

# ***Online Course Manual***

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## **Module 7**

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## Module 7 Summary

- I. Budget Standards.** Budgets, as we know, are used in planning operations. However, since the budgeting process requires the establishment of *standard costs* (the budgeted cost of producing a unit of the company's product or service), it also results in the setting of *budget standards*.
- A. **Budget standards** represent *benchmarks* against which actual results may be compared. Differences between the budgeted amount and the actual amount is called a budget *variance*.
1. The standard cost of a unit of production is determined by two factors: *quantity* (pounds of materials, hours of labor, etc.) and *cost* (materials price per pound, labor rate per hour, etc.).
  2. The use of standard costs to evaluate and control operations is called *management by exception*.
  3. Since the standards are used to evaluate the performance of workers and departments, standards should be established with input from those whose performance will be judged by them.
  4. **Ideal standards** (also called *theoretical standards*) are nearly impossible to attain. They allow no room for machine down time, materials shortages, or labor inefficiency. **Currently attainable standards** (also called *practical* or *normal* standards) are still stringent, but more realistic benchmarks. Because management theory calls for the setting of standards that are challenging but attainable and because ideal standards are too unrealistic to be useful in planning operations, *currently attainable standards* should be preferred.
- B. Standard costs may also be incorporated into the accounting system by adopting a **standard cost accounting system**, a system in which all production is accounted for at standard costs instead of actual costs. That is, entries to the Work-in-Process, Finished Goods, and Cost of Goods Sold accounts are recorded at standard cost rather than actual cost. Differences between the actual costs and the standards are set out in several variance accounts. This is illustrated below and in the appendix to the chapter in the text.
- C. **Determinants of the Standard Cost of a Unit.** In order to develop the overall standard cost for a unit of production, six items must be budgeted:
1. Standard *price* per unit *of direct materials* purchased (i.e., price per pound, gallon, yard, etc.).
  2. Standard *quantity of direct materials* used to produce a unit (i.e., number of pounds, gallons, yards, etc., per unit).
  3. Standard *labor rate per hour* paid *for the direct labor* used in production.

4. Standard *direct labor time* used to produce a unit of production (i.e., hours per unit).
5. **Predetermined standard variable factory overhead application rate.** This is basically the same application rate that was used in our discussion of job-order and process cost accounting systems. Now, though, we are distinguishing between variable and fixed overhead, and developing a separate application rate for each.
  - a. Note that forecasted variable overhead comes out of the budgeting process and, since it represents a variable cost, is the same amount per direct labor hour, machine hour, or whatever the activity base might be no matter how many units are produced.
  - b. This is *not* the case where fixed overhead costs are concerned (see below).
6. **Predetermined standard fixed factory overhead application rate.** Again, this is the same application rate developed earlier for use in job-order and process accounting, except that it pertains to only the fixed overhead costs.
  - a. Note that this application rate, as well as the variable overhead application rate, must be determined *before* production occurs.
  - b. It is calculated by dividing the *budgeted* fixed overhead amount by the *standard* direct labor hours (or machine hours, etc.) required for the number units the company *expects* to manufacture.

$$\text{Predetermined Fixed Overhead Application Rate} = \frac{\text{Budgeted Fixed overhead}}{\text{Budgeted Direct Labor Hours}}$$

- c. Note that forecasted *fixed* overhead, unlike *variable* overhead, is not the same amount per hour at different production levels. As we *increase* the number of units produced, the budgeted hours increase but the fixed overhead remains constant. This causes the fixed overhead cost per hour (and per unit) to *decline*. If we *decrease* production, the units and hours decrease, and the fixed overhead cost per hour (and unit) *increases*. Therefore, unless the company is exactly right about the number units it produces during the period, the amount of fixed overhead applied to production will not be the amount that was budgeted. This effect is illustrated below, and it is what creates the overhead *volume variance*

(discussed in the last part of this module).

*Here's an Example!* To better understand standard cost determination, consider the standard costs developed by Control Corporation. As shown below, Control Corporation has established \$14.80 as the standard cost for a unit of production:

Standard Quantities and Costs:	
Direct materials cost per unit (1.6 pounds @ \$.50/lb.)	\$ 0.80
Direct labor cost per unit (1 direct labor hour @ \$10/hr.)	\$10.00
Variable overhead cost per unit (1 direct labor hour @ \$1/hr)	\$ 1.00
Fixed overhead cost per unit (1 direct labor hour @ \$3/hr)	<u>\$ 3.00</u>
Standard manufacturing cost per unit of production	\$14.80

Each of the quantity and price figures above represents a budgeted standard. Note that the standard materials and labor cost are based on both a quantity standard (pounds of materials, hours of labor) and a price standard (price per pound, rate per hour). In this example, the variable and fixed overhead is applied on the basis of direct labor hours, and their application rates come from the data in the table below. The fixed overhead application rate of \$3 per direct labor hour is based on the assumption that the company will operate at 80% of capacity and produce 5,000 units during the period (see below).

	Possible Operating Levels		
	70%	80%	90%
Percent of Capacity			
Production (in units)	4,000	5,000	6,000
Budgeted Direct Labor Hours	4,000	5,000	6,000
Budgeted Variable Overhead	\$4,000	\$5,000	\$6,000
Budgeted Fixed Overhead	<u>\$15,000</u>	<u>\$15,000</u>	<u>\$15,000</u>
Total Budgeted Overhead	\$19,000	\$20,000	\$21,000
Overhead Application Rates (per DL hour):			
Variable Overhead (Budgeted VOH ÷ DL hours)	\$1.00	<u>\$1.00</u>	\$1.00
Fixed Overhead (Budgeted FOH ÷ DL hours)	<u>\$3.75</u>	<u>\$3.00</u>	<u>\$2.50</u>
Total Overhead per DL hour	\$4.75	<u>\$4.00</u>	\$3.50

Choosing the 80% activity level results in a \$4 OH application rate.

