933
$11,520
$14,400
$14,400
$413 U
Spending variance
$2,880 F
Efficiency variance
Never a variance
$2,467 F
Flexible-budget variance
Never a variance
$2,467 F
Overallocated variable overhead


Flexible Budget:
Allocated:
Actual Costs Incurred
Static Budget Lump Sum Regardless of Output Level
Static Budget Lump Sum Regardless of Output Level
Budgeted Input Allowed for Actual Output × Budgeted Rate
Fixed Manufacturing Overhead
450 assy. hrs. × $49.00 per assy. hr.
$12,180
$10,780
$10,780
$22,050
$1,400 U
Spending Variance
Never a Variance
$11,270 F
Production-volume variance
$1,400 U
Flexible-budget variance
$11,270 F
Production-volume variance
$9,870 F
Overallocated fixed overhead

The summary analysis is:

	Spending Variance	Efficiency Variance	Production-Volume Variance
Variable Manufacturing Overhead	$413 U	$2,880 F	Never a variance
Fixed Manufacturing Overhead	$1,400 U	Never a variance	$11,270 F

2. **Variable Manufacturing Costs and Variances**

a. Variable Manufacturing Overhead Control	11,933	
Accounts Payable Control and various other accounts		11,933
To record actual variable manufacturing overhead costs incurred.		
b. Work-in-Process Control	14,400	
Variable Manufacturing Overhead Allocated		14,400
To record variable manufacturing overhead allocated.		
c. Variable Manufacturing Overhead Allocated	14,400	
Variable Manufacturing Overhead Spending Variance	413	
Variable Manufacturing Overhead Control		11,933
Variable Manufacturing Overhead Efficiency Variance		2,880
To isolate variances for the accounting period.		
d. Variable Manufacturing Overhead Efficiency Variance	2,880	
Variable Manufacturing Overhead Spending Variance		413
Cost of Goods Sold		2,467
To write off variable manufacturing overhead variances to cost of goods sold.		

Fixed Manufacturing Costs and Variances

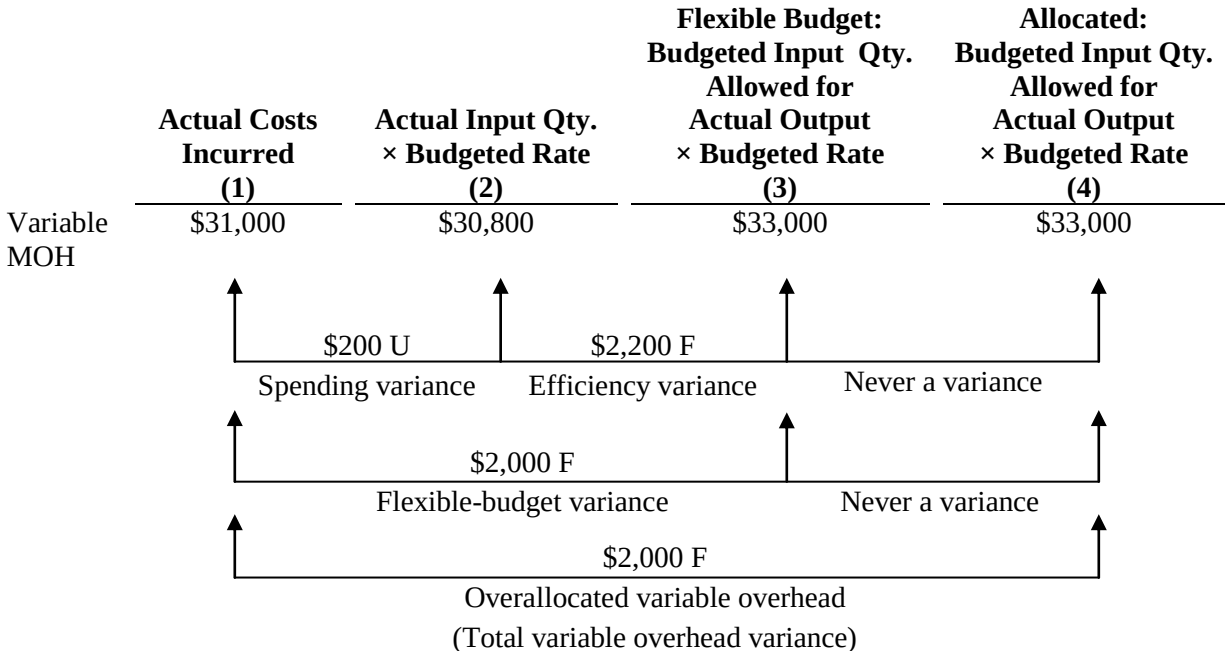
a. Fixed Manufacturing Overhead Control	12,180	
Salaries Payable, Acc. Depreciation, various other accounts		12,180
To record actual fixed manufacturing overhead costs incurred.		
b. Work-in-Process Control	22,050	
Fixed Manufacturing Overhead Allocated		22,050
To record fixed manufacturing overhead allocated.		
c. Fixed Manufacturing Overhead Allocated	22,050	
Fixed Manufacturing Overhead Spending Variance	1,400	
Fixed Manufacturing Overhead Production-Volume Variance		11,270
Fixed Manufacturing Overhead Control		12,180
To isolate variances for the accounting period.		
d. Fixed Manufacturing Overhead Production-Volume Variance	11,270	
Fixed Manufacturing Overhead Spending Variance		1,400
Cost of Goods Sold		9,870
To write off fixed manufacturing overhead variances to cost of goods sold.		

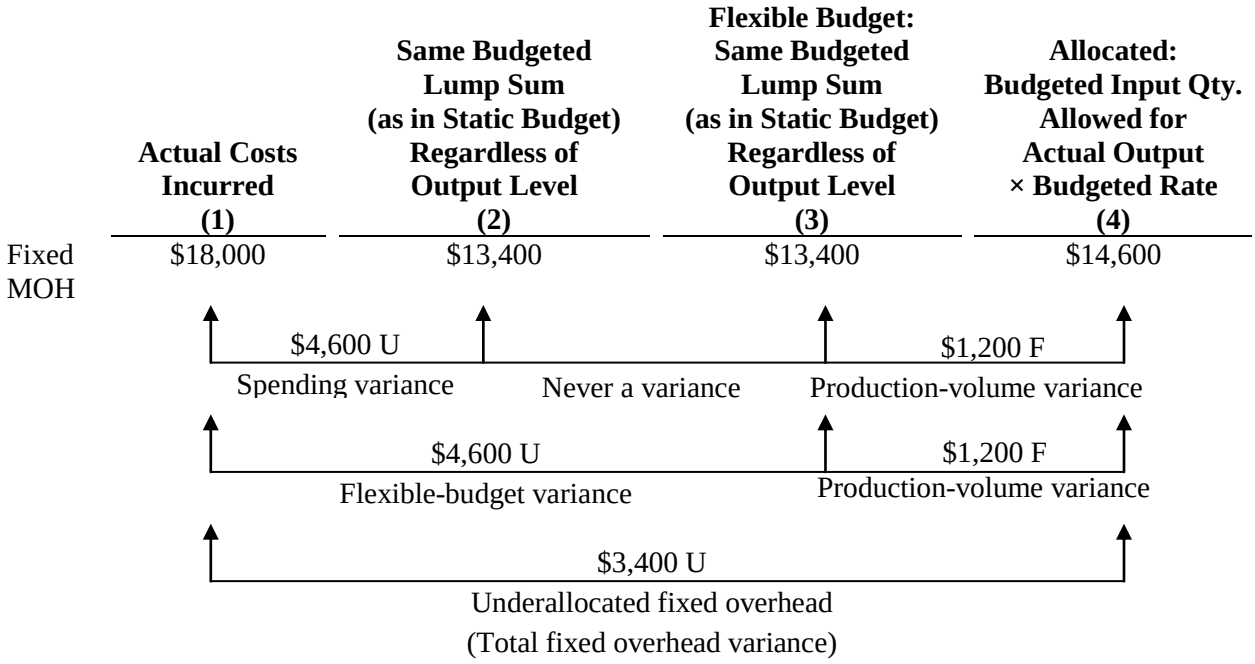
3. Planning and control of *variable* manufacturing overhead costs have both a long-run and a short-run focus. It involves Principles planning to undertake only value-added overhead activities (a long-run view) and then managing the cost drivers of those activities in the most efficient way (a short-run view). Planning and control of *fixed* manufacturing overhead costs at Principles have primarily a long-run focus. It involves undertaking only value-added fixed-overhead activities for a budgeted level of output. Principles make most of the key decisions that determine the level of fixed-overhead costs at the start of the accounting period.

8-21 (10–15 min.) **4-variance analysis, fill in the blanks.**

	Variable	Fixed
1. Spending variance	$200 U	$4,600 U
2. Efficiency variance	2,200 F	NEVER
3. Production-volume variance	NEVER	1,200 F
4. Flexible-budget variance	2,000 F	4,600 U
5. Underallocated (overallocated) MOH	2,000 F	3,400 U

These relationships could be presented in the same way as in Exhibit 8-4.





An overview of the four overhead variances is:

4-Variance Analysis	Spending Variance	Efficiency Variance	Production-Volume Variance
Variable Overhead	$200 U	$2,200 F	Never a variance
Fixed Overhead	$4,600 U	Never a variance	$1,200 F

8-22 (20–30 min.) **Straightforward 4-variance overhead analysis.**

1. The budget for fixed manufacturing overhead is 4,000 units × 6 machine-hours × $15 machine-hours/unit = $360,000.

An overview of the 4-variance analysis is:

4-Variance Analysis	Spending Variance	Efficiency Variance	Production-Volume Variance
Variable Manufacturing Overhead	$17,800 U	$16,000 U	Never a Variance
Fixed Manufacturing Overhead	$13,000 U	Never a Variance	$36,000 F

Solution Exhibit 8-22 has details of these variances.

A detailed comparison of actual and flexible budgeted amounts is:

	Actual	Flexible Budget
Output units (auto parts)	4,400	4,400
Allocation base (machine-hours)	28,400	26,400[a]
Allocation base per output unit	6.45[b]	6.00
Variable MOH	$245,000	$211,200[c]
Variable MOH per hour	$8.63[d]	$8.00
Fixed MOH	$373,000	$360,000[e]
Fixed MOH per hour	$13.13[f]	–

[a] 4,400 units × 6.00 machine-hours/unit = 26,400 machine-hours

[b] 28,400 ÷ 4,400 = 6.45 machine-hours per unit

[c] 4,400 units × 6.00 machine-hours per unit × $8.00 per machine-hour = $211,200

[d] $245,000 ÷ 28,400 = $8.63

[e] 4,000 units × 6.00 machine-hours per unit × $15 per machine-hour = $360,000

[f] $373,000 ÷ 28,400 = $13.13

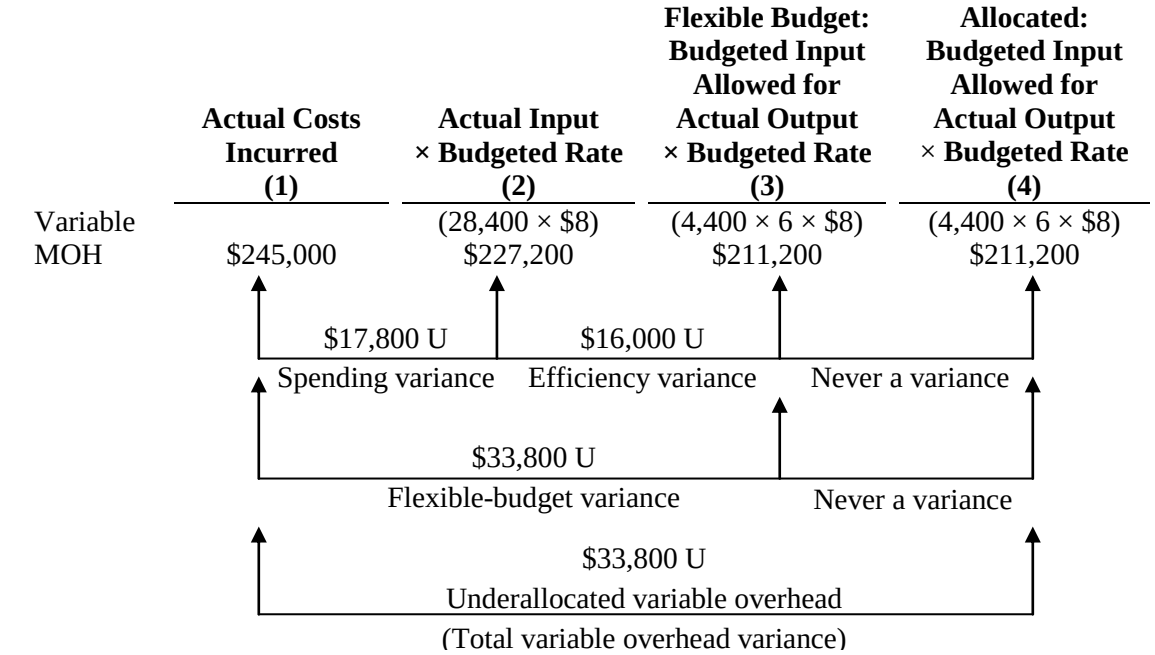
2.	Variable Manufacturing Overhead Control	245,000	
	Accounts Payable Control and other accounts		245,000
	Work-in-Process Control	211,200	
	Variable Manufacturing Overhead Allocated		211,200
	Variable Manufacturing Overhead Allocated	211,200	
	Variable Manufacturing Overhead Spending Variance	17,800	
	Variable Manufacturing Overhead Efficiency Variance	16,000	
	Variable Manufacturing Overhead Control		245,000
	Fixed Manufacturing Overhead Control	373,000	
	Wages Payable Control, Accumulated Depreciation Control, etc.		373,000
	Work-in-Process Control	396,000	
	Fixed Manufacturing Overhead Allocated		396,000
	Fixed Manufacturing Overhead Allocated	396,000	
	Fixed Manufacturing Overhead Spending Variance	13,000	
	Fixed Manufacturing Overhead Production-Volume Variance		36,000
	Fixed Manufacturing Overhead Control		373,000

