GLOBAL EDITION

HORNGREN'S

COST ACCOUNTING

17E

A MANAGERIAL EMPHASIS

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Horngren's Cost Accounting

A MANAGERIAL EMPHASIS

Seventeenth Edition
Global Edition

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these inputs. For example, the actual price of electricity may only be $0.09 per kilowatt-hour, compared with a price of $0.10 per kilowatt-hour in the flexible budget.

2. Relative to the flexible budget, the percentage increase in the actual use of individual items in the variable overhead-cost pool is less than the percentage increase in machine-hours. Compared with the flexible-budget amount of 30,000 kilowatt-hours, suppose the actual energy use was 32,400 kilowatt-hours, or 8% higher. The fact that this is a smaller percentage increase than the 12.5% increase in machine-hours (4,500 actual machine-hours versus a flexible budget of 4,000 machine-hours) will lead to a favorable variable overhead spending variance (denoted F in this text) representing more efficient use of energy.

In the last stage of the five-step decision-making process, Webb's managers examine signals provided by the variable overhead variances to *evaluate the firm's performance and learn*. Learning leads to better predictions and, as we describe next, actions to improve results in future periods.

Consider potential reasons for actual prices of variable overhead cost items to be lower than budgeted prices (reason 1 above), such as skillful negotiation on the part of the purchasing manager, oversupply in the market, or lower quality of inputs such as indirect materials. Webb's response depends on what managers believe to be the cause of the variance. If, for example, prices are lower because of low input quality, managers might put in place new quality management systems.

Consider potential reasons for the efficiency with which variable overhead resources are used (reason 2 above), such as the skill levels of workers, maintenance of machines, and the efficiency of the manufacturing process. If, for example, efficiency gains stem from manufacturing process improvements, managers might organize cross-functional teams to achieve more process improvements.

We emphasize, as we have before, that a manager should not always view a favorable variable overhead spending variance as desirable. The variable overhead spending variance would be favorable if Webb's managers purchased lower-priced, poor-quality indirect materials; hired less-skilled indirect workers; or performed less machine maintenance. These decisions reduce costs in the short run but are likely to hurt product quality and the business in the long run.

To clarify the concepts of variable overhead efficiency variance and variable overhead spending variance, consider the following example. Suppose that (1) energy is the only item of variable overhead cost and machine-hours is the cost-allocation base, (2) actual machine-hours used equals the number of machine-hours under the flexible budget, and (3) the actual price of energy equals the budgeted price. What is the efficiency variance? Zero, because the company has been efficient with respect to the number of machine-hours (the cost-allocation base) used to produce the actual output. Will there be a spending variance? Yes because (3) only eliminates reason 1 above. The energy consumed *per machine-hour* could be higher than budgeted (reason 2 above), for example, because the machines have not been maintained correctly. The cost of this higher energy usage would be reflected in an unfavorable spending variance.

8-1 TRY IT!

Duvet Company manufactures pillows. The 2020 operating budget was based on production of 20,000 pillows, with 0.75 machine-hours allowed per pillow. Budgeted variable overhead per hour was $25.

Actual production for 2020 was 18,000 pillows using 13,000 machine-hours. Actual variable costs were $26 per machine-hour.

Calculate the following:

a. The budgeted variable overhead for 2020
b. The variable overhead spending variance
c. The variable overhead efficiency variance

Journal Entries for Variable Overhead Costs and Variances

We now prepare journal entries for the Variable Overhead Control account and the contra account Variable Overhead Allocated.

Entries for variable overhead for April 2020 (data from Exhibit 8-1) are as follows:

1. Variable Overhead Control	130,500	
Accounts Payable and various other accounts		130,500
To record actual variable overhead costs incurred.		
2. Work-in-Process Control	120,000	
Variable Overhead Allocated		120,000
To record variable overhead cost allocated (0.40 machine-hour / unit × 10,000 units × $30 / machine-hour). (The costs accumulated in Work-in-Process Control are transferred to Finished-Goods Control when production is completed and to Cost of Goods Sold when the products are sold.)		
3. Variable Overhead Allocated	120,000	
Variable Overhead Efficiency Variance	15,000	
Variable Overhead Control		130,500
Variable Overhead Spending Variance		4,500
This records the variances for the accounting period.		