Note that the variable overhead rate is \$1 per direct labor hour for all production levels, but that the fixed overhead rate changes as production changes. This causes the total overhead application rate to change as well, and forces the company to estimate its future level of production in order to determine which application rate to use. Therefore, *the \$14.80 standard cost per unit only applies if 5,000 units are produced.* It will be \$.75 greater if only 4,000 units are produced, and \$0.50 less if 6,000 units are produced.

**Here's the crucial point:** Unless the company does produce exactly 5,000 units, the amount of fixed overhead applied to production will not equal the amount budgeted. This will happen because the incorrect application rate will have been used. For example, if 4,000 units are actually produced, \$12,000 of fixed overhead cost will be applied to production (\$3 per hour x 4,000 standard direct labor hours) instead of the \$15,000 budgeted. If 6,000 units are produced, \$18,000 of fixed overhead will be applied (6,000 standard hours x \$3) instead of the budgeted \$21,000. Since the company will probably not produce exactly the forecasted number of units, it will probably either over-apply or under-apply the fixed overhead. *The volume variance (discussed below) is caused by this error in applying the overhead, and it is simply equal to the amount of the over- or under-applied fixed overhead.*

**II. Performance Reports.** The term *management by exception* (also called *responsibility accounting*) refers to the use of budgets to evaluate the performance of various segments of the business (*responsibility centers*).

- A. **Performance reports** are prepared for the segment in question. The format of performance reports varies, but all are basically comparisons of actual results against those budgeted. Differences are set out as *variances* from the budget that are used to evaluate the performance of the segment.
1. If actual costs exceed those budgeted or if actual revenues fall below those budgeted, an **unfavorable budget variance** occurs.
  2. If actual costs are below those budgeted or if actual revenues exceed those budgeted, a **favorable budget variance** occurs.
- B. Not all variances call for management's attention. A range of acceptable variance values is usually established, and only variations outside this range are investigated.
- C. The budget may be a **static budget** (a budget established for a single expected level of activity) or a **flexible budget** (a budget that distinguishes between variable and fixed costs in order to derive a **budget formula** that can be used to easily restate the budget for any level of activity). Flexible budgets make performance assessment possible for any activity level attained during the period. Static budgets are only useful in assessing performance if the budgeted activity level is actually attained. They are generally not used for performance evaluations because they distort budget variances.

*Here's an Example!* To illustrate performance reports and the differences between static and flexible budgets, let's return to Control Corporation and prepare a performance report. Assume that the period has ended and, instead of producing the anticipated 5,000 units during the period, machine breakdowns resulted in only 4,000 units being manufactured. Actual costs incurred at this 4,000 unit level of activity are as follows:

Actual data for the period:		
Units actually produced	4,000	
Direct materials purchases (6,000 lbs @ \$0.60)	\$ 3,600	
Direct materials usage	6,000 lbs	
Direct labor cost (4,500 hours @ \$9/hr)	\$40,500	
Total actual factory overhead cost:	\$20,600	

The **static budget** prepared for the anticipated 5,000 unit level of production would list material cost of \$4,000 (5,000 units x \$0.80 per unit); direct labor of \$50,000 (5,000 units x \$10 per unit); variable overhead of \$5,000 (5,000 units x \$1 per unit); and fixed overhead of \$15,000. A performance report based upon this static budget would appear as shown on the following page.

<i>Example, continued.</i>				
A Static Budget Performance Report	Static Budget for 5,000 units	Actual Results at 4,000 units	Budget Variance	
Direct Materials	\$4,000	\$3,600	\$ 400	Favorable
Direct Labor	50,000	40,500	9,500	Favorable
Factory Overhead:				
Variable	5,000	4,600	400	Favorable
Fixed	<u>15,000</u>	<u>16,000</u>	<u>1,000</u>	Unfavorable
Total Production Cost	\$74,000	\$64,700	\$9,300	Favorable
<p>This report appears to be very favorable, since the variances are almost all positive ones. However, the variances are all distorted by the fact that actual results at 4,000 units of production are being compared to budgeted figures for 5,000 units. This will tend to produce favorable variances since costs incurred at lower production levels will tend to be less than those budgeted at higher levels, and makes the variance figures meaningless as far as evaluating the performance of the segment is concerned.</p> <p>The <b><i>budget formula</i></b> (materials = \$.80 per unit; direct labor = \$10 per unit; variable overhead = \$1 per unit; and fixed costs = \$15,000) can be used to produce a <b><i>flexible budget</i></b> for any level of production actually achieved. Applying the budget formula to our 4,000 unit level of activity results in the following flexible budget amounts and a revised performance report:</p>				
A Flexible Budget Performance Report	Flexible Budget for 4,000 units	Actual Results at 4,000 units	Budget Variance	
Direct Materials (budget = 4,000 x \$.80)	\$ 3,200	\$3,600	\$ 400	Unfavorable
Direct Labor (budget = 4,000 x \$10)	40,000	40,500	500	Unfavorable
Factory Overhead:				
Variable (budget = 4,000 x \$1)	4,000	4,600	600	Unfavorable
Fixed (budget = \$15,000)	<u>15,000</u>	<u>16,000</u>	<u>1,000</u>	Unfavorable
Total Production Cost	\$62,200	\$64,700	\$2,500	Unfavorable
<p>The variances are now meaningful measures of performance within the production department, and as we can see, what were once favorable variances have become unfavorable ones. Our department manager will have some explaining to do!</p>				

### III. Analysis of Materials and Labor Budget Variances.

- A. Materials and labor budget variances are affected by two factors: differences between budgeted and actual prices (a *spending* component) and by differences between budgeted and actual quantities (a *usage* component). In order to properly evaluate performance, the total variance should be broken down into its separate spending and usage variances. This process is referred to as ***variance analysis***, or ***analysis of variance (ANOVA)***.

*Note to the student:* The discussion that follows uses symbols to express the terms *standard quantity*, *actual quantity*, *standard price*, and *actual price*. The symbols for these terms are:

$Q_s$  = Standard Quantity

$Q_a$  = Actual Quantity

$P_s$  = Standard Price

$P_a$  = Actual Price



Click the link below to play a video lecture concerning performance reports, materials, and labor variances.