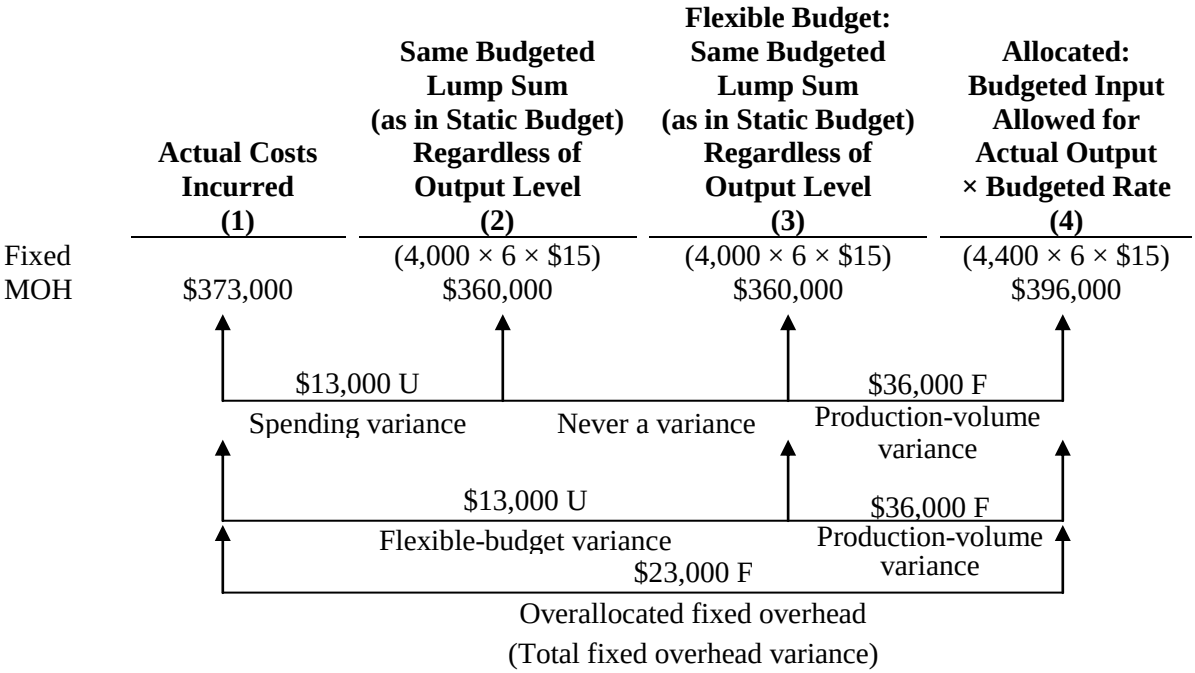
3. Individual fixed manufacturing overhead items are not usually affected very much by day-to-day control. Instead, they are controlled periodically through planning decisions and budgeting procedures that may sometimes have horizons covering six months or a year (for example, management salaries) and sometimes covering many years (for example, long-term leases and depreciation on plant and equipment).

4. The fixed overhead spending variance is caused by the actual realization of fixed costs differing from the budgeted amounts. Some fixed costs are known because they are contractually specified, such as rent or insurance, although if the rental or insurance contract expires during the year, the fixed amount can change. Other fixed costs are estimated, such as the cost of managerial salaries, which may depend on bonuses and other payments not known at the beginning of the period. In this example, the spending variance is unfavorable, so actual FOH is greater than the budgeted amount of FOH.

The fixed overhead production volume variance is caused by production being over or under expected capacity. You may be under capacity when demand drops from expected levels or if there are problems with production. Over capacity is usually driven by favorable demand shocks or a desire to increase inventories. The fact that there is a favorable volume variance indicates that production exceeded the expected level of output (4,400 units actual relative to a denominator level of 4,000 output units).

SOLUTION EXHIBIT 8-22





8-23 (30–40 min.) **Straightforward coverage of manufacturing overhead, standard-costing system.**

1. Solution Exhibit 8-23 shows the computations. Summary details are:

	Actual	Flexible Budget
Output units	65,500	65,500
Allocation base (machine-hours)	76,400	78,600[a]
Allocation base per output unit	1.17[b]	1.2
Variable MOH	$618,840	$628,800[c]
Variable MOH per hour	$8.92[d]	$8.00
Fixed MOH	$145,790	$144,000
Fixed MOH per hour	$1.91[e]	–

[a] 65,500 × 1.2 = 78,600
[b] 76,400 ÷ 65,500 = 1.17
[c] 65,500 × 1.2 × $8 = $628,800
[d] $618,840 ÷ 76,400 = $8.10
[e] $145,790 ÷ 76,400 = $1.91

An overview of the 4-variance analysis is:

4-Variance Analysis	Spending Variance	Efficiency Variance	Production–Volume Variance
Variable Manufacturing Overhead	$7,640 U	$17,600 F	Never a variance
Fixed Manufacturing Overhead	$1,790 U	Never a variance	$13,200 F

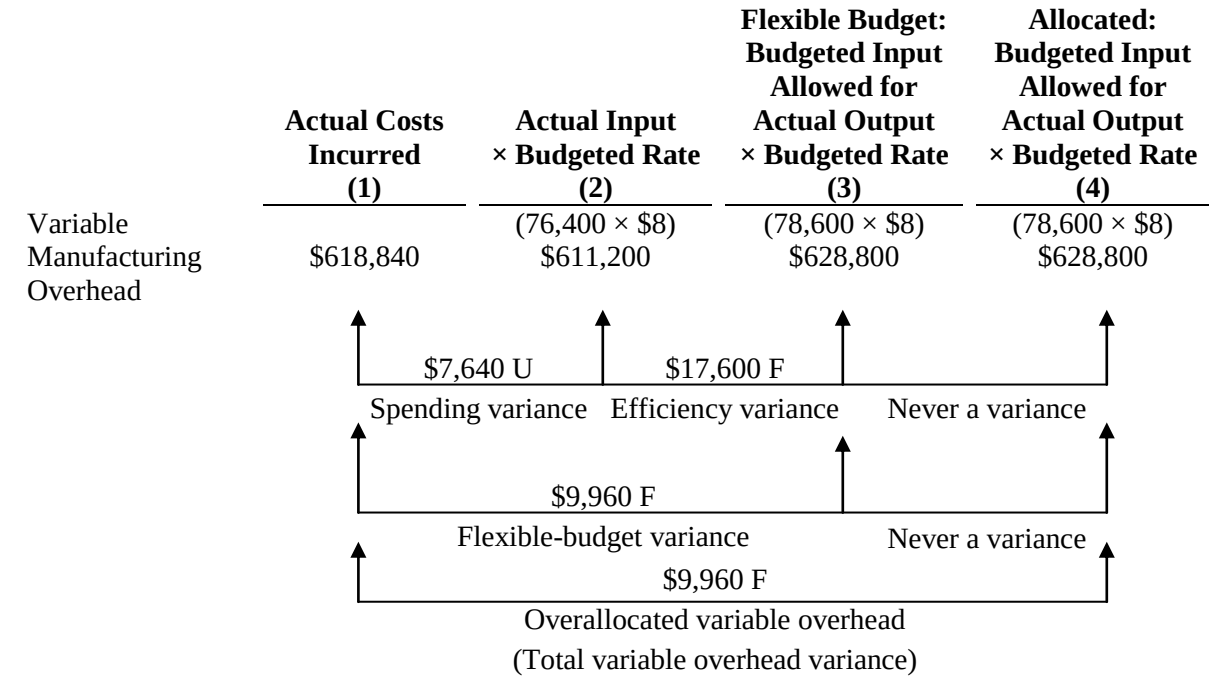
2.	Variable Manufacturing Overhead Control	618,840	
	Accounts Payable Control and other accounts		618,840
	Work-in-Process Control	628,800	
	Variable Manufacturing Overhead Allocated		628,800
	Variable Manufacturing Overhead Allocated	628,800	
	Variable Manufacturing Overhead Spending Variance	7,640	
	Variable Manufacturing Overhead Efficiency Variance		17,600
	Variable Manufacturing Overhead Control		618,840
	Fixed Manufacturing Overhead Control	145,790	
	Wages Payable Control, Accumulated Depreciation Control, etc.		145,790
	Work-in-Process Control	157,200	
	Fixed Manufacturing Overhead Allocated		157,200
	Fixed Manufacturing Overhead Allocated	157,200	
	Fixed Manufacturing Overhead Spending Variance	1,790	
	Fixed Manufacturing Overhead Production-Volume Variance		13,200
	Fixed Manufacturing Overhead Control		145,790

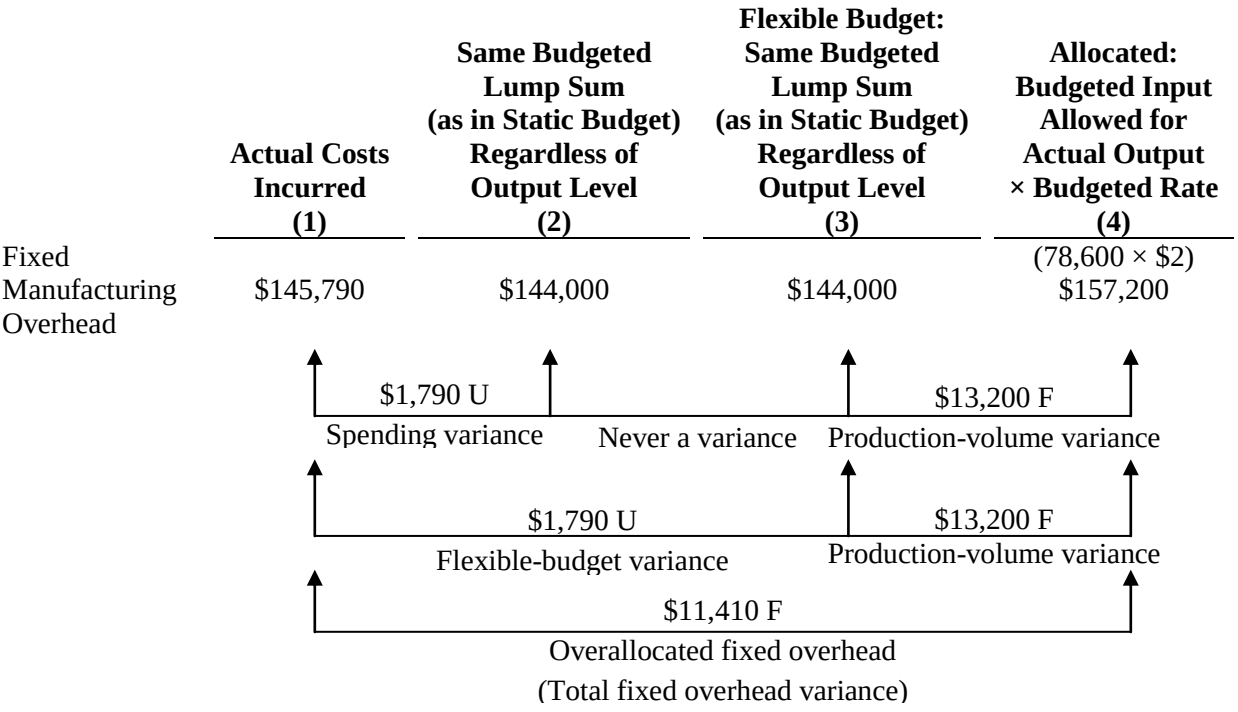
3. The control of variable manufacturing overhead requires the identification of the cost drivers for such items as energy, supplies, and repairs. Control often entails monitoring nonfinancial measures that affect each cost item, one by one. Examples are kilowatt-hours used, quantities of lubricants used, and repair parts and hours used. The most convincing way to discover why overhead performance did not agree with a budget is to investigate possible causes, line item by line item.

4. The variable overhead spending variance is unfavorable. This means the actual rate applied to the manufacturing costs is higher than the budgeted rate. Because variable overhead consists of several different costs, this could be for a variety of reasons, such as the utility rates being higher than estimated or the indirect materials costs per unit of denominator activity being more than estimated.

The variable overhead efficiency variance is favorable, which implies that the estimated denominator activity was too high. Because the denominator activity is machine hours, this could be the result of efficient use of machines, better scheduling of production runs, or machines that are well maintained and thus are working at more than the expected level of efficiency.

SOLUTION EXHIBIT 8-23





Fixed manufacturing overhead budgeted rate =$144,000 / 72,000 machine-hours = $2 per machine-hour.

8-24 (20–25 min.) **Overhead variances, service sector.**

1.

