Chapter 10

Lecture Notes

Chapter theme: This chapter extends our study of **management control** by explaining how **standard costs** are used by managers to control costs. It demonstrates how to compute direct materials, direct labor, and variable overhead variances.

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1. **Standard costs – setting the stage**
   1. **Basic definitions/concepts**
      * 1. A **standard** is a benchmark or “norm” for measuring performance. In managerial accounting, **two types of standards** are commonly used by manufacturing, service, food, and not-for-profit organizations:
           1. **Quantity standards** specify how much of an input should be used to make a product or provide a service. For example:

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1. Auto service centers like **Firestone** and **Sears** set labor time standards for the completion of work tasks.
2. Fast-food outlets such as **McDonald’s** have exacting standards for the quantity of meat going into a sandwich.
   * + - 1. **Price standards** specify how much should be paid for each unit of the input. For example:
3. **Hospitals** have standard costs for food, laundry, and other items.
4. Home **construction companies** have standard labor costs that they apply to sub-contractors such as framers, roofers, and electricians.
5. **Manufacturing companies** often have highly developed standard costing systems that establish quantity and price standards for each separate product’s material, labor, and overhead inputs. These standards are listed on a **standard cost card**.

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* + - 1. **Management by exception** is a system of management in which standards are set for various operating activities, with **actual results compared to these standards**. Any deviations that are deemed significant are brought to the attention of management as “exceptions.”

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* + - * 1. This chapter applies the management by exception principle to **quantity** and **price** standards with an emphasis on manufacturing applications.
      1. The **variance analysis cycle** is a continuous process used to identify and solve problems:
         1. The cycle begins with the **preparation of standard cost performance reports** in the accounting department.

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* + - * 1. These reports **highlight** **variances** which are differences between actual results and what should have occurred according to the standards.
        2. The variances **raise questions** such as:

1. Why did this variance occur?
2. Why is this variance larger than it was last period?

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* + - * 1. The significant variances are investigated to **discover their** **root causes**.
        2. **Corrective actions are taken.**
        3. Next period’s operations are carried out and the process is repeated.

1. **Setting standard costs**

#### General concepts

1. Standards should be designed to encourage **efficient future operations**, not just a repetition of past inefficient operations.
2. Standards tend to fall into one of **two categories**:
   * + 1. **Ideal standards** can only be attained under the best of circumstances. They allow for no work interruptions and they require employees to work at **100% peak efficiency** all of the time.

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* + - 1. **Practical standards** are tight but attainable. They allow for normal machine downtime and employee rest periods and can be attained through reasonable, highly efficient efforts by the average worker.

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* + - * 1. Practical standards can also be used for forecasting cash flows and in planning inventory.

#### Setting direct materials standards

1. The **standard price per unit** for direct materials should reflect the final, delivered cost of the materials.

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1. The **standard quantity per unit** for direct materials should reflect the amount of material required for each unit of finished product, as well as an allowance for unavoidable waste, spoilage, and other normal inefficiencies.

#### Setting direct labor standards

1. The **standard rate per hour** for direct labor includes not only wages earned but also fringe benefits and other labor costs.
2. Many companies prepare a **single rate** for all employees within a department that reflects the “mix” of wage rates earned.

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1. The **standard hours per unit** reflects the labor hours required to complete one unit of product.
2. Standards can be determined by using available **references** that estimate the time needed to perform a given task, or by relying on **time and motion studies**.

#### Setting variable manufacturing overhead standards

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1. The **price standard** for variable manufacturing overhead comes from the **variable portion of the predetermined overhead rate**.
2. The **quantity standard** for variable manufacturing overhead is expressed in either direct labor hours or machine hours depending on which is used as the **allocation** **base** in the predetermined overhead rate.

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#### The standard cost card

1. The standard cost card is a detailed listing of the standard amounts of **direct materials, direct labor, and variable overhead** inputs that should go into a unit of product, multiplied by the standard price or rate that has been set for each input.

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1. **Using standards in flexible budgets**

#### Activity and spending variances

i. Standard costs per unit for direct materials, direct labor, and variable manufacturing overhead can be used to compute **activity** and **spending** variances as described in the previous chapter.

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B. Q**uantity** **and price** **variances**

ii. Spending variances become more useful by breaking them down into **price** and **quantity** variances. This is our focus in this chapter.

1. **A general model for standard cost variance analysis**

#### Quantity and price variances

#### A quantity variance is the difference between how much of an input was actually used and how much should have been used and is stated in dollar terms using the standard price of the input.

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ii. A **price variance** is the difference between the actual price of an input and its standard price, multiplied by the actual amount of the input purchased.