[Link to Performance Report Lecture](#)

B. **Materials Variances.** For direct materials the total variance can be broken down into a *materials price variance* and a *materials quantity variance*.

- As calculated for Control Corporation and shown on the flexible budget above, the *total* materials variance is equal to the difference between the standard cost of the standard quantity of materials and the actual cost of the actual quantity used. The standard quantity of materials used is equal to 6,400 pounds (4,000 units x 1.6 pounds per unit)

$$\begin{aligned} \text{Total Materials Variance} &= (Q_s \times P_s) \text{ versus } (Q_a \times P_a) \\ &= (6,400 \text{ lbs} \times \$0.50) \text{ vs. } (6,000 \text{ lbs} \times \$0.60) \\ &= \$3,200 \text{ vs. } \$3,600 = \underline{\$400} \text{ (unfavorable)} \end{aligned}$$

- The *materials price variance* is equal to the difference between the standard cost of the materials actually used and the actual cost of the materials that were used.

$$\begin{aligned} \text{Materials price variance} &= (Q_a \times P_s) \text{ versus } (Q_a \times P_a) \\ &= (6,000 \text{ lbs} \times \$0.50) \text{ vs. } (6,000 \text{ lbs} \times \$0.60) \\ &= \$600 \text{ (unfavorable)} \end{aligned}$$

Alternatively, the price variance may be calculated as:

$$\begin{aligned} \text{Materials price variance} &= (P_s \text{ versus } P_a) \times Q_a \\ &= (\$0.50 \text{ vs. } \$0.60) \times 6,000 \text{ lbs} \\ &= \underline{\$600} \text{ (unfavorable)} \end{aligned}$$

- The *materials quantity variance* is equal to the difference between the standard cost of the standard quantity of materials and the standard cost of the materials actually used.

$$\begin{aligned}
 \text{Materials quantity variance} &= (Q_s \times P_s) \text{ versus } (Q_a \times P_s) \\
 &= (6,400 \text{ lbs} \times \$0.50) \text{ vs. } (6,000 \text{ lbs} \times \$0.50) \\
 &= \underline{\$200} \text{ (favorable)}
 \end{aligned}$$

Alternatively, the quantity variance may be calculated as:

$$\begin{aligned}
 \text{Materials quantity variance} &= (Q_s \text{ versus } Q_a) \times P_s \\
 &= (6,400 \text{ vs. } 6,000) \times \$0.50 \\
 &= \underline{\$200} \text{ (favorable)}
 \end{aligned}$$

4. Note that the unfavorable material price variance of \$600 and the favorable quantity variance of \$200 sum up and net out to equal the \$400 unfavorable total materials variance. This must always happen, since the price and quantity variances are just break-downs of the total materials variance.

**Helpful Hints:**

It is common to hear students say, “I’m confused! The price variance is always the difference between actual and standard price times a quantity. The quantity variance is always equal to the difference between actual and standard quantity times a price. I can’t remember whether to multiply by the standard quantity or actual quantity, and I get messed up on whether to use the standard price or actual price, when I do these variances!” Just remember the mantra: *Price variances are always based on actual quantities; quantity variances are based on standard prices.*

When you are calculating the variances, don’t try to use the formulas and the sign of the answer (positive or negative) to decide whether they are favorable or unfavorable. Just use logic. If the actual quantity is greater than the standard quantity, the quantity variance will be unfavorable (and vice-versa). If the actual price is greater than the standard price, the price variance will be unfavorable (and vice-versa).

- C. **Direct Labor Variances.** For direct labor the total variance can be broken down into a *direct labor rate variance* and a *direct labor time variance*. Here, we will do with the total labor variance exactly what we did with materials in the section above.
1. The **total direct labor variance** is equal to the difference between the standard cost of the standard quantity of labor hours used and the actual cost of the actual labor hours used. The standard quantity of the labor hours is equal to 4,000 hours (4,000 units x 1 hour per unit).

$$\begin{aligned}
 \text{Total Direct Labor Variance} &= (Q_s \times P_s) \text{ versus } (Q_a \times P_a) \\
 &= (4,000 \text{ hrs} \times \$10) \text{ vs. } (4,500 \text{ hrs} \times \$9) \\
 &= \$40,000 \text{ vs. } \$40,500 = \underline{\$500} \text{ (unfavorable)}
 \end{aligned}$$



2. The **direct labor rate variance** is equal to the difference between the standard cost of the labor hours actually used and the actual cost of the labor hours that were used. Note that it is calculated in exactly the same way as the materials price variance.

$$\begin{aligned} \text{Direct Labor Rate Variance} &= (Q_a \times P_s) \text{ versus } (Q_a \times P_a) \\ &= (4,500 \text{ hrs} \times \$10) \text{ vs. } (4,500 \text{ hrs} \times \$9) \\ &= \underline{\$4,500} \text{ (favorable)} \end{aligned}$$

Alternatively, the rate variance may be calculated:

$$\begin{aligned} \text{Direct Labor Rate variance} &= (P_s \text{ versus } P_a) \times Q_a \\ &= (\$10 \text{ vs. } \$9) \times 4,500 \text{ hrs} \\ &= \underline{\$4,500} \text{ (favorable)} \end{aligned}$$

3. The **direct labor time variance** is equal to the difference between the standard cost of the standard quantity of labor hours and the standard cost of the actual labor hours used. (Again, this is identical to the way the materials quantity variance was calculated).

$$\begin{aligned} \text{Direct Labor Time Variance} &= (Q_s \times P_s) \text{ versus } (Q_a \times P_s) \\ &= (4,000 \text{ hrs} \times \$10) \text{ vs. } (4,500 \text{ hrs} \times \$10) \\ &= \underline{\$5,000} \text{ (unfavorable)} \end{aligned}$$

Alternatively, the time variance may be calculated as:

$$\begin{aligned} \text{Direct Labor time Variance} &= (Q_s \text{ versus } Q_a) \times P_s \\ &= (4,000 \text{ hrs vs. } 4,500 \text{ hrs}) \times \$10 \\ &= \underline{\$5,000} \text{ (unfavorable)} \end{aligned}$$

4. Note that the favorable labor rate variance of \$4,500 and the unfavorable efficiency variance of \$5,000 sum up and net out to equal the \$500 unfavorable total direct labor variance. This is our double-check. If it doesn't happen, an error has been made in the variance calculations.