These variances are the underallocated or overallocated variable overhead costs. At the end of the fiscal year, the variance accounts are written off to cost of goods sold if immaterial in amount. If the variances are material in amount, they are prorated among the Work-in-Process Control, Finished-Goods Control, and Cost of Goods Sold accounts on the basis of the variable overhead allocated to these accounts, as described in Chapter 4, pages 144–145. As we discussed in Chapter 4, only unavoidable costs are prorated. Any part of the variances attributable to avoidable inefficiency is written off in the period. Assume that the balances in the variable overhead variance accounts as of April 2020 are also the balances at the end of the 2020 fiscal year and are immaterial in amount. The following journal entry records the write-off of the variance accounts to the Cost of Goods Sold:

Cost of Goods Sold	10,500	
Variable Overhead Spending Variance	4,500	
Variable Overhead Efficiency Variance		15,000

DECISION POINT

What variances can be calculated for variable overhead costs?

Next we demonstrate how to calculate fixed overhead cost variances.

LEARNING OBJECTIVE 4

Compute the fixed overhead flexible-budget variance,

…difference between actual fixed overhead costs and flexible-budget fixed overhead amounts

the fixed overhead spending variance,

…same as the preceding explanation

and the fixed overhead production-volume variance

…difference between budgeted fixed overhead and fixed overhead allocated on the basis of actual output produced

Fixed Overhead Cost Variances

The flexible-budget amount for a fixed-cost item is also the amount included in the static budget prepared at the start of the period. No adjustment is required for differences between actual output and budgeted output for fixed costs because fixed costs are unaffected by changes in the output level within the relevant range. At the start of 2020, Webb budgeted its fixed overhead costs to be $276,000 per month. The actual amount for April 2020 turned out to be $285,000. The **fixed overhead flexible-budget variance** is the difference between actual fixed overhead costs and fixed overhead costs in the flexible budget:

$$\begin{aligned}\text{Fixed overhead flexible-budget variance} &= \text{Actual costs incurred} - \text{Flexible-budget amount}\\ &= \$285{,}000 - \$276{,}000\\ &= \$9{,}000\ \text{U}\end{aligned}$$

The variance is unfavorable because the $285,000 actual fixed overhead costs exceed the $276,000 budgeted for April 2020, which decreases that month's operating income by $9,000.

The variable overhead flexible-budget variance described earlier in this chapter was subdivided into a spending variance and an efficiency variance. There is no efficiency variance for fixed overhead costs. That's because a given lump sum of fixed overhead costs will be unaffected

by how efficiently machine-hours are used to produce output in a given budget period. As Exhibit 8-2 shows, because there is no efficiency variance, the **fixed overhead spending variance** is the same amount as the fixed overhead flexible-budget variance:

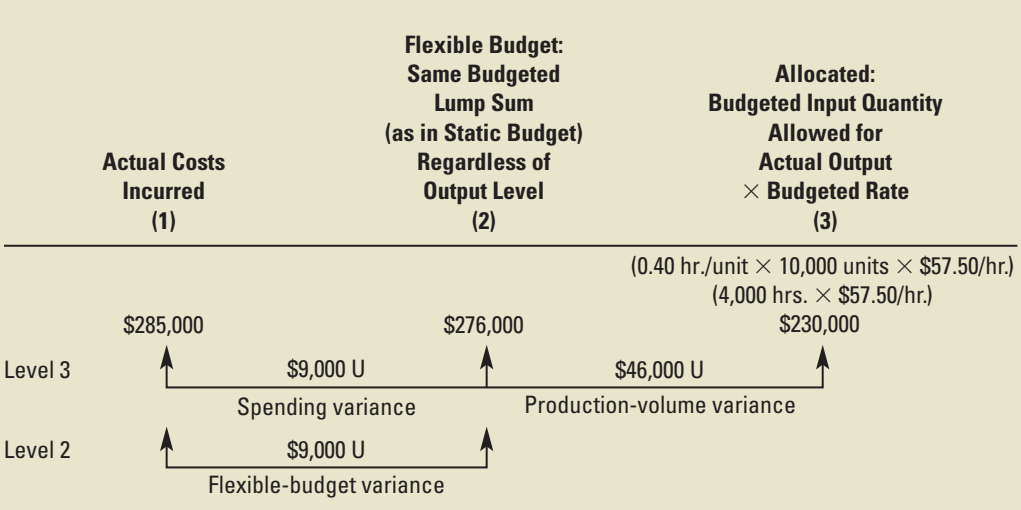
$$\begin{aligned}\text{Fixed overhead spending variance} &= \text{Actual costs incurred} - \text{Flexible-budget amount}\\ &= \$285{,}000 - \$276{,}000\\ &= \$9{,}000\ \text{U}\end{aligned}$$