#### Quantity and price standards

#### Price and quantity standards are determined separately because quantity and price variances usually have different causes. In addition:

1. **Different managers are usually responsible for buying and for using inputs**. For example:

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1. The purchasing manager is responsible for raw material purchase prices and the production manager is responsible for the quantity of raw material used.
2. **The buying and using activities occur at different points in time**. For example:
3. Raw material purchases may be held in inventory for a period of time before being used in production.

C. The **general model—an overview**

1. Quantity and price variances can be computed for all three variable cost elements – **direct materials, direct labor, and variable manufacturing overhead** – even though the variances have different names as shown.

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1. Although quantity and price variances are known by different names, they are computed **exactly the same way** (as shown on this slide) for direct materials, direct labor, and variable manufacturing overhead.

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* + - 1. The **actual** **quantity** represents the actual amount of direct materials, direct labor, and variable manufacturing overhead used.

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*Helpful Hint: Emphasize that the quantities in this model pertain to inputs not outputs. So, in the case of direct materials, the quantities will be stated in terms such as pounds, ounces, etc., not the number of units of finished goods produced.*

1. The **standard quantity** represents the **standard quantity allowed** for the actual output of the period.

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*Helpful Hint: Mention that the “SQ” portion of the model is the most common stumbling block for students when it comes to variance analysis. Emphasize that “SQ” refers to the standard quantity of inputs allowed for the* ***actual*** *level of output achieved. For example, if 5,000 drapes were produced and each requires 2 yards of fabric, the standard quantity allowed would be 10,000 yards. Any other amount of fabric used would result in a variance.*

1. The **actual price** represents the actual amount paid for the input used.

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1. The **standard price** represents the amount that should have been paid for the input used.

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1. **Using standard costs—direct materials variances**

*Learning Objective 1: Compute the direct materials quantity and price variances and explain their significance.*

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#### Glacier Peak Outfitters – an example

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1. The **materials quantity variance**, defined as the difference between the quantity of materials used in production and the quantity that should have been used according to the standard, is **$50 unfavorable**.
   * + 1. The quantity variance is labeled **unfavorable** because the actual quantity exceeds the standard quantity allowed by **10 kilograms**.

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1. The **materials price variance**, defined as the difference between what is paid for a quantity of materials and what should have been paid according to the standard, is **$21 favorable**.
   * + 1. The price variance is labeled favorable because the actual price was less than the standard price by **$0.10 per kilogram**.

*Helpful Hint: Remind students that a favorable price variance might not always be a good thing. If it arose from receiving inferior or obsolete goods at a reduced price, the total costs of making the company’s products might be higher.*

1. **Supporting/additional computations**
2. The standard quantity of **200 kilograms** was computed as shown.

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1. The actual price of **$4.90 per kilogram** was computed as shown.

23

1. The equations that we have been using thus far can be **factored** as shown and used to compute quantity and price variances.

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#### Direct materials variances—points of clarification:

1. The **purchasing manager** and **production manager** are usually held responsible for the materials price variance, and materials quantity variance, respectively.

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The **standard price** is used to compute the quantity variance so that the production manager is not held responsible for the performance of the purchasing manager.

1. The materials variances are not always entirely **controllable** by one person or department. For example:

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* + - 1. The production manager may schedule production in such a way that it requires **express delivery** of raw materials resulting in an unfavorable materials price variance.

The purchasing manager may purchase **lower quality raw materials** resulting in an unfavorable materials quantity variance for the production manager.

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*Quick Check – direct materials variance calculations*

27-35

1. **Using standard costs—direct labor variances**

*Learning Objective 2: Compute the direct labor efficiency and rate variances and explain their significance.*

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#### Glacier Peak Outfitters – continued (assume the information as shown)

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1. The **labor efficiency variance**, defined as the difference between the actual quantity of labor hours and the quantity allowed according to the standard, is **$1,000 unfavorable**.
   * + 1. The efficiency variance is labeled **unfavorable** because the actual quantity of hours exceeds the standard quantity allowed by **100 hours**.

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#### The labor rate variance, defined as the difference between the actual average hourly wage paid and the standard hourly wage, is $1,250 unfavorable.

1. The rate variance is labeled **unfavorable** because the actual average wage rate was more than the standard wage rate by **$0.50 per hour**.

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1. **Supporting/additional computations**
2. The standard quantity of **2,400 hours** was computed as shown.

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1. The actual price (or rate) of **$10.50 per hour** was computed as shown.

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1. **Factored equations** can also be used to compute the efficiency and rate variances.

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#### Direct labor variances—points of clarification:

* 1. Labor variances are **partially controllable** by employees within the Production Department. For example, production managers/supervisors can influence:

1. The deployment of highly skilled workers and less skilled workers on tasks consistent with their skill levels.

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1. The level of employee motivation within the department.
2. The quality of production supervision.
3. The quality of the training provided to the employees.
4. However, labor variances are not entirely **controllable** by one person or department. For example:

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1. The Maintenance Department may do a **poor job of maintaining production equipment**. This may increase the processing time required per unit, thereby causing an unfavorable labor efficiency variance.
2. The purchasing manager may purchase **lower quality raw materials** resulting in an unfavorable labor efficiency variance for the production manager.