Easy Meals Now (May 2014)	Actual Results	Flexible Budget	Static Budget
Output units (number of deliveries)	8,600	8,600	12,000
Hours per delivery	0.66[a]	0.70	0.70
Hours of delivery time	5,660	6,020[b]	8,400[c]
Variable overhead costs per delivery hour	$2.00[d]	$1.75	$1.75
Variable overhead (VOH) costs	$11,320	$10,535[e]	$14,700[f]
Fixed overhead costs	$39,600	$33,600	$33,600
Fixed overhead cost per hour			$4.67[g]

[a] 5,660 hours ÷ 8,600 deliveries = 0.66 hours per delivery
[b] hrs. per delivery × actual number of deliveries = 0.70 × 8,600 = 6,020 hours
[c] hrs. per delivery × expected number of deliveries = 0.70 × 12,000 = 8,400 hours
[d] $11,320 VOH costs ÷ 5,660 delivery hours = $2.00 per delivery hour
[e] 8,600 deliveries × 0.70 hours per delivery × $1.75 VOH cost per delivery hour = $14,700
[f] 12,000 deliveries × 0.70 hours per delivery × $1.75 VOH cost per delivery hour = $14,700
[f] Static budget delivery hours = 12,000 units × 0.70 hours/unit = 8,400 hours;
[g] Fixed overhead rate = Fixed overhead costs ÷ Static budget delivery hours = $33,600 ÷ 8,400 hours = $4 per hour

VARIABLE OVERHEAD

Actual Costs Incurred	Actual Input Qty. × Budgeted Rate	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate
	5,660 hrs × $1.75 per hr.	6,020 hrs × $1.75 per hr.
$11,320	$9,905	$10,535
	$1,415 U	$630 F
	Spending variance	Efficiency variance

2.

FIXED OVERHEAD

Actual Costs Incurred	Flexible Budget: Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level	Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate
		6,020 hrs. × $4/hr.
$39,600	$33,600	$24,080
	$6,000 U	$9,520 U
	Spending variance	Production-volume variance

3. The spending variances for variable and fixed overhead are both unfavorable. This means that EMN had increases over budget in either or both the cost of individual items (such as telephone calls and gasoline) in the overhead cost pools, or the usage of these individual items per unit of the allocation base (delivery time). The favorable efficiency variance for variable overhead costs results from more efficient use of the cost allocation base—each delivery takes 0.66 hours versus a budgeted 0.70 hours.

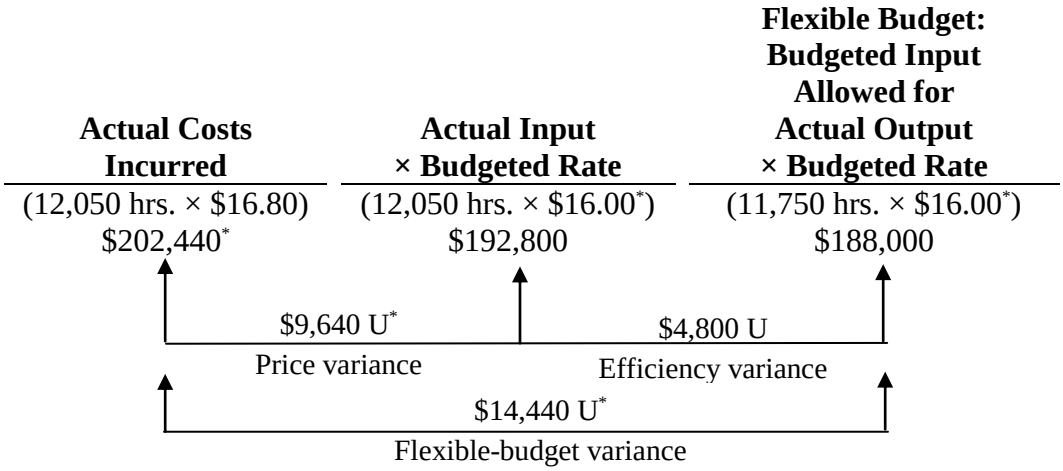
EMN can best manage its fixed overhead costs by long-term planning of capacity rather than day-to-day decisions. This involves planning to undertake only value-added fixed-overhead activities and then determining the appropriate level for those activities. Most fixed overhead costs are committed well before they are incurred. In contrast, for variable overhead, a mix of long-run planning and daily monitoring of the use of individual items is required to manage costs efficiently. EMN should plan to undertake only value-added variable-overhead activities (a long-run focus) and then manage the cost drivers of those activities in the most efficient way (a short-run focus).

There is no production-volume variance for variable overhead costs. The unfavorable production-volume variance for fixed overhead costs arises because EMN has unused fixed overhead resources that it may seek to reduce in the long run.

8-25 (45–50 min.) **Total overhead, 3-variance analysis.**

1. This problem has two major purposes: (a) to give experience with data allocated on a total overhead basis instead of on separate variable and fixed bases and (b) to reinforce distinctions between actual hours of input, budgeted (standard) hours allowed for actual output, and denominator level.

An analysis of direct manufacturing labor will provide the data for actual hours of input and standard hours allowed. One approach is to plug the known figures (designated by asterisks) into the analytical framework and solve for the unknowns. The direct manufacturing labor efficiency variance can be computed by subtracting $9,640 from $14,440. The complete picture is as follows:



* Given

Direct Labor calculations

Actual input × Budgeted rate = Actual costs – Price variance
= $202,440 – $9,640 = $192,800

Actual input = $192,800 ÷ Budgeted rate = $192,800 ÷ $16 = 12,050 hours

Budgeted input × Budgeted rate = $192,800 – Efficiency variance
= $192,800 – $4,800 = $188,000

Budgeted input = $188,000 ÷ Budgeted rate = $188,000 ÷ 16 = 11,750 hours
= 10,000* × $8.00 = $117,600

2. The calculations for total overhead are given below.

Repair Overhead

Variable overhead rate	= $64,000* ÷ 8,000* hrs. = $8.00 per standard labor-hour
Budgeted fixed overhead costs	= $197,600* – 10,000* × ($8.00) = $117,600

If total overhead is allocated at 120% of direct labor-cost, the single overhead rate must be 120% of $16.00, or $19.20 per hour. Therefore, the fixed overhead component of the rate must be $19.20 – $8.00, or $11.20 per direct labor-hour.

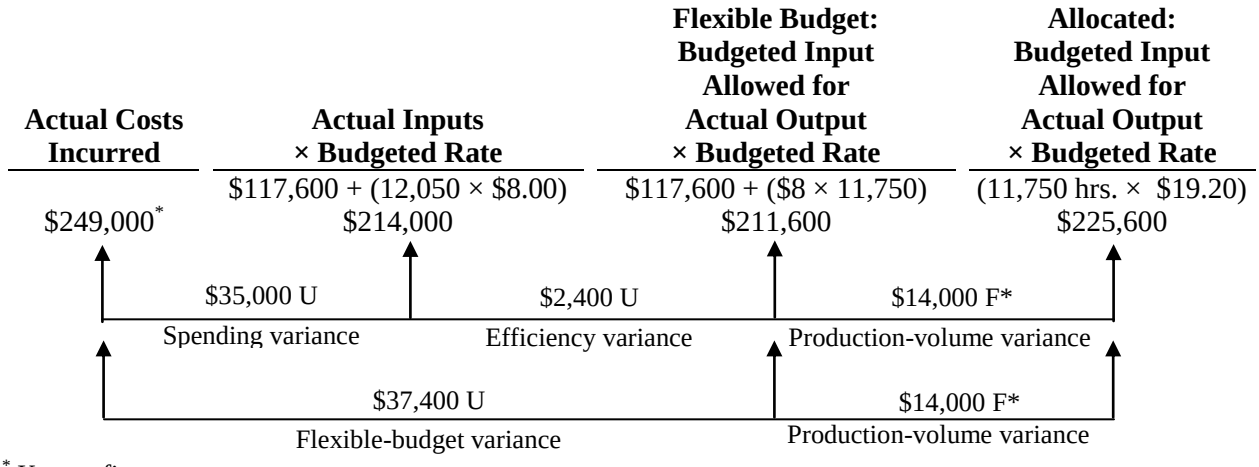
Let D = denominator level in input units

$$\text{Budgeted fixed overhead rate per input unit} = \frac{\text{Budgeted fixed overhead costs}}{\text{Denominator level in input units}}$$

$$\$11.20 = \frac{\$117,600}{D}$$

$$D = 10,500 \text{ direct labor-hours}$$

A summary 3-variance analysis for February follows:



* Known figure

An overview of the 3-variance analysis using the block format in the text is:

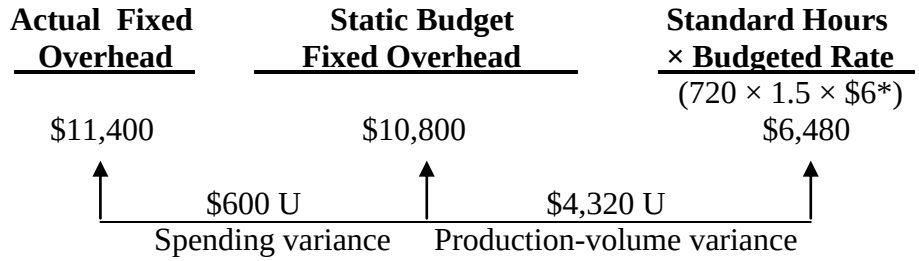
3-Variance Analysis	Spending Variance	Efficiency Variance	Production–Volume Variance
Total Overhead	$35,000 U	$2,400 U	$14,000 F

3. The control of variable manufacturing overhead requires the identification of the cost drivers for such items as energy, supplies, equipment, and maintenance. Control often entails monitoring nonfinancial measures that affect each cost item, one by one. Examples are kilowatts used, quantities of lubricants used, and equipment parts and hours used. The most convincing way to discover why overhead performance did not agree with a budget is to investigate possible causes, line item by line item.

Individual fixed manufacturing overhead items are not usually affected very much by day-to-day control. Instead, they are controlled periodically through planning decisions and budgeting that may sometimes have horizons covering six months or a year (for example, management salaries) and sometimes covering many years (for example, long-term leases and depreciation on plant and equipment).

8-26 (35 min.) **Production-volume variance analysis and sales volume variance.**

1. and 2. Fixed Overhead Variance Analysis for Marissa Designs, Inc. for February



* fixed overhead rate = (budgeted fixed overhead)/(budgeted DL hours at capacity)
= $10,800/(1,200 × 1.5 hours)
= $10,800/1,800 hours
= $6/hour

3. An unfavorable production-volume variance measures the cost of unused capacity. Production at capacity would result in a production-volume variance of zero because the fixed overhead rate is based on expected hours at capacity production. However, the existence of an unfavorable volume variance does not necessarily imply that management is doing a poor job or incurring unnecessary costs. Two reasons can be identified.

a. For most products, demand varies from month to month while commitment to the factors that determine capacity, e.g., size of the workshop or supervisory staff, tends to remain relatively constant. If Marissa wants to meet demand in high demand months, it will have excess capacity in low demand months. In addition,

forecasts of future demand contain uncertainty due to unknown future factors. Having some excess capacity would allow Marissa to produce enough to cover peak demand as well as slack to deal with unexpected demand surges in non-peak months.

b. Basic economics provides a demand curve that shows a tradeoff between price charged and quantity demanded. Potentially, Marissa could have a lower net revenue if they produce at capacity and sell at a lower price than if they sell at a higher price at some level below capacity.

In addition, the unfavorable production-volume variance may not represent a feasible cost savings associated with lower capacity. Even if Marissa could shift to lower fixed costs by lowering capacity, the fixed cost may behave as a step function. If so, fixed costs would decrease in fixed amounts associated with a range of production capacity, not a specific production volume. The production-volume variance would only accurately identify potential cost savings if the fixed cost function is continuous, not discrete.

