Chapter 12 (Part II)
Variance Analysis of Factory Overhead (FOH)

- To assign manufacturing overhead costs to cost objects, companies allocate them on the basis of some selected cost drivers or cost-allocation base (BASE).
- Most companies use ***direct labor-hours*** or ***machine-hours*** as an Application BASE. This is particularly true in multi- product firms where hours serve as a common denominator for diverse products.
- In chapter 3 (under **normal costing** system), we assigned factory overhead to cost object based on a predetermined overhead rate by implementing the following approach:

  Step 1: Select the cost allocation base(s),
  Step 2: Estimate the ***budgeted*** FOH and the ***budgeted*** Base,
  Step 3: Compute the predetermined ***Application Rate*** using the following formula:

$$\text{Application R. (FOH)} = \frac{\text{Budgeted Variable FOH}}{\text{Budgeted "BASE"}}$$

  Step 4: Assign FOH to cost objects using the following equation:

$$\text{Applied FOH} = \text{App. R. (FOH)} \times \text{Actual Q. used of the "BASE"}$$

- Under Standard Costing System, we apply the exact same system Except in Step 4 we change second term of the equation from { **Actual Q.** used of the "BASE"} to {**Standard Q**. allowed of "BASE"}

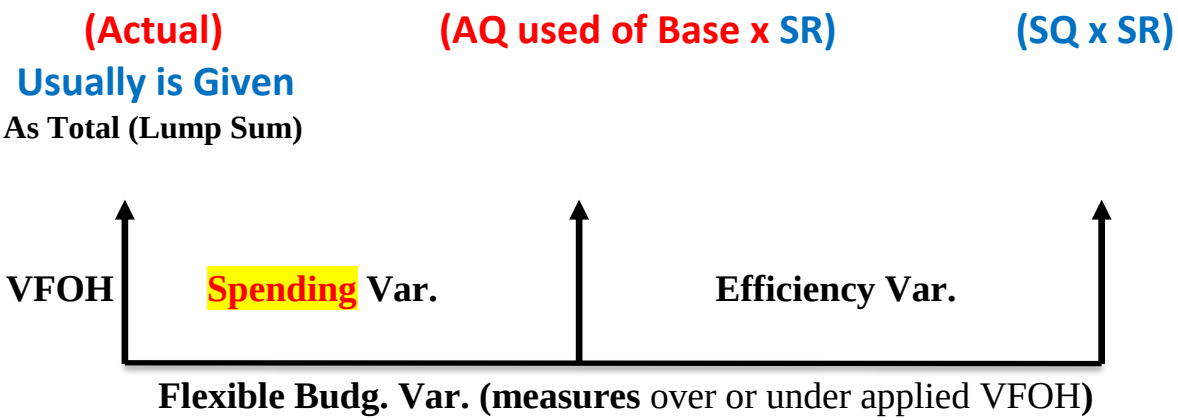
$$\text{Applied FOH} = \text{App. R. (FOH)} \times \text{Standard Q. allowed of the "BASE"}$$

- Under Standard Costing System, we separate variable factory overhead (VFOH) from the fixed factory overhead ((FFOH) and perform separate variance analysis on each. Thus, equations under steps 3 and 4 will be calculated separately for each type of overhead.
- For Variable Factory Overhead (VFOH) we will use the following two equations:

$$\text{Application R. (VFOH)} = \frac{\text{Budgeted VFOH}}{\text{Budgeted BASE}}$$

$$\text{Applied (VFOH)} = \text{App. R. (VFOH)} \times \text{Standard Q. allowed of the "BASE"}$$

VFOH Variance Analysis



Spending Variance:

Spending Variance Results from paying more/less than expected for overhead items and/or from using more/less quantity of input items, compared to the expected for the Actual amount of "BASE" used. For example: higher/lower cost per unit of input (e.g., $'s per kilowatt hour, etc.) or more/less units of input used than expected (e.g., more kilowatts consumed than expected).