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## IV. The Overhead Variances

- A. The overhead variances differ from materials and labor variances in two regards. First, fixed and variable overhead are not direct costs and they must be *applied* to production. Therefore, variance in the application base that drives the overhead cost (direct labor hours in Control Corporation's

case) can distort the amount of overhead applied and, in turn, the amount of overhead variance calculated for the company. Also, as we noted in part I of this module, the fixed overhead application rate varies with activity levels, and the fixed overhead will be either over- or under-applied if production level are not exactly as forecasted. All of this adds up to a rather complicated set of overhead variance calculations that we will attempt to simplify as much as possible in the remainder of this module.

**B. The total overhead controllable variance**

1. The total overhead controllable variance is equal to the difference between the total overhead budgeted on the flexible budget and the total overhead cost actually incurred. This overhead variance is a simple one!

***Controllable Variance = Total OH Cost Budgeted versus Actual Total OH***

2. Note that this variance is calculated in the same way as the total materials variance and the total direct labor variance. That is, it is equal to the overhead variance that we set out earlier on the flexible budget performance report (see page 7 above). For Control Corporation, it is equal to \$1,600 (Unfavorable):

	Flexible Budget for 4,000 units	Actual Results at 4,000 units	Budget Variance	
Factory Overhead:				
Variable (budget = 4,000 x \$1)	\$ 4,000	\$ 4,600	\$ 600	Unfavorable
Fixed (budget = \$15,000)	<u>15,000</u>	<u>16,000</u>	<u>1,000</u>	Unfavorable
Total Production Cost	\$19,000	\$20,600	\$1,600	Unfavorable

**C. The Overhead Volume Variance.**

1. The **volume variance** only occurs when overhead is applied to production using the wrong predetermined application rate. It is defined as the *difference between the overhead that was applied to production and the overhead that was budgeted (on the flexible budget)*. In other words, it is the difference between the overhead that was applied, and the overhead that should have been applied.

***Volume Variance = Total OH Cost Budgeted versus Total OH Applied***

2. Let's return to the flexible budget performance report and add a new column. We'll use it to display the overhead cost that was applied to production, using the predetermined overhead application rate of \$4 per direct labor hour that we calculated earlier (see page 5 above). The volume variance is equal to the difference between the \$16,000 of overhead that was applied to production, and the \$19,000 of overhead budgeted for 4,000 units of production, or \$3,000.

	Overhead Applied to 4,000 units	Flexible Budget for 4,000 units	Actual Results at 4,000 units	Budget Variance
Factory Overhead Applied:				
Variable (4,000 DL hours x \$1)	\$ 4,000	\$ 4,000	\$ 4,600	\$ 600 (U)
Fixed (4,000 DL hours x \$3)	<u>12,000</u>	<u>15,000</u>	<u>16,000</u>	<u>1,000 (U)</u>
Total (4,000 DL hours x \$4)	\$16,000	\$19,000	\$20,600	\$1,600 (U)
	= \$3,000 Volume Variance			

In our previous discussion, we explained that the company had to estimate its level of activity, determine the standard number of DL hours for that level, and then divide them into the budgeted overhead in order to calculate the application rate (see page 5). The table that illustrated this process is reproduced below:

	Possible Operating Levels		
	70%	80%	90%
Percent of Capacity	70%	80%	90%
Production (in units)	4,000	5,000	6,000
Budgeted Direct Labor Hours	4,000	5,000	6,000
Budgeted Variable Overhead	\$4,000	\$5,000	\$6,000
Budgeted Fixed Overhead	<u>\$15,000</u>	<u>\$15,000</u>	<u>\$15,000</u>
Total Budgeted Overhead	\$19,000	\$20,000	\$21,000
Overhead Application Rates (per DL hour):			
Variable Overhead (Budgeted VOH ÷ DL hours)	\$1.00	\$1.00	\$1.00
Fixed Overhead (Budgeted FOH ÷ DL hours)	<u>\$3.75</u>	<u>\$3.00</u>	<u>\$2.50</u>
Total Overhead per DL hour	<u>\$4.75</u>	\$4.00	\$3.50

*Given the 70% activity level, the OH application rate used should have been \$4.75.*

Our company guessed that it would operate at a 5,000 unit level of activity, and so calculated a \$4 per standard direct labor hour overhead application rate. If the company actually operates at some other activity level, this application rate will be incorrect, and it will not apply the budgeted amount of overhead to its production.

This is exactly what happened in our example. The company thought it would produce 5,000 units, but it actually operated at 4,000 units of production. When it used the \$4 per DL hour overhead application rate, instead of the \$4.75 per DL hour that was calculated for the 4,000 unit activity level, only \$16,000 of overhead was applied. Since \$19,000 of overhead is budgeted for the 4,000 unit activity level, the overhead was under-applied by \$3,000. This is our volume variance.

2. We still need to determine whether the volume variance is favorable or unfavorable, and the answer isn't as obvious as it is with the other variances we have discussed. There is a little trick, though, that will always work. When the company produces more than it thought it would, the volume variance will be favorable. When it produces less, the volume variance will be unfavorable. *Favorable production results produce favorable volume variances, and vice-versa.*

**Instructor's Lecture Notes:** This discussion is supplemental to the course coverage, and you will not be tested directly over it. You should read it over, though, since it will help you to better understand the module's content.

Note that since overhead is divided into both fixed and variable components, the total overhead controllable variance can be broken down into a *variable overhead controllable variance* (\$600 unfavorable in our example above) and a *fixed overhead controllable variance* (\$1,000 unfavorable).

