

What are the *direct input* (materials and labor) *total variances and subvariances*, and how are they calculated?

Define the *primary* accounting requirements for *direct material variances* in a standard costing system.

Define the *primary* accounting requirements for *direct labor variances* in a standard costing system.

How are the *total price and quantity variances calculated* when there is more than one material input or more than one class of labor used in the production process?

What are the *mix and yield variances* and how are they calculated?

What is the *total variable overhead variance* and how is it calculated?

Standard costing systems use actual variance accounts to record the variances from the standard costs as they occur:

- 1) Purchases of direct materials are recorded as debits to the Materials Inventory account at their standard cost. If the company recognizes price variances at the time of purchase, any price difference versus standard is recorded in a Direct Materials Purchase Price Variance account. The credit is to Accounts Payable.
- 2) When direct materials are requisitioned from materials inventory for use in the production process, the debit to Work-In-Process Inventory is for the standard quantity of materials that should have been used for manufacturing the units manufactured, at their standard cost. The credit to the Materials Inventory account is for the total amount of materials actually used, at their standard cost. The difference is the direct materials quantity variance, and it is recorded in the Direct Materials Quantity (or Usage) Variance account.

At the end of the period, the variances are closed out to cost of goods sold (COGS) or, if material, prorated among COGS and inventories.

When a company uses more than one material input and/or more than one class of labor input in the production process, the total price and quantity variances are determined by calculating the price and quantity variances for each individual input separately, and then adding them together.

The total variable overhead variance is equal to the difference between the actual variable overhead incurred and the standard variable overhead applied. The standard variable overhead applied is based on the standard usage given the actual output of the overhead allocation base (machine hours, direct labor hours, etc). This is also called the variable overhead flexible budget variance.

$$\begin{aligned} & \text{Actual Total Variable Overhead Incurred} \\ - & \text{Flexible Budget Amount}^1 \\ = & \text{Total Variable Overhead Variance}^2 \end{aligned}$$

<sup>1</sup> This is calculated as (Standard Rate \* Standard Quantity for the Actual Production Level).

<sup>2</sup> Note that this is the same as the amount of over- or underapplied variable overhead.

The total variance for direct materials or direct labor is the difference between the actual direct materials costs for the period and the standard costs for the standard amount of materials at the standard price per unit for the level of output actually produced (the flexible budget).

The total variance is broken down into two subvariances, calculated as follows:

$$\text{Price Variance} = (\text{AP} - \text{SP}) * \text{AQ}$$

$$\text{Quantity Variance} = (\text{AQ} - \text{SQ}) * \text{SP}$$

Where:

AP = Actual Price

SP = Standard Price

AQ = Actual Quantity

SQ = Standard Quantity

The production payroll is recorded by debiting Work-In-Process Inventory for the total number of standard hours for the units manufactured at the standard hourly rate. The credit is to accrued payroll at the total number of hours actually spent and at the actual hourly rate. The difference is recorded in the Direct Labor Rate Variance (the price variance) and the Direct Labor Efficiency Variance (the quantity variance) accounts. Unfavorable variances are debits, and favorable variances are credits.

The variances are closed out at the end of the period, either to Cost of Goods Sold or, if they are material, prorated among Work-In-Process Inventory, Finished Goods Inventory, and Cost of Goods Sold.

When more than one material input and/or more than one class of labor is used in the production process, the quantity variances for materials and labor are broken down into the mix variance and the yield variance.

Mix variance results when the mix of material used was different from the mix that should have been used.

$$\text{Mix Variance} = (\text{WASPAM} - \text{WASPSM}) * \text{AQ}$$

The yield variance results from the difference between the total quantity of the inputs that were actually used to produce the actual output and the standard quantity that should have been used to produce the actual output.

$$\text{Yield Variance} = (\text{AQ} - \text{SQ}) * \text{WASPSM}$$

WASPAM = Weighted Average Standard Price-Actual Mix

WASPSM = Weighted Average Standard Price-Standard Mix

AQ = Actual Quantity

SQ = Standard Quantity

What are the *variable overhead subvariances* and how are they calculated?

What is the *total fixed overhead variance* and how is it calculated?

What are the *fixed overhead subvariances* and how are they calculated?

How are the *two-way, three-way and four-way variance analyses* calculated?

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The total fixed overhead variance analysis is the difference between the actual fixed overhead incurred and the amount that was applied using the standard rate and the standard usage for the actual level of output.

$$\begin{aligned} & \text{Actual Fixed Overhead Incurred} \\ - & \text{Applied Fixed Overheads} \\ = & \text{Total Fixed Overhead Variance}^1 \end{aligned}$$

As with the variable overhead variance, this total fixed overhead variance can be broken down into two other variances: spending (or budget) variance and volume variance.

<sup>1</sup>Note that this amount is the same as the over- or under-applied fixed factory overhead.

Two, three and four-way analysis are the different ways of classifying the four overhead variances.

In four-way analysis, each of the four variances are looked at independently.

In three-way analysis, the variable overhead spending variance and the fixed overhead spending (budget) variance are combined into what is called the Spending Variance.

In Two-way analysis, the variable overhead efficiency variance is added to the Spending Variance (as used in three-way analysis) to create what is called the Controllable Variance. The fixed overhead volume variance remains by itself in two-way analysis.

The variable overhead spending variance (a price variance) is related to the difference between the actual variable overhead cost per unit (this is calculated as the actual overhead costs ÷ the actual usage of the allocation base) and the standard application rate.

$$\text{Variable OH Spending Variance} = (AP - SP^1) * AQ$$

The variable overhead efficiency variance (a quantity variance) is the amount of the total variance caused by a different usage of the allocation base than was expected (for example, the standard hours for the actual output).

$$\text{Variable OH Efficiency Variance} = (AQ - SQ) * SP$$

<sup>1</sup>Note that this is really not a price, but rather a rate. We use the letter P in this formula to keep it the same as in the materials and labor variances since the formulas are essentially the same.

The total fixed overhead variance is broken down into the fixed overhead volume variance and the fixed overhead budget/spending variance.

Fixed overhead spending (budget) variance - the difference between the actual fixed overhead costs and the budgeted fixed overhead amount.

$$\begin{aligned} & \text{Actual Fixed Overhead Incurred} \\ - & \text{Budgeted Fixed Overheads (from the static budget)} \\ = & \text{Fixed Overhead Budget/Spending Variance} \end{aligned}$$

Fixed overhead production volume variance - the difference between the budgeted amount of fixed overhead and the amount of fixed overhead applied (standard rate \* standard input for the actual level of output).

$$\begin{aligned} & \text{Budgeted Fixed Overheads (from the static budget)} \\ - & \text{Applied amount of Fixed Overhead} \\ = & \text{Fixed Overhead Volume Variance} \end{aligned}$$