4. The static-budget operating income for February is:

Revenues $55 × 1,200	$66,000
Variable costs $25 × 1,200	30,000
Fixed overhead costs	10,800
Static-budget operating income	$25,200

The flexible-budget operating income for February is:

Revenues $55 × 720	$39,600
Variable costs $25 × 720	18,000
Fixed overhead costs	10,800
Flexible-budget operating income	$10,800

The sales-volume variance represents the difference between the static-budget operating income and the flexible-budget operating income:

Static-budget operating income	$25,200
Flexible-budget operating income	10,800
Sales-volume variance	$14,400 U

Equivalently, the sales-volume variance captures the fact that when Marissa sells 720 units instead of the budgeted 1,200, only the revenue and the variable costs are affected. Fixed costs remain unchanged. Therefore, the shortfall in profit is equal to the budgeted contribution margin per unit times the shortfall in output relative to budget.

$$\text{Sales-volume variance} = \left[\text{Budgeted selling price} - \text{Budgeted variable cost per unit}\right] \times \text{Difference in quantity of units sold relative to the static budget}$$

$$= (\$55 - \$25) \times 480 = \$30 \times 480 = \$14{,}400 \text{ U}$$

In contrast, we computed in requirement 2 that the production-volume variance was $4,320 U. This captures only the portion of the budgeted fixed overhead expected to be unabsorbed because of the 480-unit shortfall. To compare it to the sales-volume variance, consider the following:

Budgeted selling price		$55
Budgeted variable cost per unit	$25	
Budgeted fixed cost per unit ($10,800 ÷ 1,200)	9	
Budgeted cost per unit		34
Budgeted profit per unit		$ 21
Operating income based on budgeted profit per unit		
$21 per unit × 720 units		$15,120

The $4,320 U production-volume variance explains the difference between operating income based on the budgeted profit per unit and the flexible-budget operating income:

Operating income based on budgeted profit per unit	$15,120
Production-volume variance	4,320 U
Flexible-budget operating income	$10,800

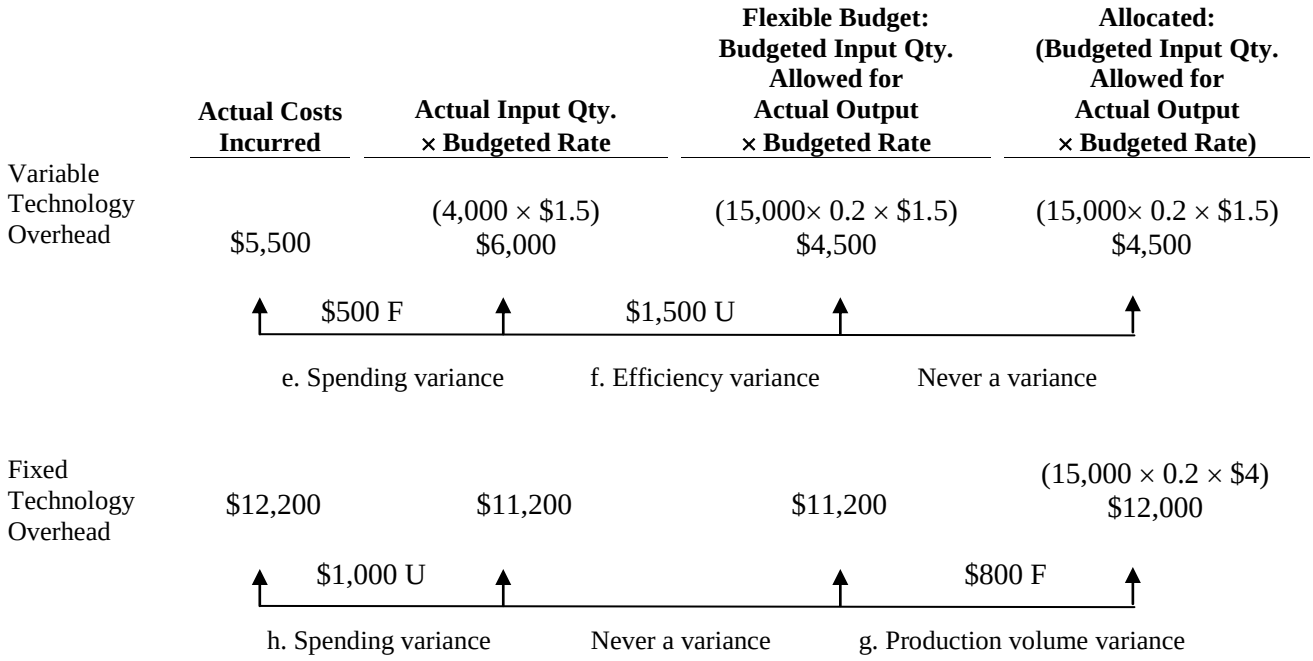
Because the sales-volume variance represents the difference between the static- and flexible-budget operating incomes, the difference between the sales-volume and production-volume variances, which is referred to as the operating-income volume variance, is:

Operating-income volume variance
= Sales-volume variance – Production-volume variance
= Static-budget operating income – Operating income based on budgeted profit per unit
= $25,200 U – $15,120 U = $10,080 U.

The operating-income volume variance explains the difference between the static-budget operating income and the budgeted operating income for the units actually sold. The static-budget operating income is $25,200 and the budgeted operating income for 720 units would have been $15,120 ($21 operating income per unit × 720 units). The difference, $10,080 U, is the operating-income volume variance, i.e., the 480 unit drop in actual volume relative to budgeted volume would have caused an expected drop of $10,080 in operating income, at the budgeted operating income of $21 per unit. The operating-income volume variance assumes that $4,320 in fixed cost ($9 per unit × 480 units) would be saved if production and sales volumes decreased by 480 units.

8-27 (20 min.) **Overhead variances, service setting.**

1. and 2. Variable and Fixed Technology Overhead Variance Analysis for Munich Partners for the first quarter of 2014



3. Munich Partners has done a reasonable job overall of managing its technology overhead costs. It has an unfavorable variable overhead efficiency variance because it used too many CPU units of processing time relative to the number of client interactions it had. This is not an issue if the goal was to meet the high-performance computing needs of clients and resulted in higher levels of client satisfaction or revenues. For the 4,000 CPU units used, Munich Partners spent $1.375 per unit relative to the budgeted $1.50, so the price/spending variance on variable technology overhead was favorable.

From the standpoint of capacity utilization, Munich Partners were successful at managing their fixed technology overhead resources. They handled 15,000 client interactions, compared to an expected output of 14,000. It would be useful to know what the firm views as the maximum attainable level of capacity given its current spending on technology. This is particularly significant because Munich Partners spent an additional $1,000 more than the expected expenditure on fixed resources for the period. The firm should attempt to identify the causes of this negative spending variance and assess whether this higher spending level is likely to persist in future years.

8-28 (15 min.) **Identifying favorable and unfavorable variances.**

Scenario	VOH Spending Variance	VOH Efficiency Variance	FOH Spending Variance	FOH Production-Volume Variance
Production output is 6% less than budgeted, and actual fixed manufacturing overhead costs are 5% more than budgeted.	Cannot be determined; no information on actual versus budgeted VOH rates.	Cannot be determined; no information on actual versus flexible-budget machine-hours.	Unfavorable:;actual fixed costs are more than budgeted fixed costs.	Unfavorable; output is less than budgeted causing FOH costs to be underallocated.
Production output is 13% less than budgeted; actual machine-hours are 7% more than budgeted.	Cannot be determined; no information on actual versus budgeted VOH rates.	Unfavorable; actual machine-hours more than flexible-budget machine-hours.	Cannot be determined; no information on actual versus budgeted FOH costs.	Unfavorable; output is less than budgeted causing FOH costs to be underallocated.
Production output is 10% more than budgeted.	Cannot be determined; no information on actual versus budgeted VOH rates.	Cannot be determined; no information on actual machine-hours versus flexible-budget machine-hours.	Cannot be determined; no information on actual versus budgeted FOH costs.	Favorable; output more than budgeted will cause FOH costs to be overallocated.
Actual machine-hours are 20% less than flexible-budget machine-hours.	Cannot be determined; no information on actual versus budgeted VOH rates.	Favorable; less machine-hours used relative to flexible budget.	Cannot be determined; no information on actual versus budgeted FOH costs.	Cannot be determined; no information on flexible-budget machine-hours relative to static-budget machine-hours.
Relative to the flexible budget, actual machine-hours are 15% less, and actual variable manufacturing overhead costs are 20% greater.	Unfavorable; actual VOH rate greater than budgeted VOH rate.	Favorable; actual machine-hours less than flexible-budget machine-hours.	Cannot be determined; no information on actual versus budgeted FOH costs.	Cannot be determined; no information on actual output relative to budgeted output.

8-29 (35 min.) **Flexible-budget variances, review of Chapters 7 and 8.**

1. Solution Exhibit 8-29 contains a columnar presentation of the variances for Darby Design Company (DDC) for April 2014.

SOLUTION EXHIBIT 8-29

	Actual Costs Incurred: Actual Input Qty. × Actual Rate	Actual Input Qty. × Budgeted Price: Purchases	Actual Input Qty. × Budgeted Price: Usage	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Price
Direct Materials	(12,900 × $10) $129,000	(12,900 × $9) $116,100	(9,000 × $9) $81,000	(32,000 ×0.3 × $9) $86,400
		$12,900 U		$5,400 F
		a. Price variance		b. Efficiency variance
Direct Manufacturing Labor	$621,600		(29,600 × $16) $473,600	(32,000 × 1.2 × $16) $614,400
		$148,000 U		$140,800 F
		c. Price variance		d. Efficiency variance

	Actual Costs Incurred	Actual Input Qty. × Budgeted Rate	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate	Allocated: (Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate)
Variable Manufacturing Overhead	$64,900	(9,000 × $4) $36,000	(9,600 × $4) $38,400	(9,600 × $4) $38,400
		$28,900 U	$2,400 F	
		e. Spending variance	f. Efficiency variance	Never a variance
Fixed Manufacturing Overhead	$160,000	$143,500*	$143,500	(32,000 ×0.3 × $14) $134,400
		$16,500 U		$9,100 U
		h. Spending variance	Never a variance	g. Production volume variance

*Denominator level (Annual) in pounds of material: 410,000 × 0.3 = 123,000 pounds
Annual Budgeted Fixed Overhead: 123,000 × $14/lb = $1,722,000
Monthly budgeted FOH: $1,722,000 / 12 = $143,500

2. The direct materials price variance indicates that DDC paid more for brass than they had planned. If this is because they purchased a higher quality of brass, it may explain why they used less brass than expected (leading to a favorable material efficiency variance). In turn, because variable manufacturing overhead is assigned based on pounds of materials used, this directly led to the favorable variable overhead efficiency variance. The purchase of a better quality of brass may also explain why it took less labor time to produce the doorknobs than expected (the favorable direct labor efficiency variance). Finally, the unfavorable direct labor price variance could imply that the workers who were hired were more experienced than expected, which could also be related to the positive direct material and direct labor efficiency variances.

8-30 (30 min.) **Comprehensive variance analysis.**

1. Budgeted number of machine-hours planned can be calculated by multiplying the number of units planned (budgeted) by the number of machine-hours allocated per unit:

   588 units × 3 machine-hours per unit = 1,764 machine-hours.

2. Budgeted fixed MOH costs per machine-hour can be computed by dividing the flexible budget amount for fixed MOH (which is the same as the static budget) by the number of machine-hours planned (calculated in 1.):

   $343,980 ÷ 1,764 machine-hours = $195.00 per machine-hour.

3. Budgeted variable MOH costs per machine-hour are calculated as budgeted variable MOH costs divided by the budgeted number of machine-hours planned:

   $72,324 ÷ 1,764 machine-hours = $41.00 per machine-hour.

4. Budgeted number of machine-hours allowed for actual output achieved can be calculated by dividing the flexible-budget amount for variable MOH by budgeted variable MOH costs per machine-hour:

   $79,950 ÷ $41.00 per machine-hour= 1,950 machine-hours allowed.

5. The actual number of output units is the budgeted number of machine-hours allowed for actual output achieved divided by the planned allocation rate of machine hours per unit:

   1,950 machine-hours ÷ 3 machine-hours per unit = 650 units.

6. The actual number of machine-hours used per output unit is the actual number of machine hours used (given) divided by the actual number of units manufactured:

   1,170 machine-hours ÷ 650 units = 1.8 machine-hours used per output unit.

8-31 (60 min.) **Journal entries (continuation of 8-30).**

1. Key information underlying the computation of variances is:

	Actual Results	Flexible-Budget Amount	Static-Budget Amount
1. Output units (food processors)	650	650	588
2. Machine-hours	1,170	1,950	1,764
3. Machine-hours per output unit	1.80	3.00	3.00
4. Variable MOH costs	$51,480	$79,950	$72,324
5. Variable MOH costs per machine-hour (Row 4 ÷ Row 2)	$44.00	$41.00	$41.00
6. Variable MOH costs per unit (Row 4 ÷ Row 1)	$79.20	$123.00	$123.00
7. Fixed MOH costs	$350,210	$343,980	$343,980
8. Fixed MOH costs per machine-hour (Row 7 ÷ Row 2)	$299.32	$176.40	$195.00
9. Fixed MOH costs per unit (Row 7 ÷ Row 1)	$538.78	$529.20	$585.00

Solution Exhibit 8-31 shows the computation of the variances.