***Variable OH Controllable Variance = Budgeted Variable OH vs. Actual Variable OH***

***Fixed OH Controllable Variance = Budgeted Fixed OH vs. Actual Fixed OH***

Line workers are usually the ones most directly responsible for variable overhead controllable variances (which is caused by utilities, indirect materials, supplies usage and so on), but they often have little control over the fixed overhead costs (depreciation, property tax, insurance, salaries, etc.).

***Cause of the Fixed Overhead controllable variance.*** There can only be one cause for the fixed component of the total budget variance: unforeseen increases or decreases in the fixed costs. For example, the property tax levy may be unexpectedly increased (or decreased), salaries may have changed due to new hires or resignations, depreciation may increase (decrease) because equipment was purchased (sold), and so on. These events are probably uncontrollable and so are relatively unimportant in managing day-to-day operations.

***Causes of the Variable Overhead controllable variance.*** Given the way the flexible budget amounts are determined, the total variable overhead controllable variance can have two possible causes (and probably results from a combination of both):

(1) Actual overhead costs incurred per activity base hour actually used were greater than (or less than) the amount budgeted. This is the obvious factor that can create variance, but, because overhead cost is “driven” by labor hours, machine hours, or other activity bases, another exists as well. (2) More (or fewer) activity base hours were actually used than were budgeted for the production level achieved.

A company might, for example, incur exactly the budgeted amount of variable overhead cost *per direct labor hour used*, but if more hours are used than budgeted, more variable overhead cost will be incurred than is shown on the flexible budget (which is, remember, based on standard hours). This would create an unfavorable total variable overhead controllable variance even though the company is operating exactly “on budget” as far as variable overhead cost *per hour* is concerned. In Control Corporation’s case, direct labor hours “drive” variable overhead cost, and direct labor usage was over budget. This creates an unfavorable variable overhead variance effect since the variable overhead figure on the flexible budget assumed that *standard* hours were used for production (i.e., the amount entered was equal to the standard labor hours times the predetermined application rate). To make the variance report more useful to management, the labor “efficiency” effect should be removed. Note that this also works in reverse - *favorable* labor usage will have a *favorable* effect on the variable overhead variance.



Click the first link below to play a video lecture concerning the overhead variances. The second link will launch a video that illustrates the use of a standard cost system.

[Link to Overhead Variance Lecture](#)

[Link to Standard Cost System Lecture](#)

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## V. Standard Cost Systems

- A. Often, a company that has invested time and effort in developing standard costs for its products will also operate a standard cost accounting system.

*Note to the student:* The entries under a standard cost system are really no different from those presented earlier in our coverage of process cost systems. In order to fully understand where the volume variance comes from and what it represents, it is necessary to understand how entries are made in standard cost systems to account for production. For this reason, you are responsible for the section presented below (part B) which details these journal entries. Note that the text presents only the entries made to account for materials and labor variances, but you will need to be able to journalize all the entries presented below.

- Under a standard cost system, production is accounted for at standard quantities and standard costs. That is, as production occurs, the entries to the Materials, Work in Process, Finished Goods and Cost of Goods Sold accounts are made for the standard quantity of materials, labor and overhead at their standard costs, and not for the actual quantities and costs.

2. Since actual costs will differ from those budgeted, and since the difference simply represent the total materials, labor and overhead variances; the entries made to account for production during the period will require debits and credits to variance accounts. This results in prompt measurement and reporting of variances for use in managing operations.
3. At the end of the period, the Materials, Work-In-Process, Finished Goods and Cost of Goods Sold accounts will all be valued at standard cost. The differences between actual and standard costs will have been set out in variance accounts. The final step is to close the variance accounts into Materials, Work-In-Process, Finished Goods and Cost of Goods Sold so that their balances will then represent actual cost.
4. There are two advantages to a standard cost system: variances are identified and can be used to control operations in a timely fashion, and production can be accounted for quickly and easily since the costs to be recorded have been predetermined.

B. **Standard Cost System Entries.** The following is an illustration of the entries made to account for Control Corporation's production activities under a standard cost system. The company uses a standard cost process accounting system, making all entries in the accounts at standard quantities and standard costs. The information below was presented earlier (see page 5) and it is repeated here for convenience. According to the table, the standard cost of producing a unit is \$14.80. This is the sum of the standard direct materials, labor, and overhead costs.

<i>Standard Quantities and Costs:</i>	
Direct materials cost per unit (1.6 pounds @ \$.50/lb.)	\$ 0.80
Direct labor cost per unit (1 direct labor hour @ \$10/hr.)	\$10.00
Variable overhead cost per unit (1 direct labor hour @ \$1/hr)	\$ 1.00
Fixed overhead cost per unit (1 direct labor hour @ \$3/hr)	<u>\$ 3.00</u>
Standard manufacturing cost per unit of production	<u>\$14.80</u>
Actual data for the period:	
Units actually produced	4,000
Direct materials purchases (6,000 lbs @ \$0.60)	\$ 3,600
Direct materials usage	6,000 lbs
Direct labor cost (4,500 hours @ \$9/hr)	\$40,500
Total actual factory overhead cost:	\$20,600

1. **Materials Purchases.** In a process cost system, purchases of materials are recorded directly in the Materials Inventory account. The account is debited for the *standard* cost of the units actually purchased. The credit to Accounts Payable must be for the *actual* cost

of the units purchased. The difference in the entry (standard cost of the actual quantity versus actual cost of the actual quantity) is merely the Materials Price Variance, and will be accounted for as such:

<b>Materials Inventory (6,000 x \$.50)</b>	<b>3,000</b>
<b>Materials Price Variance (6,000 x \$.10)</b>	<b>600</b>
<b>Accounts Payable (6,000 x \$.60)</b>	<b>3,600</b>

*To record purchase of materials*

- a. Note that a debit balance in this or any other variance account represents an unfavorable difference between standard cost and actual cost. Therefore, **debit balances in variance accounts represent unfavorable variances.**
  - b. A credit balance in this or any other variance account would represent a favorable difference between standard cost and actual cost. Therefore, **credit balances in variance accounts represent favorable variances.**
2. **Materials Usage.** When allocated to a production process, the Materials Inventory account is credited and the Work-in-Process Inventory account is debited. Under a standard cost system the debit to Work-in-Process must be for the standard quantity of materials at standard cost. The credit to Materials Inventory must be for the actual quantity of materials used at standard cost. Note that the difference between the debit and the credit is equal to the Materials Quantity Variance (i.e., standard cost of standard quantity versus standard cost of quantity actually used):