Reasons for the unfavorable spending variance could be higher equipment-leasing costs, higher depreciation on plant and equipment, or higher administrative costs, such as a higher-than-budgeted salary paid to the plant manager. If equipment-leasing costs were higher, for example, managers might look to lease equipment from other suppliers.

Production-Volume Variance

The **production-volume variance** arises only for fixed costs. It is the difference between the budgeted fixed overhead and the fixed overhead allocated on the basis of actual output produced. Recall that at the start of the year, Webb calculated a budgeted fixed overhead rate of $57.50 per machine-hour based on monthly budgeted fixed overhead costs of $276,000. Under standard costing, Webb's fixed overhead costs are allocated to the actual output produced during each period at the rate of $57.50 per standard machine-hour, which is equivalent to a rate of $23 per jacket (0.40 machine-hour per jacket × $57.50 per machine-hour). If Webb produces 1,000 jackets, $23,000 ($23 per jacket × 1,000 jackets) out of April's budgeted fixed overhead costs of $276,000 will be allocated to the jackets. If Webb produces 10,000 jackets, $230,000 ($23 per jacket × 10,000 jackets) will be allocated. Only if Webb produces 12,000 jackets (that is, operates, as budgeted, at capacity) will all $276,000 ($23 per jacket × 12,000 jackets) of the budgeted fixed overhead costs be allocated to the jacket output. The key point here is that even though Webb budgeted its fixed overhead costs to be $276,000, it does not necessarily allocate all these costs to output. The reason is that Webb budgets $276,000 of fixed costs to support its planned production of 12,000 jackets. If Webb produces fewer than 12,000 jackets, it only allocates the budgeted cost of capacity actually needed and used to produce the jackets.

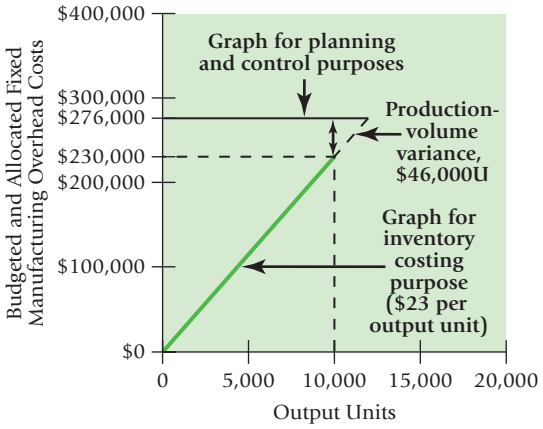
EXHIBIT 8-2 Columnar Presentation of Fixed Overhead Variance Analysis: Webb Company for April 2020[a]



[a]F = favorable effect on operating income; U = unfavorable effect on operating income.

EXHIBIT 8-3

Behavior of Fixed Manufacturing Overhead Costs: Budgeted for Planning and Control Purposes and Allocated for Inventory Costing Purposes for Webb Company for April 2020



The production-volume variance, also referred to as the **denominator-level variance**, is the difference between the budgeted and allocated fixed overhead amounts. Note that the allocated overhead can be expressed in terms of the budgeted fixed cost per unit of the allocation base (machine-hours for Webb) or in terms of the budgeted fixed cost per unit:

$$\begin{aligned}\text{Production volume variance} &= \text{Budgeted fixed overhead} - \text{Fixed overhead allocated for actual output units produced}\\ &= \$276{,}000 - (0.40 \text{ hour per jacket} \times \$57.50 \text{ per hour} \times 10{,}000 \text{ jackets})\\ &= \$276{,}000 - (\$23 \text{ per jacket} \times 10{,}000 \text{ jackets})\\ &= \$276{,}000 - \$230{,}000\\ &= \$46{,}000 \text{ U}\end{aligned}$$

As shown in Exhibit 8-2, the budgeted fixed overhead ($276,000) will be the lump sum shown in the static budget and also in any flexible budget within the relevant range. The fixed overhead allocated ($230,000) is calculated by multiplying the number of output units produced during the budget period (10,000 units) by the budgeted cost per output unit ($23). The $46,000 U production-volume variance can also be thought of as $23 per jacket × 2,000 jackets that were *not* produced.