Journal entries for variable MOH, year ended December 31, 2014:

Variable MOH Control	51,480	
Accounts Payable Control and Other Accounts		51,480
Work-in-Process Control	79,950	
Variable MOH Allocated		79,950
Variable MOH Allocated	79,950	
Variable MOH Spending Variance	3,510	
Variable MOH Control		31,980
Variable MOH Efficiency Variance		51,480

Journal entries for fixed MOH, year ended December 31, 2014:

Fixed MOH Control	350,210	
Wages Payable, Accumulated Depreciation, etc.		350,210
Work-in-Process Control	380,250	
Fixed MOH Allocated		380,250
Fixed MOH Allocated	380,250	
Fixed MOH Spending Variance	6,230	
Fixed MOH Control		350,210
Fixed MOH Production-Volume Variance		36,270

2. **Adjustment of COGS**

Variable MOH Efficiency Variance	31,980	
Fixed MOH Production-Volume Variance	36,270	
Variable MOH Spending Variance		3,510
Fixed MOH Spending Variance		6,230
Cost of Goods Sold		58,510

SOLUTION EXHIBIT 8-31

Variable Manufacturing Overhead

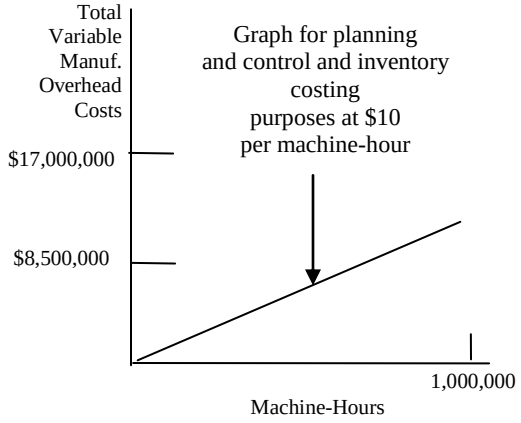
Actual Costs Incurred (1)	**Actual Input Qty. × Budgeted Rate (2)**	**Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (3)**	**Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)**
(1,170 × $44)	(1,170 × $41)	(1,950 × $41)	(1,950 × $41)
$51,480	$47,970	$79,950	$79,950
	$3,510 U	$31,980 F	
	Spending variance	Efficiency variance	Never a variance

Fixed Manufacturing Overhead

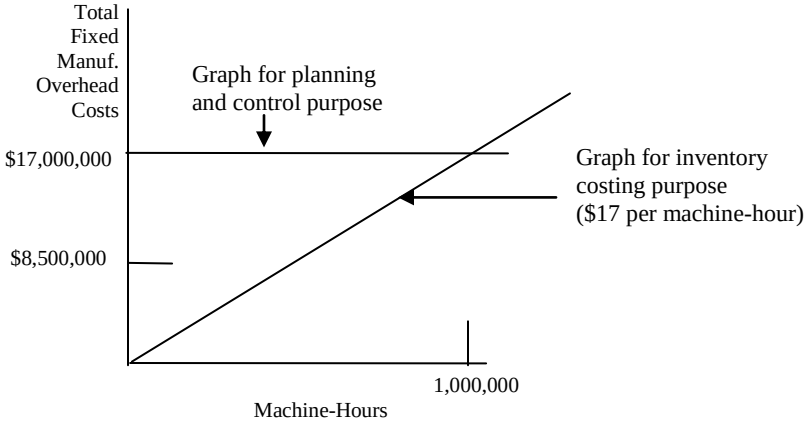
Actual Costs Incurred (1)	**Same Budgeted Lump Sum (as in Static Budget) Regardless Of Output Level (2)**	**Flexible Budget: Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level (3)**	**Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)**
			(1,950 × $195)
$350,210	$343,980	$343,980	$380,250
	$6,230 U		$36,270 F
	Spending variance	Never a variance	Production-volume variance

8-32 (30–40 min.) **Graphs and overhead variances.**

1. Variable Manufacturing Overhead Costs



Fixed Manufacturing Overhead Costs

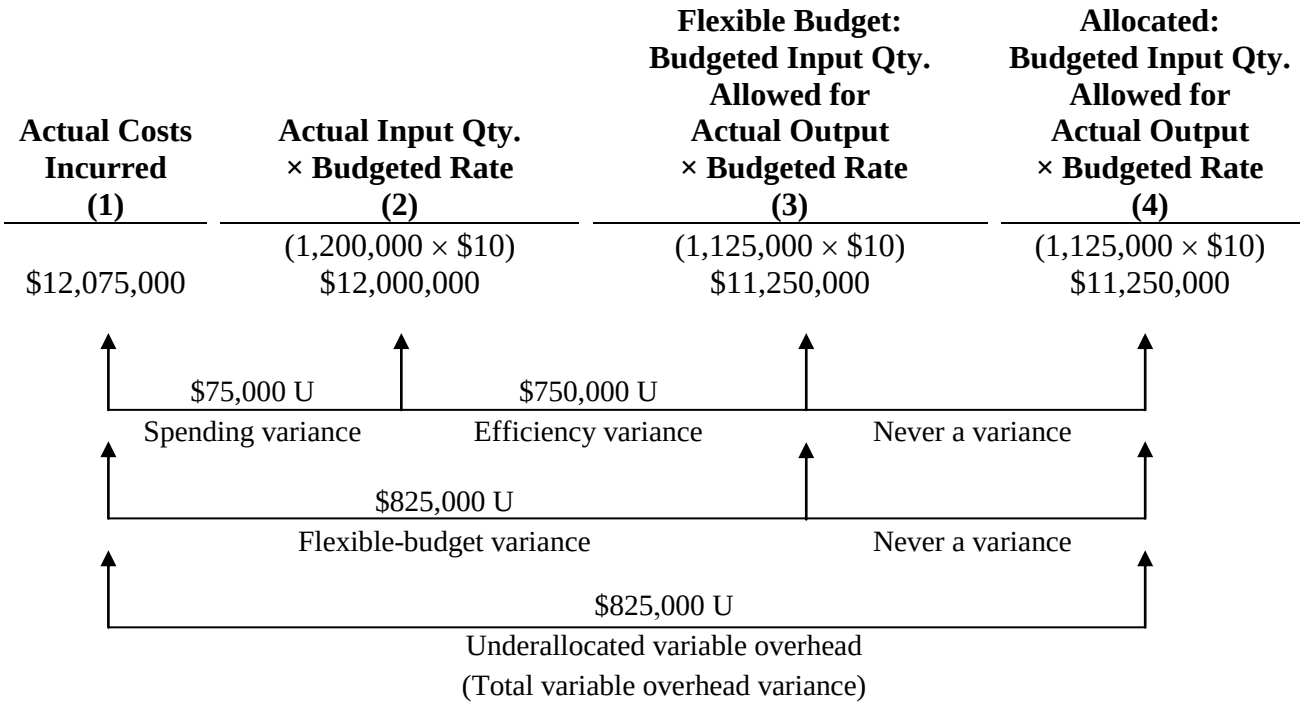


* Budgeted fixed manufacturing overhead rate per hour $= \dfrac{\text{Budgeted fixed manufacturing overhead}}{\text{Denominator level}}$

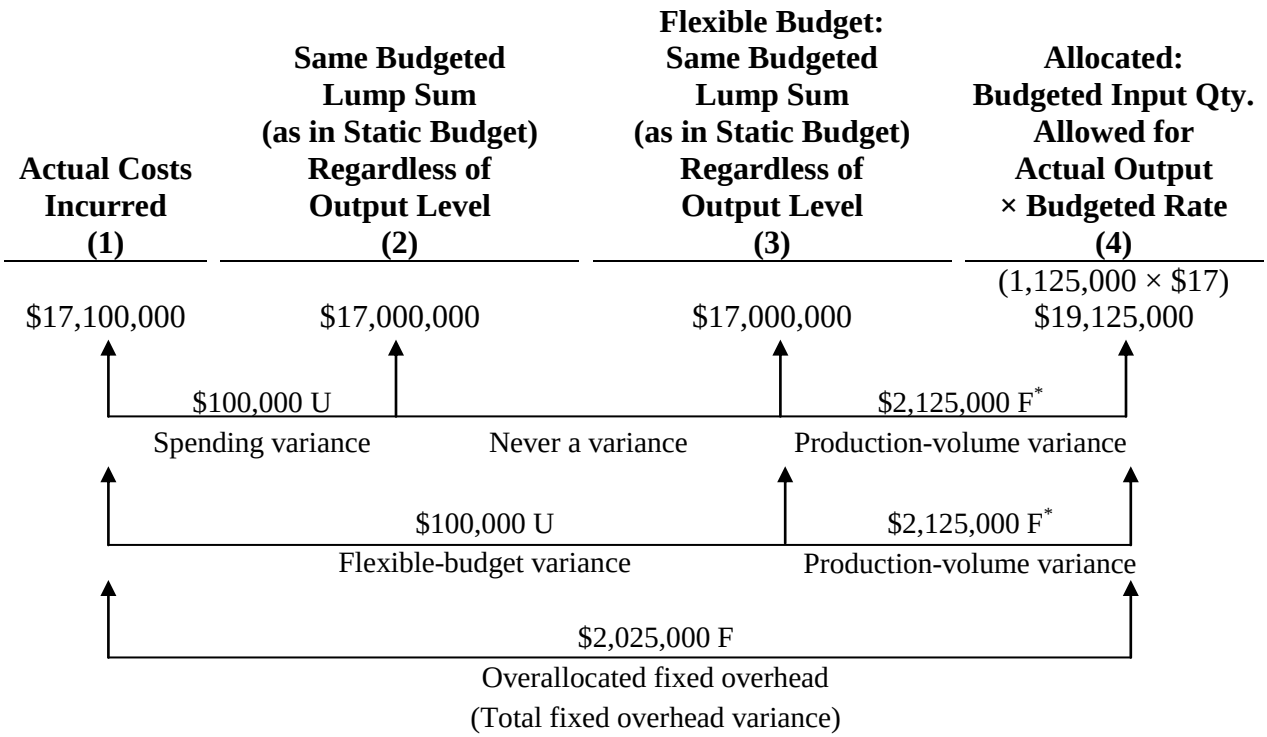
= $17,000,000/ 1,000,000 machine hours

= $17 per machine-hour

2. (a) Variable Manufacturing Overhead Variance Analysis for Best Around, Inc. for 2014



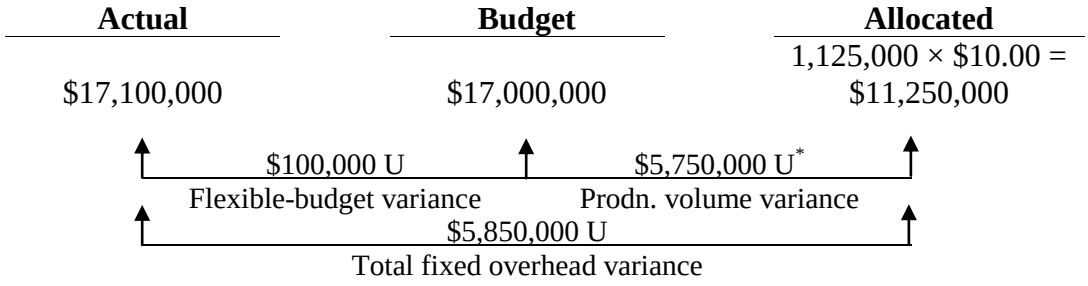
(b) Fixed Manufacturing Overhead Variance Analysis for Best Around, Inc., for 2014



*Alternative computation: 1,125,000 budgeted hrs. allowed – 1,000,000 denominator hrs. = 125,000 hrs.
125,000 × $17 = $2,125,000 F

3. The underallocated variable manufacturing overhead was $825,000 and overallocated fixed overhead was $2,025,000. The flexible-budget variance and underallocated overhead are always the same amount for variable manufacturing overhead because the flexible-budget amount of variable manufacturing overhead and the allocated amount of variable manufacturing overhead coincide. In contrast, the budgeted and allocated amounts for fixed manufacturing overhead only coincide when the budgeted input of the allocation base for the actual output level achieved exactly equals the denominator level.

4. The choice of the denominator level will affect inventory costs. The new fixed manufacturing overhead rate would be $17,000,000 ÷ 1,700,000 = $10.00 per machine-hour. In turn, the allocated amount of fixed manufacturing overhead and the production-volume variance would change as seen below:



*Alternate computation: (1,700,000 – 1,125,000) × $10.00 = $5,750,000 U

The major point of this requirement is that inventory costs (and, hence, income determination) can be heavily affected by the choice of the denominator level used for setting the fixed manufacturing overhead rate.

8-33 (30 min.) **Overhead variance, missing information.**

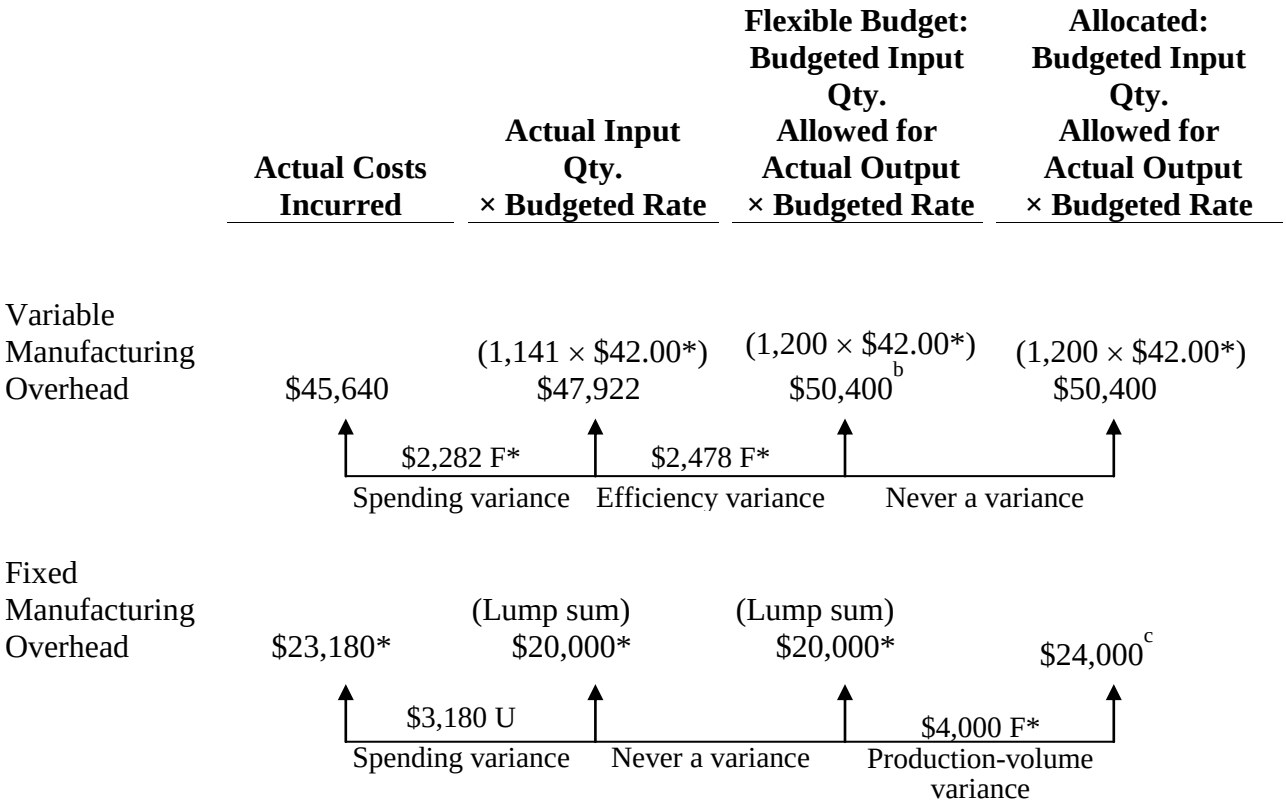
Known figures denoted by an *

Case A:

	Actual Costs Incurred	Actual Input Qty. × Budgeted Rate	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate	Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate
Variable Manufacturing Overhead	$120,400*	(6,270 × $20) $125,400	(6,200* × $20) $124,000*	(6,200* × $20) $124,000*
		$5,000* F Spending variance	$1,400 U Efficiency variance	Never a variance
Fixed Manufacturing Overhead	$84,920*	(Lump sum) $88,200*	(Lump sum) $88,200*	(6,200* × $14[a]) $86,800*
		$3,280 F Spending variance	Never a variance	$1,400 U Production-volume variance

Total budgeted manufacturing overhead = $124,000 + $88,200 = $212,200

Case B:



Total budgeted manufacturing overhead = $50,400 + $20,000 = $70,400

[a]Budgeted FMOH rate = Standard fixed manufacturing overhead allocated ÷ Standard machine-hours allowed for actual output achieved = $86,800 ÷ 6,200 = $14.

[b] Budgeted hours allowed for actual output achieved must be derived from the output level variance before this figure can be derived, or because the fixed manufacturing overhead rate is $20,000 ÷ 1,000 = $20 and the allocated amount is $24,000, the budgeted hours allowed for the actual output achieved must be 1,200 ($24,000 ÷ $20).

[c] 1,200 × ($20,000* ÷ 1,000*) = $24,000.

8-34 (15–25 min.) **Flexible budgets, 4-variance analysis.**

1. Budgeted hours allowed per unit of output $= \frac{\text{Budgeted DLH}}{\text{Budgeted actual output}}$
$= 3{,}360{,}000/672{,}000 = 5$ hours per unit

Budgeted DLH allowed for May output = 72,000 units × 5 hrs./unit = 360,000 hrs.
Allocated total MOH = 360,000 × Total MOH rate per hour
= 360,000 × $0.99 = $356,400

2, 3, 4, 5. See Solution Exhibit 8-34

Variable manuf. overhead rate per DLH = $0.30 + $0.20 = $0.50
Fixed manuf. overhead rate per DLH = $0.17 + $0.11 + $0.21 = $0.49
Fixed manuf. overhead budget for May = ($571,200 + $369,600 + $705,600) ÷ 12
= $1,646,400 ÷ 12 = $137,200

or,

Fixed manuf. overhead budget for May = $47,600 + $30,800 + $58,800 = $137,200

Using the format of Exhibit 8-5 for variable manufacturing overhead and then fixed manufacturing overhead:
Actual variable manuf. overhead: $84,000 + $117,000 = $201,000
Actual fixed manuf. overhead: $41,000 + $55,000 + $58,800 = $154,800

An overview of the 4-variance analysis using the block format of the text is:

4-Variance Analysis	Spending Variance	Efficiency Variance	Production-Volume Variance
Variable Manufacturing Overhead	$40,500 U	$19,500 F	Never a variance
Fixed Manufacturing Overhead	$17,600 U	Never a variance	$39,200 F

SOLUTION EXHIBIT 8-34
Variable Manufacturing Overhead

Actual Costs Incurred (1)	Actual Input Qty. × Budgeted Rate (2)	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (3)	Allocated: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate (4)
	(321,000 × $0.50)	(360,000 × $0.50)	(360,000 × $0.50)
$201,000	$160,500	$180,000	$180,000
	$40,500 U	$19,500 F	
	Spending variance	Efficiency variance	Never a variance

Fixed Manufacturing Overhead

Actual Costs Incurred (1)	Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level (2)	Flexible Budget: Same Budgeted Lump Sum (as in Static Budget) Regardless of Output Level (3)	Allocated: Budgeted Input Allowed for Actual Output × Budgeted Rate (4)
			(360,000 × $0.49)
$154,800	$137,200	$137,200	$176,400
	$17,600 U		$39,200 F
	Spending variance	Never a variance	Production-volume variance

8-35 (20 min.) **Activity-based costing, batch-level variance analysis**

1. Static budget number of crates = Budgeted pairs shipped / Budgeted pairs per crate
= 225,000/15
= 15,000 crates

2. Flexible budget number of crates = Actual pairs shipped / Budgeted pairs per crate
= 180,000/15
= 12,000 crates

3. Actual number of crates shipped = Actual pairs shipped / Actual pairs per box
= 180,000/10
= 18,000 crates

4. Static budget number of hours = Static budget number of crates × budgeted hours per box
= 15,000 × 0.9 = 13,500 hours

Fixed overhead rate = Static budget fixed overhead / static budget number of hours
= $54,000/13,500
= $4.00 per hour

5. Variable Direct Variance Analysis for Audrina's Fleet Feet, Inc. for 2014

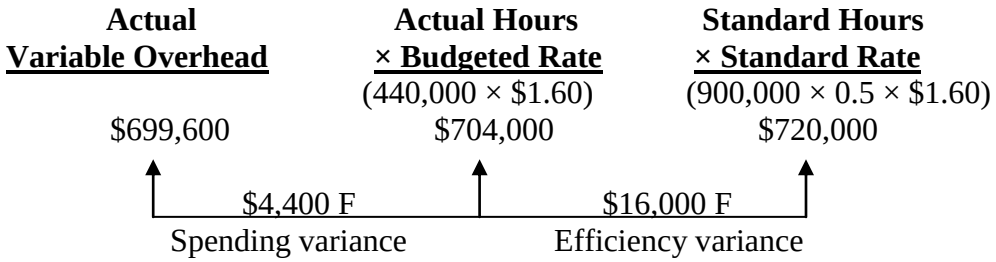
Actual Variable Cost	**Actual Hours × Budgeted Rate**	**Budgeted Hours Allowed for Actual Output × Budgeted Rate**
(18,000 × 1.1 × $16)	(18,000 × 1.1 × $18)	(12,000 × 0.9 × $18)
$316,800	$356,400	$194,400
	$39,600 F	$162,000 U
	Price variance	Efficiency variance

6. Fixed Overhead Variance Analysis for Audrina's Fleet Feet, Inc. for 2014

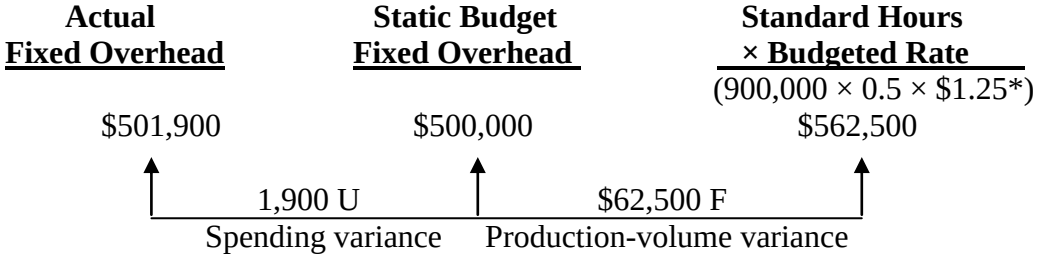
Actual Fixed Overhead	**Static Budget Fixed Overhead**	**Budgeted Hours Allowed for Actual Output × Budgeted Rate**
		(12,000 × 0.9 × $4.0)
$56,500	$54,000	$43,200
	$2,500 U	$10,800 U
	Spending variance	Production volume variance

8-36 (30 – 40 minutes) **Overhead variances and sales volume variance**

1. Variable overhead variances



Fixed overhead variances



*FOH rate is $500,000 / 400,000 std hours = $1.25 per hour

2.

	Actual Results (1)	Flexible-Budget Variances (2) = (1) – (3)	Flexible Budget (3)	Sales-Volume Variances (4) = (3) – (5)	Static Budget (5)
Units sold	900,000		900,000		800,000
Unit price	$6		$5		$5
Revenues	$5,400,000	$900,000 F	$4,500,000	$500,000 F	$4,000,000
Variable costs					
Direct materials	1,080,000	0	1,080,000	120,000 U	960,000
Direct labor	1,620,000	0	1,620,000	180,000 U	1,440,000
Variable overhead	699,600	20,400 F	720,000	80,000 U	640,000
Total variable costs	3,399,600	20,400 F	3,420,000	380,000 U	3,040,000
Contribution margin	2,000,400	920,400 F	1,080,000	120,000 F	960,000
Fixed manufacturing costs	501,900	1,900 U	500,000	0	500,000
Operating income	$1,498,500	$918,500 F	$ 580,000	$120,000 F	$460,000

3. Budgeted cost per shopping bag:

Direct materials per bag (given)		$1.20
Direct labor per bag (given)		1.80
Variable overhead ($1.6 per hour × 0.5 MH)	0.80	
Fixed overhead ($1.25 per hour × 0.5 MH)		0.625
Total		$4.425

Budgeted sales revenue, 900,000 actual units sold	
900,000 × $5	$4,500,000
Budgeted Cost of Goods sold	
900,000 × $4.425	3,982,500
Budgeted operating income	$ 517,500

4.

Budgeted operating income (from #3)	$ 517,500
Add: favorable volume variance (from #1)	58,750
Flexible budget operating income	$ 580,000
Add: Favorable flexible budget variance	918,500
Actual operating income	$1,498,500

5. Operating income volume variance:

Budgeted operating income for actual output – static budget operating income
= $517,500 – $460,000 = $57,500 F

Sales volume variance = $116,250 F
= production volume variance + operating income volume variance
= $58,750 + $57,500 = $116,250 F

8-37 (30 min.) **Activity-based costing, batch-level variance analysis**

1. Static budget number of setups = Budgeted books produced/ Budgeted books per setup
   = 197,600 ÷ 520 = 380 setups

2. Flexible budget number of setups = Actual books produced / Budgeted books per setup
   = 225,680 ÷ 520 = 434 setups

3. Actual number of setups = Actual books produced / Actual books per setup
   = 225,680/496 = 455 setups

4. Static budget number of hours = Static budget # of setups × Budgeted hours per setup
   = 380 × 7 = 2,660 hours

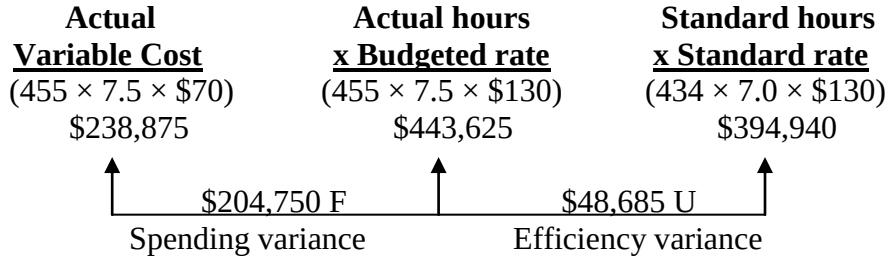
   Fixed overhead rate = Static budget fixed overhead / Static budget number of hours
   = $53,200/2,660 = $20 per hour

5. Budgeted direct variable cost of a setup
   = Budgeted variable cost per setup-hour × Budgeted number of setup-hours
   = $130 × 7 = $910.

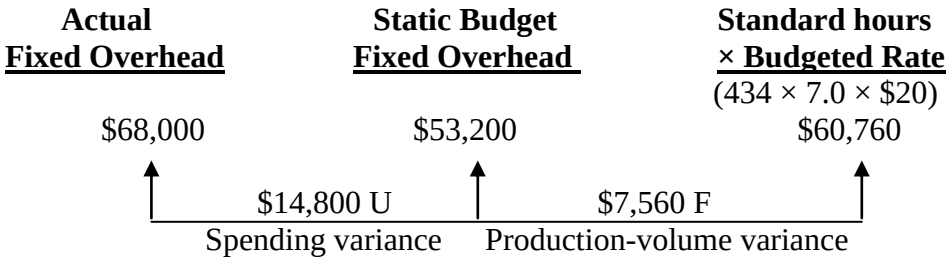
   Budgeted total cost of a setup
   = Budgeted direct variable cost + Fixed overhead rate × Budgeted number of setup-hours
   = $910 + $20 × 7 = $1,050.

   So, the charge of $987 covers the budgeted incremental (i.e., variable) cost of a setup but not the budgeted full cost.