Thus, there are two factors affecting the ***spending*** variance for variable manufacturing overhead are:

- Price inflation or deflation of individual items included in variable overhead.
- Usage of individual items included in variable overhead.

Efficiency Variance

It measures the efficiency of the company in using the **base** (i.e., whether the company has used more/less of "BASE" than expected for the actual output achieved). It provides information about the ability of the company to control the overhead cost driver (the base).

Note that the variable overhead efficiency variance is not a measure of how efficiently overhead resources were used. It is a measure of the efficiency with which the base underlying the flexible budget was used.

Example 1:

XYZ Co. has developed the following standards:

Standards:

- Direct Labor = 5 Units Per Hour
- Application Rate of Variable FOH = $2 Per DL hr.

Actual Results:

- Variable FOH = $ 4,820
- Actual DL_hrs = 2,000 Hours
- Actual Output = 12,000 Units

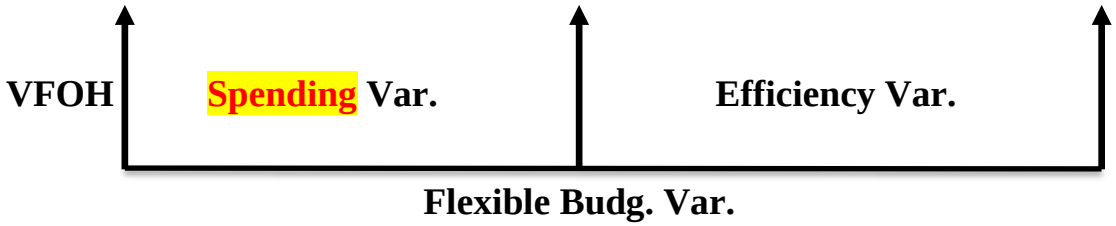
Required:

Calculate VFOH variances

(Actual) **(AQ used of Base x SR)** **(SQ x SR)**

Usually is Given

As Total (Lump Sum)



Example 2:

Hanson, Inc. applies variable factory overhead on the basis of DLHs. Hanson has the following variable factory overhead standard to manufacture one unit of product:

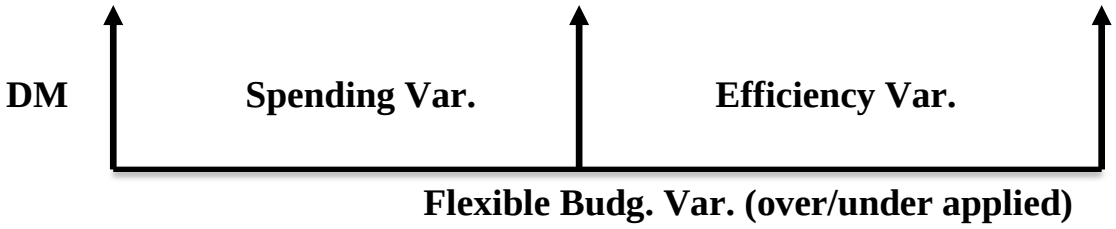
- 1.5 standard DLHs per unit @ a variable overhead rate of $3.00 per DLH
- Last month, 1,550 hours were worked to make 1,000 units, and $5,115 was spent for variable factory overhead

Required:

Calculate VFOH variances

(AQ x AR) **(AQ x SR)** **(SQ x SR)**

Given Lump Sum

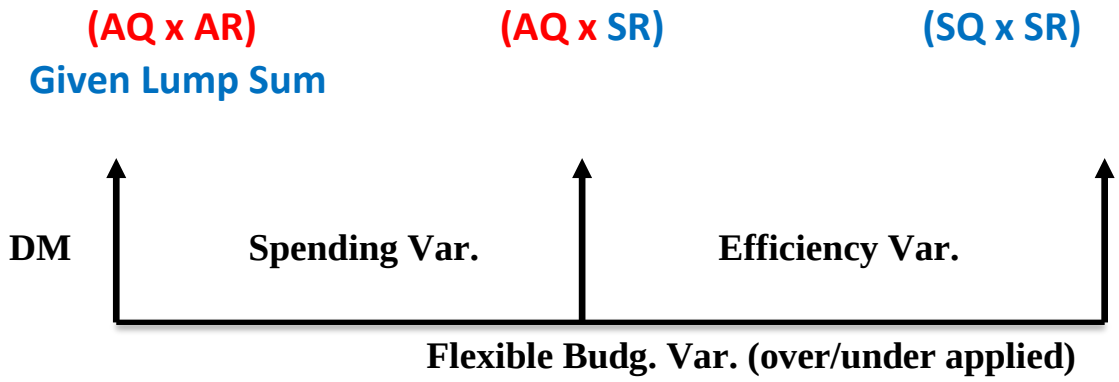


Use the following information to answer the next two questions:

Yoder Enterprises' actual production for the period required 2,100 standard direct labor hours. Actual variable overhead for the period was $10,950. Actual direct labor hours worked were 2,050. The predetermined variable overhead rate is $5 per direct labor hour.

1. What was the spending variance?
   a. $450 U
   b. $450 F
   c. $700 F
   d. $700 U

2. What was the efficiency variance?
   a. $450 U
   b. $450 F
   c. $250 F
   d. $250 U



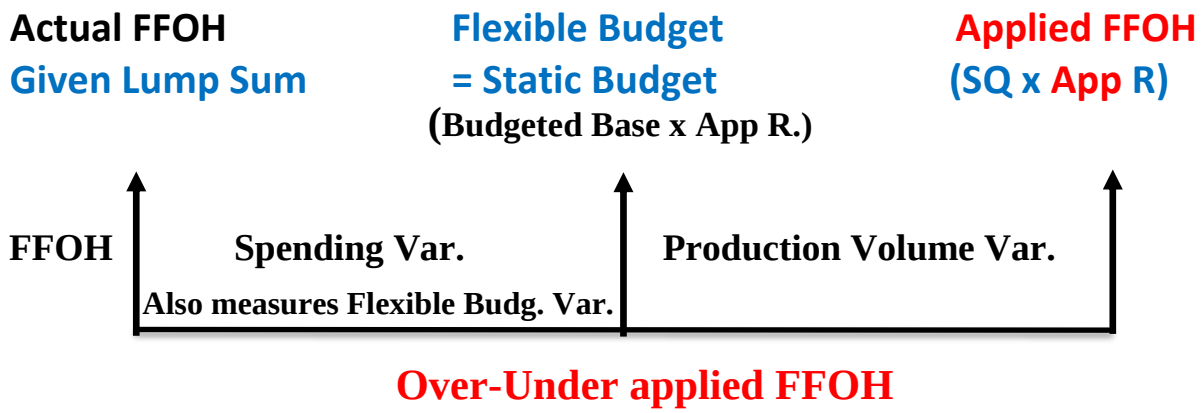
Fixed FOH Variance Analysis

The formula to calculate a predetermined overhead rate for FFOH is:

$$\text{App. R. (FFOH)} = \left(\frac{\textbf{Budgeted Variable FOH}}{\text{Budgeted "BASE"}}\right.$$

The Formula to apply FFOH to production under Standard Costing System:

Applied FFOH = SQ allowed of "BASE" * App. R. (FFOH)



Spending (Budget) Variance:

- A measure of whether the company has Spent More/Less on Fixed FOH than Expected
- Usually caused by changing in fixed costs (e.g., increase in rent, insurance premium, etc.)

Production Volume (Denominator) Variance:

It is a measure of usage of capacity. It measures whether the company has operated at a different level of activity than what it had expected in the budgeted base level.