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44-49

*Quick Check – direct labor variance calculations*

1. **Using standard costs—variable manufacturing overhead variances**

*Learning Objective 3: Compute the variable manufacturing overhead efficiency and rate variances and explain their significance.*

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#### Glacier Peak Outfitters – continued

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1. The **variable overhead efficiency variance**, defined as the difference between the actual activity of a period and the standard activity allowed, multiplied by the variable part of the predetermined overhead rate, is **$400 unfavorable**.
   * 1. The efficiency variance is labeled **unfavorable** because the actual quantity of the activity (hours) exceeds the standard quantity of the activity allowed by **100 hours**.

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1. The **variable overhead rate variance**, defined as the difference between the actual variable overhead costs incurred during the period and the standard cost that should have been incurred based on the actual activity of the period, is **$500 unfavorable**.
2. The rate variance is labeled **unfavorable** because the actual variable overhead rate was more than the standard variable overhead rate by **$0.20 per hour**.

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1. **Supporting/additional computations**
2. The standard quantity of **2,400 hours** was computed as shown.

53

1. The actual price of **$4.20 per hour** was computed as shown.

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1. **Factored equations** can be used to compute the efficiency and rate variances.

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56-61

*Quick Check – variable overhead variance calculations*

1. **Materials variances—an important subtlety**

#### When the quantity of materials purchased differs from the quantity used in production, the quantity variance is based on the quantity used in production and the price variance is based on the quantity purchased.

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B. **Glacier Peak Outfitters—revisited**

i. The **materials quantity variance** is computed using the actual quantity used in production (**200** **kgs**.); therefore, the materials quantity variance is **$0**.

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ii. The **materials price variance** is computed using the actual quantity purchased (**210 kgs**.); therefore, the materials price variance is **$21 favorable**.

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1. **Variance analysis and management by exception**

#### All variances are not worth investigating. Methods for highlighting a subset of variances as exceptions include:

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#### Looking at the size of the variance.

1. Looking at the size of the variance **relative to** the amount of spending.
2. Plotting variance analysis data on a **statistical control chart**. Variances are investigated if:

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1. They are **unusual** relative to the normal level of random fluctuation.
2. An unusual **pattern** emerges in the data.
3. **Evaluation of controls based on standard costs**

#### Research has shown that a substantial portion of companies in the United Kingdom, Canada, Japan, and the United States use standard cost systems. This is because standard cost systems offer many advantages including:

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#### Standard costs are a key element of the management by exception approach which helps managers focus their attention on the most important issues.

1. Standards that are viewed as reasonable by employees can serve as **benchmarks** that promote economy and efficiency.

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1. Standard costs can greatly **simplify bookkeeping**.
2. Standard cost**s fit naturally into a responsibility accounting system.**

#### The use of standard costs can also present a number of problems. For example:

#### Standard cost variance reports are usually prepared on a monthly basis; hence, they may contain information that is outdated.

1. If variances are **misused** as a club to negatively reinforce employees, **morale may suffer** and employees may make **dysfunctional decisions**.
2. Labor variances make **two important assumptions**. First, they assume that production is labor-paced; if labor works faster, output will go up. Second, they assume that labor is a variable cost. These assumptions are often invalid in today’s automated manufacturing environment where employees are essentially a fixed cost.

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1. In some cases, **a “favorable” variance can be as bad** **as or worse than an “unfavorable” variance**.
2. **Excessive emphasis** **on meeting the standards** may overshadow other important objectives such as maintaining and improving quality, on-time delivery, and customer satisfaction.
3. Just meeting standards may not be sufficient; **continual improvement** using techniques such as Six Sigma may be necessary to survive in a competitive environment.

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1. **Appendix 10A: predetermined overhead rates and overhead analysis in a standard costing system (Slide #70 is the title slide)**

*Learning Objective 4: Compute and interpret the fixed overhead volume and budget variances.*

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#### Fixed manufacturing overhead variances

1. **Volume variance**
2. The equation for computing the volume variance is shown on this slide. It is the difference between the budgeted fixed overhead and the fixed overhead applied to work in process.

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1. The volume variance can also be computed as shown on this slide. The equation on the prior slide and this equation result in identical answers.

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1. Both variance computations will be demonstrated in the forthcoming example.
2. **Budget variance**
   * + 1. The equation for computing the budget variance is shown on this slide. It is simply the **difference** between the **actual fixed manufacturing overhead** and the **budgeted fixed manufacturing overhead** for the period.

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#### ColaCo: computing fixed overhead variances

1. The background data needed for this example are shown in these two slides.

75-76

1. **Predetermined overhead rates**
   * + 1. The predetermined overhead rate (**$4.00**) is computed as shown on this slide.