6. Direct Variable Variance Analysis for Rae Steven Publishing Company for 2014



7. Fixed Setup Overhead Variance Analysis for Rae Steven Publishing Company for 2014



8. Rejecting an order may have implications for future orders (i.e., professors would be reluctant to order books from this publisher again). Rae Steven should consider factors such as prior history with the customer and potential future sales.

   If a book is relatively new, Rae Steven might consider running a full batch and holding the extra books in case of a second special order or just hold the extra books until next semester.

   If the special order comes at heavy volume times, Rae Steven should look at the opportunity cost of filling it, i.e., accepting the order may interfere with or delay the printing of other books.

8-38 (30–40 min.) **Comprehensive review of Chapters 7 and 8, working backward from given variances.**

1. Solution Exhibit 8-38 outlines the Chapter 7 and 8 framework underlying this solution.

   a. Pounds of direct materials purchased = $179,300 ÷ $1.10 = 163,000 pounds

   b. Pounds of excess direct materials used = $75,900 ÷ $11.50 = 6,600 pounds

   c. Variable manufacturing overhead spending variance = $10,400 – $18,100 = $7,700 F

   d. Standard direct manufacturing labor rate = $1,250,000 ÷ 50,000 hours = $25 per hour
   Actual direct manufacturing labor rate = $25 + $0.50 = $25.50
   Actual direct manufacturing labor-hours = $535,500 ÷ $25.50
   = 21,000 hours

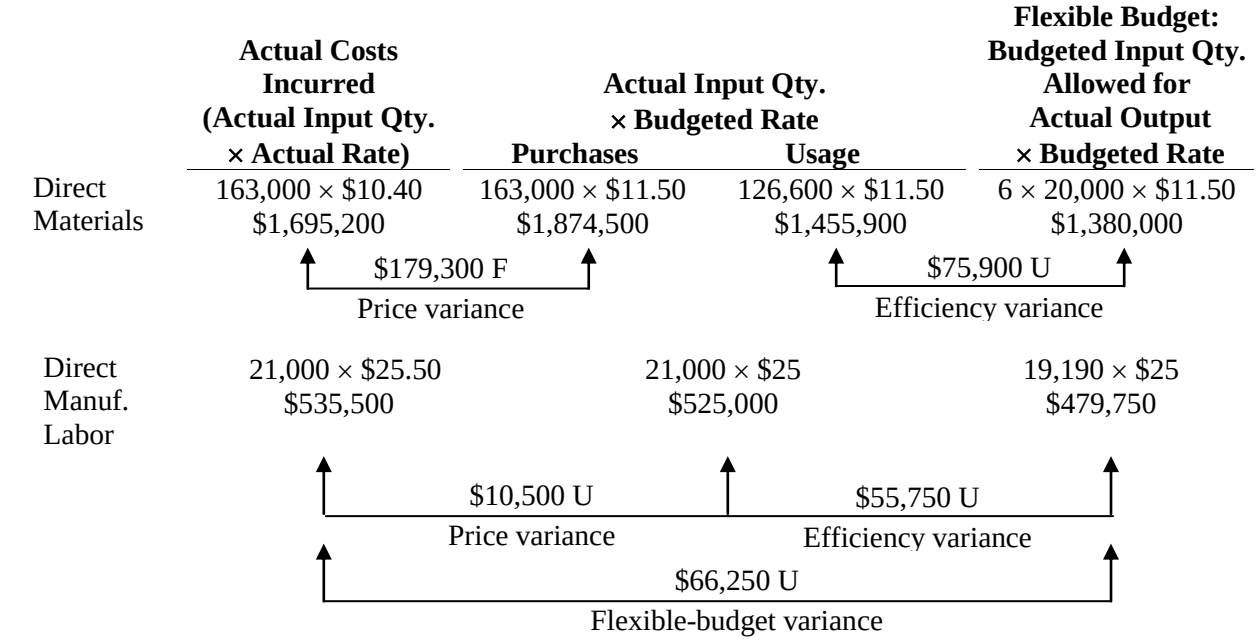
   e. Standard variable manufacturing overhead rate = $500,000 ÷ 50,000
   = $10 per direct manuf. labor-hour
   Variable manuf. overhead efficiency variance of $18,100 ÷ $10 = 1,810 excess hours
   Actual hours – Excess hours = Standard hours allowed for units produced
   21,000 – 1,810 = 19,190 hours

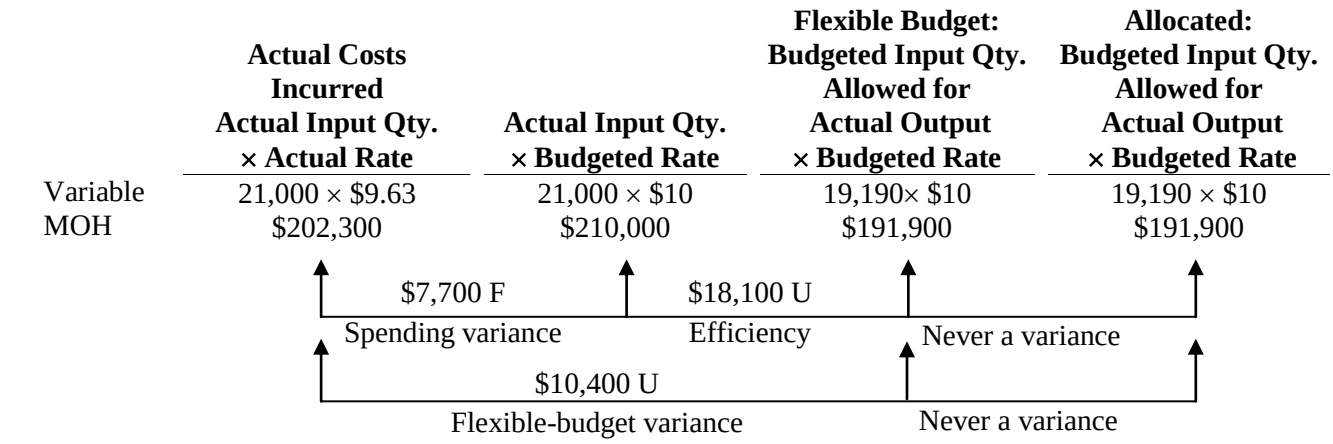
   f. Budgeted fixed manufacturing overhead rate = $1,000,000 ÷ 50,000 hours
   = $20 per direct manuf. labor-hour
   Fixed manufacturing overhead allocated = $20 × 19,190 hours = $383,800
   Production-volume variance = $1,000,000 – $383,800 = $616,200 U

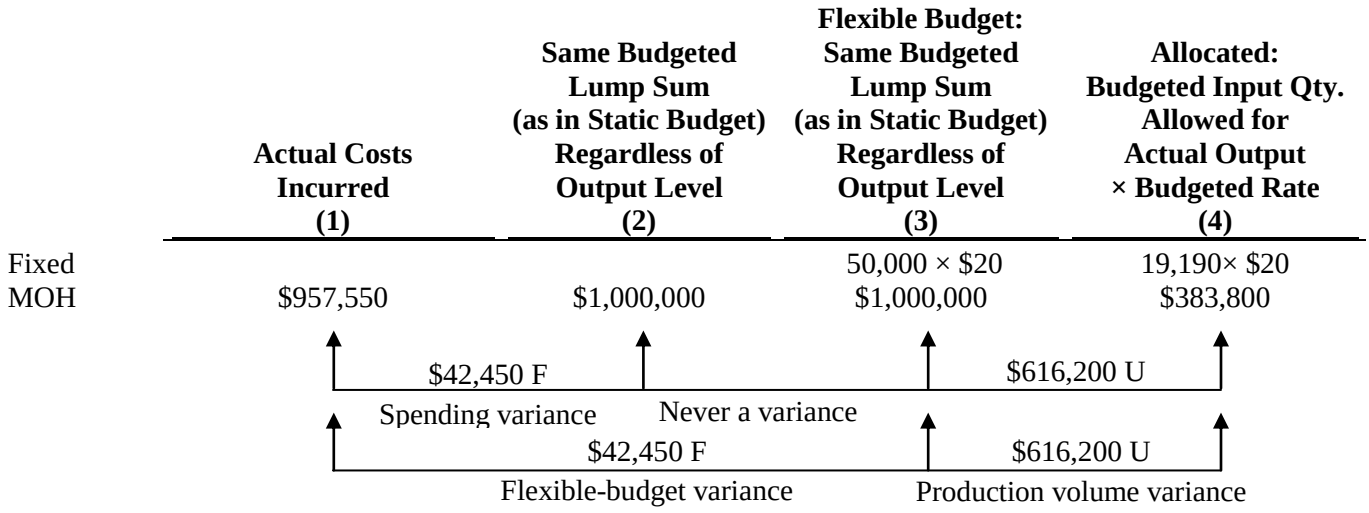
2. The control of variable manufacturing overhead requires the identification of the cost drivers for such items as energy, supplies, and repairs. Control often entails monitoring nonfinancial measures that affect each cost item, one by one. Examples are kilowatts used, quantities of lubricants used, and repair parts and hours used. The most convincing way to discover why overhead performance did not agree with a budget is to investigate possible causes, line item by line item.

Individual fixed overhead items are not usually affected very much by day-to-day control. Instead, they are controlled periodically through planning decisions and budgeting procedures that may sometimes have planning horizons covering six months or a year (for example, management salaries) and sometimes covering many years (for example, long-term leases and depreciation on plant and equipment).

SOLUTION EXHIBIT 8-38







8-39 (30–50 min.) **Review of Chapters 7 and 8, 3-variance analysis.**

Note: In some print versions of the text, the name of the company is stated as Beal. The problem should refer to the Brown Manufacturing Company instead.

1. Total standard production costs are based on 7,600 units of output.

Direct materials, 7,600 × $20.00	
7,600 × 5 lbs. × $4.00 (or 38,000 lbs. × $4.00)	$ 152,000
Direct manufacturing labor, 7,600 × $64.00	
7,600 × 4 hrs. × $16.00 (or 30,400 hrs. × $16.00)	486,400
Manufacturing overhead:	
Variable, 7,600 × $32.00 (or 30,400 hrs. × $8.00)	243,200
Fixed, 7,600 × $36.00 (or 30,400 hrs. × $9.00)	273,600
Total	$1,155,200

The following is for later use:

Fixed manufacturing overhead, a lump-sum budget	$333,000*

$$^{*}\text{Fixed manufacturing overhead rate} = \frac{\text{Budgeted fixed manufacturing overhead}}{\text{Denominator level}}$$

$$\$9.00 = \text{Budget}/37{,}000 \text{ hours}$$

$$\text{Budget} = 37{,}000 \text{ hours} \times \$9.00 = \$333{,}000$$

2. Solution Exhibit 8-39 presents a columnar presentation of the variances. An overview of the 3-variance analysis using the block format of the text is:

3-Variance Analysis	Spending Variance	Efficiency Variance	Production Volume Variance
Total Manufacturing Overhead	$65,800 U	$8,000 U	$59,400 U

SOLUTION EXHIBIT 8-39

	Actual Costs Incurred: Actual Input Qty. × Actual Rate	Actual Input Qty. × Budgeted Price: Purchases	Actual Input Qty. × Budgeted Price: Usage	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Price
Direct Materials	(40,300 × $3.80) $153,140	(40,300 × $4.00) $161,200	(37,300 × $4.00) $149,200	(38,000 × $4.00) $152,000
		$8,060 F a. Price variance		$2,800 F b. Efficiency variance
Direct Manuf. Labor	(31,400 × $16.25) $510,250	(31,400 × $16.00) $502,400		(30,400 × $16.00) $486,400
		$7,850 U c. Price variance		$16,000 U d. Efficiency variance

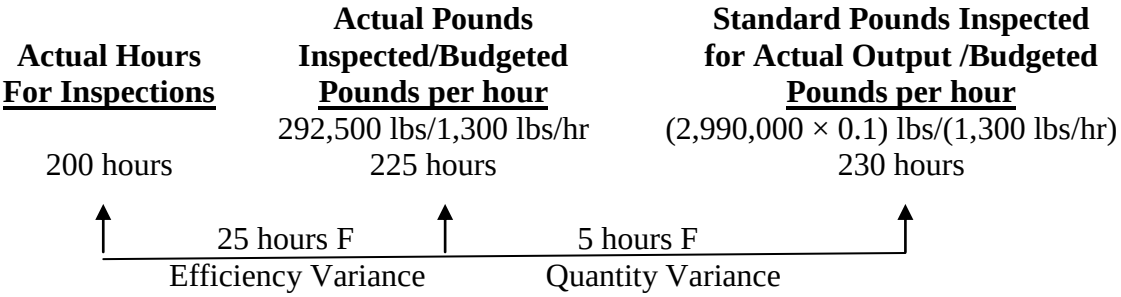
	Actual Costs Incurred	Actual Input Qty. × Budgeted Rate	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate	Allocated: (Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate)
Variable Manuf. Overhead	(not given)	(31,400 × $8.00) $251,200	(30,400 × $8.00) $243,200	(30,400 × $8.00) $243,200
		$8,000 U Efficiency variance		Never a variance
Fixed Manuf. Overhead	(not given)	$333,000	$333,000	(30,400 × $9.00) $273,600
		Never a variance	$59,400 U* Prodn. volume variance	
Total Manuf. Overhead	(given) $650,000	($333,000 + $251,200) $584,200	($243,200 + $333,000) $576,200	($234,200 + $273,600) $507,800
		$65,800 U e. Spending variance	$8,000 U f. Efficiency variance	$59,400 U g. Prodn. volume variance

*Denominator level in hours 37,000
Production volume in standard hours allowed 30,400
Production-volume variance 6,600 hours × $9.00 = $59,400 U

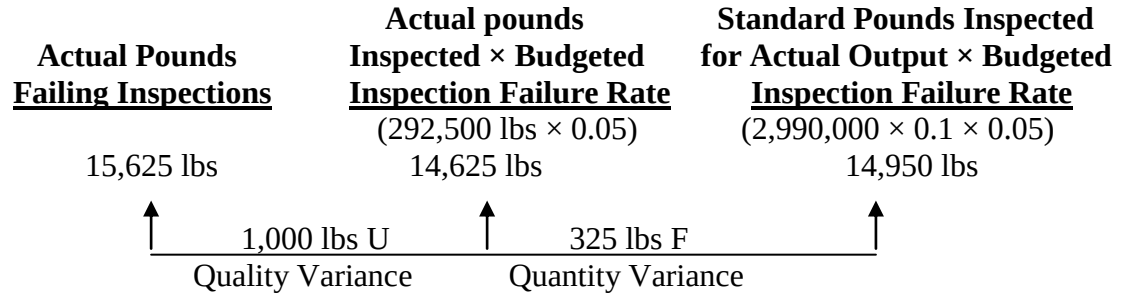
8-40 (20 minutes) **Non-financial variances.**

Note: In some print versions of the text, the name of the company is incorrectly referred to at one point as Supreme rather than Max Canine Products.