<b>Work-in-Process (6,400 lbs x \$.50)</b>	<b>3,200</b>
<b>Materials Quantity Variance (400 lbs x \$.50)</b>	<b>200</b>
<b>Materials Inventory (6,000 lbs x \$.50)</b>	<b>3,000</b>

*To record materials usage.*

3. **Direct Labor Costs.** Direct labor costs are recorded by debiting Work-in-Process and crediting Wages Payable or Cash. In a standard cost system, the debit to Work-in-Process must be for the standard number of direct labor hours at the standard rate. The credit to Wages Payable must be for the actual hours at the actual rate. The difference is equal to the total direct labor variance, which is broken down into a direct labor time variance and a direct labor rate variance and recorded.

<b>Work-in-Process (4,000 hours @ \$10/hr)</b>	<b>40,000</b>
<b>Direct Labor Time Variance (500 hrs x \$10)</b>	<b>5,000</b>
<b>Direct Labor Rate Variance (\$1/hr x 4,500 hrs)</b>	<b>4,500</b>
<b>Wages Payable (4,500 hours @ \$9/hr)</b>	<b>40,500</b>
<i>To record payroll</i>	

4. Since all production is carried through the accounts at standard cost, the company may account for completed production and sales using the standard cost. If Control Corporation completes the 4,000 units and then sells them all for \$90,000, the Finished Goods inventory account and then Cost of Goods Sold would simply be debited for \$59,200 (4,000 units x \$14.80 standard cost per unit).

<b>Finished Goods Inventory (4,000 x \$14.80)</b>	<b>59,200</b>
<b>Work-in-Process</b>	<b>59,200</b>
<i>To record the completion of 1,000 units</i>	

<b>Accounts Receivable</b>	<b>90,000</b>
<b>Sales</b>	<b>90,000</b>
<i>To record the revenue from the sale of the 1,000 units</i>	

<b>Cost of Goods Sold (4,000 x \$14.80)</b>	<b>59,200</b>
<b>Finished Goods Inventory</b>	<b>59,200</b>
<i>To record the cost of the 1,000 units</i>	

5. **Applied Overhead Cost.** As production activities are recorded during the period in standard cost systems, overhead costs are *applied* to production using the *predetermined overhead application rate*. This is nothing new, since we did exactly this in accounting for production under job-order and process accounting systems. If Control Corporation originally set a production goal of 5,000 units for the period, the company would use a predetermined overhead application rate of \$4 per standard direct labor hour to apply the overhead. This rate was discussed earlier in the module, and the supporting calculations are repeated below for the sake of convenience. Recall that the \$4 per standard direct labor hour rate will not be the “correct” application rate to use, since the company is not operating at its expected level of activity (80% of capacity and 5,000 units of production).



Control Corporation Overhead Budget and Application Rates	Possible Operating Levels		
	70%	80%	90%
Percent of Capacity			
Production (in units)	4,000	5,000	6,000
Budgeted Direct Labor Hours	4,000	5,000	6,000
Budgeted Variable Overhead	\$4,000	\$5,000	\$6,000
Budgeted Fixed Overhead	<u>\$15,000</u>	<u>\$15,000</u>	<u>\$15,000</u>
Total Budgeted Overhead	\$19,000	\$20,000	\$21,000
Overhead Application Rates (per DL hour):			
Variable Overhead	\$1.00	\$1.00	\$1.00
Fixed Overhead	<u>\$3.75</u>	<u>\$3.00</u>	<u>\$2.50</u>
Total Overhead	\$4.75	\$4.00	\$3.50

6. Given actual production of only 4,000 units with 4,000 standard direct labor hours, Control Corporation will apply \$16,000 (4,000 standard hours x \$4/hr) of overhead to production, debiting the Work-in-Process account. Since many of the actual overhead costs will not be recorded until the end of the period, no attempt is made to credit accounts like Accumulated Depreciation, Prepaid Insurance, Taxes Payable and so on at this time. Instead, the credit is "stored" in the Factory Overhead account, just as we did previously in process and job-order cost accounting.

<b>Work-in-Process (4,000 standard hrs x \$4/hr)</b>	<b>16,000</b>
<b>Factory Overhead</b>	<b>16,000</b>
<i>To apply overhead to production</i>	

7. **Recording Actual Overhead Costs.** As transactions involving overhead are recorded during the period and when adjusting entries are made at the end of the period, the actual overhead costs are debited to the Factory Overhead account. For Control Corporation these costs totaled \$20,600 (\$4,600 of variable overhead costs + \$16,000 in fixed overhead).

<b>Factory Overhead</b>	<b>20,600</b>
<b>Accumulated Depreciation, Cash, etc.</b>	<b>20,600</b>
<i>To record actual overhead costs incurred</i>	

8. **End of Period Entries – Recording Overhead Variances.** At the end of the period the balance remaining in the Factory Overhead account represents the difference between the overhead *applied* to production

and the *actual* overhead costs incurred. In standard cost systems, this difference represents an overall overhead variance that must be accounted for. For Control Corporation, it totals \$4,600:

Factory Overhead	
<i>Debited for actual OH costs:</i>	<i>Credited for Applied OH Costs:</i>
\$20,600	\$16,000
Overall Overhead Variance =	Balance \$ 4,600

- a. **Important.** This overall variance is not the same thing as the total overhead controllable variance discussed previously (which is equal to the difference between the \$19,000 of overhead that was *budgeted* and the \$20,600 of overhead actually incurred). And it is not the same thing as the \$3,000 overhead volume variance (which is equal to the difference between the \$19,000 of overhead budgeted and the \$16,000 of overhead that was *applied*).
- b. Now we are dealing with the \$16,000 overhead that was *applied* to production compared to the \$20,600 of actual overhead costs incurred. *The \$4,600 difference is equal to both the controllable variance and the volume variance combined!*