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* + - 1. This rate can be broken down into a variable component (**$1.00**) and a fixed component (**$3.00**).

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* + - * 1. The **fixed component** of the predetermined overhead rate will be used to compute the **volume variance**.
      1. The total overhead applied to work in process (**$336,000**) is computed as shown on this slide.
         1. Notice, the **standard hours allowed for the actual level** **of output** is used to apply overhead to work in process.
         2. In the job-order costing chapter, we used the **actual level of activity** to apply overhead costs to work in process.

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* + - * 1. The different approach arises because we are using a **standard cost system** in this chapter and the job-order costing chapter uses a **normal costing system**.

1. **Computing the volume variance**
   * + 1. The volume variance of **$18,000 U** is computed as shown.
          1. The fixed overhead applied to work in process (**$252,000**) is computed by multiplying the fixed component of the predetermined overhead rate (**$3.00**) by the standard machine hours allowed for the actual output (**84,000 hours**).

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* + - 1. The volume variance of $18,000 U can also be computed using the equation shown on this slide.
         1. Because the standard hours allowed is **less than** the denominator volume, it presumably signals inefficient usage of facilities. Therefore, the variance is labeled as unfavorable.

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1. **Computing the budget variance**
   * + 1. The budget variance of **$10,000 U** is computed as shown. It is simply the difference between the actual fixed overhead (**$280,000**) and the budgeted fixed overhead (**$270,000**).

82

* + - * 1. The variance is labeled as Unfavorable because the company actually incurred more cost than the budget projected.

1. **A pictorial view of the variances**

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* + - 1. This slide offers a pictorial view of the computation of the fixed overhead volume and budget variances.

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#### ColaCo: a graphic analysis of the variances

1. The vertical axis is used to graph **fixed overhead cost**.

The first cost that ColaCo would plot on this axis is **$270,000** of budgeted fixed overhead.

1. The horizontal axis is used to graph **the volume of activity**.
2. The first activity level that ColaCo would plot is its denominator activity level of **90,000 machine hours**.

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1. The linear manner in which fixed overhead is **applied** to products is depicted by drawing a straight line from the origin to the intersection of the budgeted fixed overhead (**$270,000**) and the denominator activity (**90,000 machine hours**).
2. The slope of this line indicates that fixed overhead is applied at a rate of **$3 per machine hour**.
3. Next, plot the actual amount of fixed overhead costs on the vertical axis (**$280,000**).

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1. The difference between the budgeted amount of fixed overhead and the actual amount (**$10,000**) is the **budget variance**.
2. Finally, identify the **standard** **hours** allowed for the actual level of output (**84,000 hours**). Draw a vertical line from this activity level until it intersects the sloped line that depicts the fixed overhead applied to products. From this point, draw a horizontal line that intersects the vertical axis. This dollar amount (**$252,000**) represents the fixed overhead applied.

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1. The difference between the budgeted fixed overhead and the fixed overhead applied (**$18,000**) is the **volume variance**.

#### ColaCo: reconciling overhead variances and underapplied or overapplied overhead

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1. In a standard cost system, the sum of the overhead variances **equals** the underapplied or overapplied overhead cost for the period.
2. This slide shows how ColaCo’s underapplied or overapplied is computed.

89

* + - 1. The manufacturing overhead is **$44,000 underapplied**.

1. Computing the variable overhead variances
   * + 1. ColaCo’s variable overhead efficiency variance (**$4,000 U**) is computed as shown on this slide.

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* + - 1. ColaCo’s variable overhead rate variance (**$12,000 U**) is computed as shown on this slide.

91

1. Computing the sum of all variances.
   * + 1. The sum of the variable and fixed overhead variances (**$44,000 U**) is shown on this slide.

92

* + - 1. Notice, the sum of the variances equals the amount of ColaCo’s underapplied overhead.

1. **Appendix 10B: General Ledger Entries to Record Variances (Slide #93 is the title slide)**

*Learning Objective 5: Prepare journal entries to record standard costs and variances.*

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#### Glacier Peak Outfitters – revisited

1. **Direct materials variances**
2. The entry to record the **purchase of direct materials** would be as shown.

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1. The entry to record the **materials quantity variance** would be as shown.
2. **Direct labor variances**

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1. The journal entry to record the **incurrence of direct labor cost** would be as shown.
2. **Cost flows in a standard cost system**
3. The entries into the various accounts are made at **standard cost – not actual cost**.
4. The differences between actual and standard costs are entered into special accounts that accumulate the various standard cost variances.

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1. The standard cost variance accounts are usually closed out to **Cost of Goods Sold** at the end of the period. Unfavorable variances **increase** Cost of Goods Sold, and favorable variances **decrease** Cost of Goods Sold.