Exhibit 8-3 shows Webb's production-volume variance. For planning and control purposes, Webb's fixed (manufacturing) overhead costs do not change in the 0- to 12,000-unit relevant range. Contrast this behavior of fixed costs with how costs are depicted for the purpose of inventory costing in Exhibit 8-3. Under Generally Accepted Accounting Principles, fixed (manufacturing) overhead costs are allocated as an inventoriable cost to the output units produced. Every output unit that Webb manufactures will increase fixed overhead allocated to products by $23. That is, for purposes of allocating fixed overhead costs to jackets, these costs are viewed *as if* they had a variable-cost behavior pattern. As the graph in Exhibit 8-3 shows, the difference between the $276,000 in fixed overhead costs budgeted and the $230,000 of costs allocated is the $46,000 U production-volume variance.

Be careful to distinguish the true behavior of fixed costs from the manner in which fixed costs are assigned to products. In particular, although fixed costs are unitized (i.e., converted into per-unit amounts) and allocated for inventory-costing purposes, be wary of using the same per-unit fixed overhead costs for planning and control purposes. When forecasting or controlling fixed costs, identifying the best ways to use capacity, or when making decisions, concentrate on total lump-sum costs instead of unitized costs.

Interpreting the Production-Volume Variance

Lump-sum fixed costs represent the costs of acquiring capacity. These costs do not decrease automatically if the capacity needed turns out to be less than the capacity acquired. Sometimes costs are fixed for a specific time period for contractual reasons, such as an

annual lease contract for equipment. At other times, costs are fixed because capacity has to be acquired or disposed of in fixed increments, or lumps. For example, suppose that acquiring a sewing machine gives Webb the ability to produce 1,000 jackets. If it is not possible to buy or lease a fraction of a machine, Webb can add capacity only in increments of 1,000 jackets. That is, Webb may choose capacity levels of 10,000, 11,000, or 12,000 jackets, but nothing in between.

What explains the $46,000 U production-volume variance? Why did this overcapacity occur? Why were 10,000 jackets produced instead of 12,000? Is demand weak? Should Webb reevaluate its product and marketing strategies? Is there a quality problem? Or did Webb make a strategic mistake by acquiring too much capacity? The causes of the $46,000 U production-volume variance will determine the actions Webb's managers take in response to the variance.

In contrast, a favorable production-volume variance indicates an overallocation of fixed overhead costs. That is, the overhead costs allocated to the actual output produced exceed the budgeted fixed overhead costs of $276,000. The favorable production-volume variance represents fixed costs allocated in excess of $276,000.

Be careful when drawing conclusions about Webb's capacity planning on the basis of an unfavorable production-volume variance. Consider why Webb sold only 10,000 jackets in April. Suppose a new competitor gained market share by pricing its jackets lower than Webb's. To sell the budgeted 12,000 jackets, Webb might have had to reduce its own selling price on all 12,000 jackets. Suppose it decided that selling 10,000 jackets at a higher price yielded higher operating income than selling 12,000 jackets at a lower price. This would be a good decision even though it would mean Webb would not utilize all its capacity. The production-volume variance cannot take into account such information. We should not interpret the $46,000 U amount as the total economic cost of selling 2,000 jackets fewer than the 12,000 jackets budgeted.

Companies plan their plant capacity strategically on the basis of market information about how much capacity will be needed over some future time horizon. For 2020, Webb's budgeted quantity of output is equal to the maximum capacity of the plant for that budget period. Actual demand (and quantity produced) turned out to be below the budgeted quantity of output, so Webb reports an unfavorable production-volume variance for April 2020. However, it would be incorrect to conclude that Webb's management made a poor planning decision regarding its plant capacity. The demand for Webb's jackets might be highly uncertain. Given this uncertainty and the cost of not having sufficient capacity to meet sudden demand surges (including lost contribution margins as well as reduced repeat business), Webb's management may have made a wise capacity choice for 2020.