1. Variance Analysis of Inspection Hours for Max Canine Products for May



2. Variance Analysis of Pounds Failing Inspection for Max Canine Products for May



8-41 (30 minutes) **Overhead variances, service sector.**

1. In the columnar presentation of variable overhead variance analysis, all numbers shown in bold are calculated from the given information, in the order (a)–(e).

VARIABLE MANUFACTURING OVERHEAD

Actual Costs Incurred (b)	**Actual Input Qty. × Budgeted Rate (a)**		**Flexible Budget: Budgeted Input Qty. Allowed for Actual Output (c)**		**Budgeted Rate**
	15,000 RAM hrs.	× $6.00 per RAM hr.	14,850 RAM hrs.	×	$6.00 per RAM hr.
$89,500	**$90,000**		**$89,100**		

$500 F Spending variance | **$900 U (d)** Efficiency variance

$400 U (e) Flexible-budget variance

a. 15,000 RAM hours × $6 per RAM hour = $90,000

b. Actual VMOH = $90,000 – $500F (VOH spending variance) = $89,500

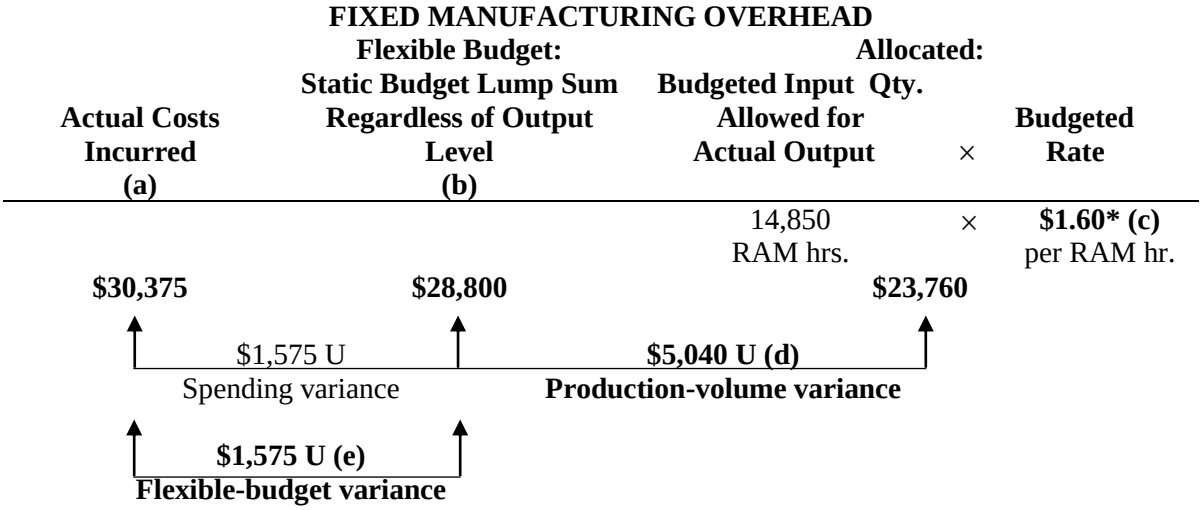
c. 14,850 RAM hours × $6 per RAM hour = $89,100

d. VOH efficiency variance = $90,000 – $89,100 = $900 U

e. VOH flexible budget variance = $900U – $500F = $400 U

Allocated variable overhead will be the same as the flexible budget variable overhead of $89,100. The actual variable overhead cost is $89,500. Therefore, variable overhead is underallocated by $400.

2. In the columnar presentation of fixed overhead variance analysis, all numbers shown in bold are calculated from the given information, in the order (a)–(e).



a. Actual FOH costs = $119,875 total overhead costs – $89,500 VOH costs = $30,375

b. Static budget FOH lump sum = $30,375 – $1,575 spending variance = $28,800

c. *FOH allocation rate = $28,800 FOH static-budget lump sum ÷ 18,000 static-budget RAM-hours

= $1.60 per RAM hour

Allocated FOH = 14,850 RAM hours × $1.60 per RAM hour = $23,760

d. PVV = $28,800 – $23,760 = $5,040 U

e. FOH flexible budget variance = FOH spending variance = $1,575 U

Allocated fixed overhead is $23,760. The actual fixed overhead cost is $30,375. Therefore, fixed overhead is underallocated by $6,615.

8-42 (30 min.) **Direct-cost and overhead variances, income statement.**

Total standard production costs are based on 80,000 units of output.

Direct materials,	
80,000 × 1 lb. × $1.00	$ 80,000
Direct manufacturing labor	
80,000 × 0.25 hrs. × $16.00	320,000
Fixed manufacturing overhead	
Lump-sum	200,000
Total	$600,000

Standard cost per unit = $600,000/80,000 = $7.50 per unit

$$\text{Fixed manufacturing overhead rate} = \frac{\text{Budgeted fixed manufacturing overhead}}{\text{Denominator level}}$$

$$= \$200{,}000/(80{,}000 \times 0.25 \text{ hrs.})$$

$$= \$200{,}000/\ 20{,}000 \text{ hours}$$

$$= \$10 \text{ per labor hour}$$

1. Solution Exhibit 8-42 presents a columnar presentation of the variances. Based on the exhibit, the variances are as follows:

a. Direct materials efficiency variance = $10,000 U

b. Direct materials price variance = $11,000 U

c. Direct labor efficiency variance = $80,000 U

d. Direct labor price variance = $15,000 F

e. Total manufacturing overhead spending variance = $100,000 U

f. Fixed overhead flexible budget variance = Spending variance = $100,000 U

g. Fixed overhead production-volume variance = $50,000 F

Note that the total variances for the period equal:

$10,000 U + $11,000 U + $80,000 U + $15,000 F + $100,000 U + $50,000 F = $136,000 U.

This represents the cumulative amount by which costs were underapplied during the year.

SOLUTION EXHIBIT 8-42

	Actual Costs Incurred: Actual Input Qty. × Actual Rate	Actual Input Qty. × Budgeted Price: Purchases	Actual Input Qty. × Budgeted Price: Usage	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Price
Direct Materials	(110,000 × $1.10)	(110,000 × $1)	(110,000 × $1)	(100,000 × 1 lb. × $1)
	$121,000	$110,000	$110,000	$100,000
	$11,000 U Price variance		$10,000 U Efficiency variance	
Direct Manuf. Labor	(30,000 × $15.50)	(30,000 × $16.00)		100,000 × 0.25 hrs × $16.00)
	$465,000	$480,000		$400,000
	$15,000 F Price variance		$80,000 U Efficiency variance	

	Actual Costs Incurred	Actual Input Qty. × Budgeted Rate	Flexible Budget: Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate	Allocated: (Budgeted Input Qty. Allowed for Actual Output × Budgeted Rate)
Fixed Manuf. Overhead	$300,000	$200,000	$200,000	(100,000 × 0.25 hrs × $10.00) $250,000
	$100,000 U Spending variance	Never a variance	$50,000 F Prodn. volume variance	

2. Sales Revenue = 80,000 units sold × $12.50 = $1,000,000

Cost of Goods sold: At standard: 80,000 × $7.50 = $600,000
(+) Prorated share of underapplied cost: $136,000 × (80,000/100,000) = $108,800
Total $708,800

Gross Margin = $1,000,000 (–) $708,800
= $291,200

8-43 (40 – 50 minutes) **Overhead variances, ethics**

1. a. Georgia plant:

Expected output in units	2,000,000
Direct labor hours per unit	0.50
Total budgeted labor hours	1,000,000

Budgeted fixed OH rate = $2,400,000 / 1,000,000 DLH = $2.40 per DLH

Alabama plant:

Expected output in units	2,100,000
Direct labor hours per unit	0.50
Total budgeted labor hours	1,050,000

Budgeted fixed OH rate = $2,205,000 / 1,050,000 DLH = $2.10 per DLH

b. Allocation of common fixed costs:
To Georgia: $3,150,000 × 2/3 = $2,100,000
To Alabama: $3,150,000 × 1/3 = $1,050,000

Georgia plant:

Budgeted fixed OH rate = ($2,400,000 + $2,100,000) / 1,000,000 DLH = $4.50 per DLH

Alabama plant:

Budgeted fixed OH rate = ($2,205,000 + $1,050,000)/ 1,050,000 DLH = $3.10 per DLH

2. Variable overhead variances:

Georgia plant:

Actual Variable Overhead	**Actual hours × Budgeted rate**	**Budgeted input allowed for Actual output × Budgeted rate**
(1,020,000 × $3.20)	(1,020,000 × $3.30)	(1,950,000 × 0.50 × $3.30)
$3,264,000	$3,366,000	$3,217,500
	$102,000 F	$148,500 U
	Spending variance	Efficiency variance

Alabama plant:

Actual Variable Overhead	Actual hours × Budgeted rate	Budgeted input allowed for Actual output × Budgeted rate
(1,225,000 × $3.20)	(1,225,000 × $3.10)	(2,175,000 × 0.50 × $3.10)
$3,920,000	$3,797,500	$3,371,250
	$122,500 U	$426,250 U
	Spending variance	Efficiency variance

3. Fixed overhead variances

   a. Excluding the allocated common costs

Georgia plant:

Actual Fixed Overhead	Static Budget Fixed Overhead	Budgeted input allowed for Actual output × Budgeted Rate
		(1,950,000 × 0.50 × $2.40)
$2,440,000	$2,400,000	$2,340,000
	$40,000 U	$60,000 U
	Spending variance	Production-volume variance

Alabama plant:

Actual Fixed Overhead	Static Budget Fixed Overhead	Budgeted input allowed for Actual output × Budgeted Rate
		(2,175,000 × 0.50 × $2.10)
$2,300,000	$2,205,000	$2,283,750
	$95,000 U	$78,750 F
	Spending variance	Production-volume variance

b. Including allocated common costs

Georgia plant:

Actual Fixed Overhead	Static Budget Fixed Overhead	Budgeted input allowed for Actual output ×Budgeted Rate
$2,440,000 + (2/3 ×$3,075,000)	($2,400,000 + $2,100,000)	(1,950,000 × 0.50 × $4.50)
$4,490,000	$4,500,000	$4,387,500
	$10,000 F	$112,500 U
	Spending variance	Production-volume variance

Alabama plant:

Actual Fixed Overhead	Static Budget Fixed Overhead	Budgeted input allowed for Actual output × Budgeted Rate
$2,300,000 + (1/3 × $3,075,000)	($2,205,000 + $1,050,000)	(2,175,000 × 0.50 × $3.10)
$3,325,000	$3,255,000	$3,371,250
	$70,000 U	$116,250 F
	Spending variance	Production-volume variance

4. Tom Saban's attempt did not fully work. Even though he tried to allocate a significantly larger amount of common cost to the Georgia plant than to the Alabama plant, the cost becomes part of the fixed overhead rate and thus will only cause a large unfavorable spending variance for the Georgia plant if the cost itself is much larger than expected. Because the actual common costs were lower, the result was actually to shift Georgia's spending variance from unfavorable to favorable! Also, the spending variance for the Alabama plant is already larger than that of the Georgia plant, and the gap between them only increases when the common fixed costs are added to both plants. That said, the inclusion of the common fixed cost does exacerbate the impact of the underproduction by Georgia relative to budget (via the higher unfavorable production volume variance) while increasing the favorable volume variance for Alabama.

5. Common fixed costs should not be allocated to units that are being evaluated for performance because common fixed costs are not controllable by those units. Thus, the units should not be responsible for such costs.

6. Tom Saban's behavior is not ethical. He attempted to make his friend better off by manipulating costs and overhead rates, rather than focusing on which cost system would provide the best measure of relative performance among the divisions.