	Overhead Applied to 4,000 units	Flexible Budget for 4,000 units	Actual Results at 4,000 units
Factory Overhead Applied:			
Variable (4,000 DL hours x \$1)	\$ 4,000	\$ 4,000	\$ 4,600
Fixed (4,000 DL hours x \$3)	<u>12,000</u>	<u>15,000</u>	<u>16,000</u>
Total (4,000 DL hours x \$4)	\$16,000	\$19,000	\$20,600
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <span style="font-size: 2em;">}</span> Volume Variance                 </div> <div style="text-align: center;"> <span style="font-size: 2em;">}</span> Controllable Variance                 </div> </div> <div style="text-align: center; margin-top: 5px;"> <span style="font-size: 2em;">}</span> Balance in FOH = \$4,600 debit                 </div>			

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- 9. **Journal Entries to Record Overhead Variances.** Now that the end of the period has been reached, the Work-in-Process, Finished Goods, and Cost of Goods Sold accounts are all valued at standard cost; the variance accounts hold balances equal to the difference between standard and actual cost; and the Factory Overhead account has a balance equal to the overall overhead

variance (the controllable and the volume variances, combined).

- a. The first step in recording the overhead variances involves correcting the ending balance in Factory Overhead for the under-applied overhead. In the process we will record the volume variance in the accounts. Since the company did not reach its expected level of activity, the volume variance is unfavorable. This means that Overhead Volume Variance needs to be debited (unfavorable variances are recorded with debits), and Factory Overhead needs to be credited.

<b>Overhead Volume Variance</b>	<b>3,000</b>
<b>Factory Overhead</b>	<b>3,000</b>

*To adjust Factory Overhead and to record the Volume Variance.*

*Is the volume variance favorable or unfavorable? The volume variance is unfavorable if overhead is under-applied. It is favorable if overhead is over-applied. Under-application occurs when planned production levels are not reached, over-application happens when they are exceeded. Therefore, we can always fall back on the quick trick memory helper:*

***Unfavorable production = unfavorable volume variance;  
Favorable production = favorable volume variance.***

*To really understand why this is so, consider the following. If overhead is under-applied, a credit must be made to Factory Overhead, which means that a debit must be made to the Volume Variance account. Therefore, the volume variance that has been recorded is "unfavorable" since the account has a debit balance. Had overhead been over-applied, a credit balance would result from the entry, and a favorable volume variance would be reported. The volume variance occurs because of error in the application of the overhead, not because costs ran over budget or came in below budget. The terms "favorable" and "unfavorable" are really misleading and inappropriate, but they are still used.*

Factory Overhead		
	<i>Debited for actual OH costs:</i>	<i>Credited for Applied OH Costs:</i>
	\$20,600	\$16,000
Overall Overhead Variance =	Balance \$ 4,600	
		Adj. 3,000 = OH Volume Variance
Controllable OH Variance =	Balance \$ 1,600	

- b. The “T” account above shows the effect of the journal entry just made. The balance in the Factory Overhead account now represents the difference between the actual overhead cost incurred and the amount originally budgeted on the flexible budget. *This is the unfavorable overhead controllable variance.* Therefore, we may now remove the remaining balance in Factory Overhead and record an unfavorable controllable variance:

<b>Overhead Controllable Variance</b>	<b>1,600</b>
<b>Factory Overhead</b>	<b>1,600</b>

*To close Factory Overhead and record the OH Controllable Variance.*

The variance accounts and their balances are now as shown below:

Materials Price Variance	OH Controllable Variance
600	1,600
Materials Quantity Variance	OH Volume Variance
200	3,000
Labor Rate Variance	Cost of Goods Sold
4,500	59,200
Labor Time Variance	
5,000	

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- F. **End of Period Entries – Closings.** Once the overhead variances have been measured and recorded, the variance accounts are closed. Since unfavorable variances (debit balances) represent costs that were incurred but not charged to production, and since favorable variances (credit balances) represent costs that were charged to production but were not incurred, the variance accounts are closed into the production account(s) that were either over- or under-charged during the period. These accounts are the *Materials, Work-in-Process, Finished Goods* and *Cost of Goods Sold* accounts. However, if the amount is not material, the variances are usually closed directly into the Cost of Goods Sold account. (This is exactly what we did with under- and over-applied overhead in our discussion of job-order accounting systems).

<i>Cost of Goods Sold</i>	<i>5,500</i>	
<i>Direct Labor Rate Variance</i>	<i>4,500</i>	
<i>Materials Quantity Variance</i>	<i>200</i>	
<i>Overhead Volume Variance</i>		<i>3,000</i>
<i>Overhead Controllable Variance</i>		<i>1,600</i>
<i>Direct Labor time Variance</i>		<i>5,000</i>
<i>Materials Price Variance</i>		<i>600</i>
<i>To close the variance accounts to COGS</i>		

Note that after making this entry the balance in COGS is \$64,700 (\$59,200 + 5,500), and this amount agrees with the actual production costs that were actually incurred during the period. We have now corrected for the difference between the standard production costs that were recorded during the period and the actual costs incurred. During the period, the differences between actual and standard cost (the variances) have been “parked” in the variance accounts.

**V. Balanced Scorecards and Nonfinancial Standards** are used by many companies to maintain control over operations.

A. These tools are similar to the standard cost performance reports discussed previously, except that the “standards” that are set revolve around customer satisfaction goals instead of cost containment objectives.

B. The performance measures (i.e., the standards) that are set on the balanced scorecard must be easy for managers to understand and must be in conformance with the company’s *strategy* (the *way* the company has decided it should operate in order to achieve its goals).

1. For example, a movie theater may have decided that the strategy it will employ to meet its goal of satisfying the customer and generating many ticket sales is to make going to the theater as convenient and “painless” as renting a video DVD. Therefore, it may set as one performance measure the time spent waiting in line to buy a ticket. Another may be the time spent waiting at the counter to buy snacks and drinks.