So what should Webb's managers ultimately do about the unfavorable variance in April? Should they try to reduce capacity, increase sales, or do nothing? Suppose Webb's managers anticipate they will not need 12,000 jackets of capacity in future years. They will then cancel leases on some machines but continue to maintain some excess capacity to accommodate unexpected surges in demand. Concepts in Action: Variance Analysis and Standard Costing Help Sandoz Manage Its Overhead Costs highlights another example of managers using variances to help guide their decisions.

We next describe journal entries to record fixed overhead costs using standard costing.

8-2 TRY IT!

Duvet Company manufactures pillows. For 2020, the company expects fixed overhead costs of $300,000. Duvet uses machine-hours to allocate fixed overhead costs and anticipates 15,000 hours during the year to manufacture 20,000 pillows.

During 2020, Duvet manufactured 18,000 pillows and spent $290,000 on fixed overhead costs.

Calculate the following:

a. The fixed overhead rate for 2020
b. The fixed overhead spending variance for 2020
c. The production-volume variance for 2020

CONCEPTS IN ACTION

Variance Analysis and Standard Costing Help Sandoz Manage Its Overhead Costs[4]

Fir Mamat/Alamy Stock Photo

Sandoz, the $10.1 billion generics division of Swiss-based Novartis AG, is the world's third largest generic drug manufacturer. As products lose patents, multiple manufacturers enter the market and prices drop. How much? Very significantly. In the United States, for example, 90% of all prescription drugs dispensed were generics, but they account for only 23% of total drug costs. To compete, generics companies must carefully control costs.

To manage overhead costs, Sandoz prepares an overhead budget based on a detailed production plan, planned overhead spending, and other factors. Sandoz uses activity-based costing to assign budgeted overhead costs to different work centers (for example, mixing, blending, tableting, testing, and packaging). Finally, overhead costs are assigned to products based on the activity levels required by each product at each work center.

Each month, Sandoz compares actual costs to the standard costs of products made to evaluate whether costs are in line with the budget. If not, reasons are examined and accountable managers are notified. Manufacturing overhead variances are examined at the work center level. These variances help determine when equipment is not running as expected so it can be repaired or replaced. Variances also help to identify inefficiencies in processing and setup and cleaning times, which leads to more efficient ways to use equipment. Sometimes, the manufacturing overhead variance analysis leads to the review and improvement of the standards themselves—a critical element in planning the level of plant capacity. Management also reviews current and future capacity on a monthly basis to identify constraints and future capital needs.

[4] *Sources*: Novartis AG, 2018 Form 20-F (Basel, Switzerland: Novartis AG, 2019) (https://www.novartis.com/sites/www.novartis.com/files/novartis-20-f-2018.pdf); Association for Accessible Medicines, *2018 Generic Drug Access and Savings in the U.S.*, Washington, DC: Association for Accessible Medicines, 2018 (https://accessiblemeds.org/resources/blog/2018-generic-drug-access-and-savings-report); conversations with, and documents prepared by, Tobias Hestler and Chris Lewis of Sandoz, 2016.

Journal Entries for Fixed Overhead Costs and Variances

We illustrate journal entries for fixed overhead costs for April 2020 using the Fixed Overhead Control account and the contra account Fixed Overhead Allocated (data from Exhibit 8-2).

1. Fixed Overhead Control	285,000	
Salaries Payable, Accumulated Depreciation, and various other accounts		285,000
To record actual fixed overhead costs incurred.		
2. Work-in-Process Control	230,000	
Fixed Overhead Allocated		230,000
To record fixed overhead costs allocated. (0.40 machine-hour/unit × 10,000 units × $57.50/machine-hour). (The costs accumulated in Work-in-Process Control are transferred to Finished-Goods Control when production is completed and to the Cost of Goods Sold when the products are sold.)		
3. Fixed Overhead Allocated	230,000	
Fixed Overhead Spending Variance	9,000	
Fixed Overhead Production-Volume Variance	46,000	
Fixed Overhead Control		285,000
To record variances for the accounting period.		

Overall, $285,000 of fixed overhead costs were incurred during April, but only $230,000 were allocated to jackets. The difference of $55,000 is precisely the underallocated fixed overhead costs we introduced when studying normal costing in Chapter 4. The third entry illustrates how the fixed overhead spending variance of $9,000 and the fixed overhead production-volume variance of $46,000 together record this amount in a standard costing system.