2. Once these performance measures have been established, standards can be set for them (with the involvement of the theater manager, the ticket takers, and the snack counter clerks). A stopwatch can be used to measure actual performance and a performance report can be prepared.

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## Module 6 Supplement

### Comprehensive Standard Cost Review Problem

Standards Corporation utilizes a standard cost accounting system. The company's standard cost per container for its Butter Beaters Margarine product line is as follows:

*Standard Quantities and Costs:*

Direct materials cost per unit (1 pound @ \$.20/lb.)	\$ 0.20
Direct labor cost per unit (.2 direct labor hours @ \$9/hr.)	\$1.80
Variable overhead cost per unit (.2 direct labor hours @ \$2/hr)	\$ 0.40
Fixed overhead cost per unit (.2 direct labor hour @ \$1.40/hr)	<u>\$ 0.28</u>
Standard manufacturing cost per unit of production	\$2.68

The variable and fixed overhead is applied on the basis of direct labor hours. The fixed overhead application rate of \$1.40 per direct labor hour is based on the assumption that the company will operate at 80% of capacity and produce 60,000 units during the period.

	Possible Operating Levels		
	70%	80%	90%
Percent of Capacity			
Production (in units)	50,000	60,000	70,000
Budgeted Direct Labor Hours	10,000	12,000	14,000
 Budgeted Variable Overhead	 \$20,000	 \$24,000	 \$28,000
Budgeted Fixed Overhead	<u>\$16,800</u>	<u>\$16,800</u>	<u>\$16,800</u>
Total Budgeted Overhead	\$36,800	\$40,800	\$44,800
Overhead Application Rates (per DL hour):			
Variable Overhead	\$2.00	\$2.00	\$2.00
Fixed Overhead	<u>\$1.68</u>	<u>\$1.40</u>	<u>\$1.20</u>
Total Overhead	\$3.68	\$3.40	\$3.20

During the period, Standards Corporation actually operated at 90% of capacity, producing 70,000 pounds of Butter Beaters. Actual costs incurred were as follows:

Actual data for the period:	
Units actually produced	70,000
Direct materials purchases (71,000 lbs @ \$0.19)	\$13,490
Direct materials usage	71,000 lbs
Direct labor cost (13,800 hours @ \$9.10/hr)	\$125,580
Total actual factory overhead cost:	\$43,800

Required: (1) Record the purchase of the materials, their allocation to manufacturing, the labor wage payment, the incurrence of actual overhead costs (all cash), and the application of overhead to production. (2) Record the sale of 50,000 units of production at a sales price of \$5 per unit. (3) Eliminate any balance remaining in the Factory Overhead account, recording the overhead variances. (4) Close the variance accounts to Cost of Goods Sold.

***Solution to Review Problem***

*Requirement (1).*

***Materials Purchases:***

Materials Inventory (71,000 x \$.20)	14,200	
Materials Price Variance (71,000 x \$.01)		710
Accounts Payable (71,000 x \$.19)		13,490
<i>To record purchase of materials</i>		

***Materials Usage.***

Work-in-Process (70,000 lbs x \$.20)	14,000	
Materials Quantity Variance (1,000 lbs x \$.20)	200	
Materials Inventory (71,000 lbs x \$.20)		14,200
<i>To record materials usage.</i>		

***Direct Labor Costs.***

Work-in-Process (14,000 hours @ \$9/hr)	126,000	
Direct Labor Rate Variance (\$ .10/hr x 13,800 hrs)	1,380	
Direct Labor Time Variance (200 hrs x \$9)		1,800
Cash (13,800 hours @ \$9.10/hr)		125,580
<i>To record payroll</i>		

***Application of Overhead Cost.***

Work-in-Process (14,000 standard hrs x \$3.40/hr)	47,600	
Factory Overhead		47,600
<i>To apply overhead to production</i>		

***Recording Actual Overhead Costs.***

Factory Overhead	43,800	
Cash		43,800
<i>To record actual overhead costs incurred</i>		

Requirement (2).

**Completion of Production and Sale.**

Finished Goods Inventory (70,000 x \$2.68)	187,600
Work-in-Process	187,600
<i>To record the completion of 70,000 units</i>	

Accounts Receivable (50,000 x \$5)	250,000
Sales	250,000
Cost of Goods Sold (50,000 x \$2.68)	134,000
Finished Goods Inventory	134,000
<i>To record the sale of 50,000 units</i>	

Requirement (3).

**End of Period Entries – Recording Overhead Variances.** The Factory Overhead account appears as follows:

Factory Overhead	
<i>Debited for actual OH costs:</i>	<i>Credited for Applied OH Costs:</i>
\$43,800	\$47,600
	\$ 3,800 Balance = Total Overhead Variance

Factory Overhead	2,800
Overhead Volume Variance (44,800 vs. 47,600)	2,800
<i>To adjust Factory Overhead for under-applied overhead and to record the Volume Variance.</i>	
<i>Calculations: \$44,800 budgeted versus \$47,600 applied = \$2,800.</i>	

The Factory Overhead account now appears as below. Note that after the misapplied overhead is removed from the account (when the Volume Variance is recorded) only the difference between the overhead budgeted and the overhead that was actually incurred is left in the account.



Factory Overhead		
<i>Debited for actual OH costs:</i>	<i>Credited for Applied OH Costs:</i>	
\$43,800	\$47,600	
	\$ 3,800 Balance	= Total Overhead Variance
OH Volume Variance =	Adj. \$ 2,800	
	\$ 1,000 Balance	= Controllable OH Variance

Factory Overhead  
 1,000  
 Overhead Controllable variance  
 1,000  
*To close Factory Overhead and record the OH Controllable  
 Variance*

*Requirement (4).*

***End of Period Entries – Closings.***

Overhead Volume Variance	2,800	
Overhead Controllable Variance	1,000	
Direct Labor Time Variance	1,800	
Materials Price Variance	710	
Cost of Goods Sold		4,730
Direct Labor Rate Variance		1,380
Materials Quantity Variance		200
<i>To close the variance accounts to COGS</i>		

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