If SQ allowed for the actual activity > Budgeted Base activity ⇒ **Favorable**

If SQ allowed for the actual activity < Budgeted Base activity ⇒ **Unfavorable**

Use the following information to answer the next two questions:

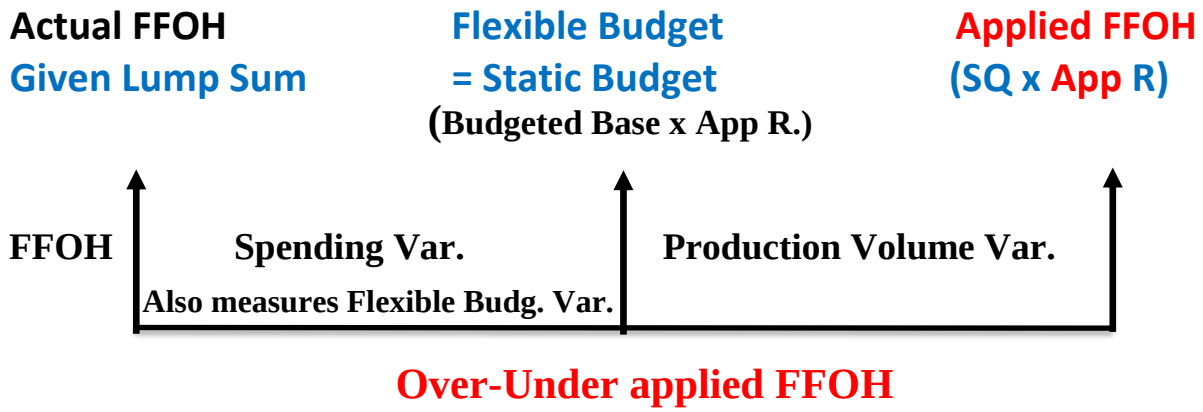
Yoder Enterprises' actual production for the period ***required*** 2,100 standard direct labor hours. Actual fixed overhead for the period was $14,800. The budgeted fixed overhead was $14,450. The predetermined fixed overhead rate was $7 per direct labor hour.

1. What was the spending variance?

a. $350 U
b. $350 F
c. $100 F
d. $100 U

2. What was the volume variance?

a. $250 U
b. $250 F
c. $100 F
d. $100 U



Example 3:

Swift Company manufactures a single product. Standard cost data for the product follow:

	(1) Standard Quantity	(2) Standard Price	(3) Standard *Cost* per unit (1) × (2)
Direct materials.....	3.5 feet	$12 per foot	$42
Direct labor.....	2.0 hours	$16 per hour	$32

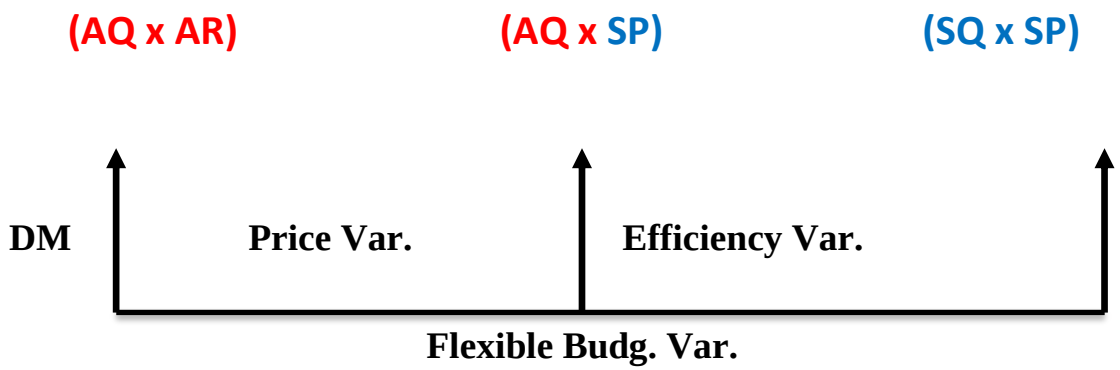
- Swift built up its long term production capacity to produce up to **10,000 units** of output per period.
- Overhead is assigned to the product on the ***basis of direct labor hours***.
- At the beginning of 2006, Swift Company expects to produce **7,500 units**. Thus the denominator activity level is ***15,000 DLH***. (i.e., the company will operate at 7,500 units of output, which is equivalent to 15,000 DLH level of Activity).
- **Budgeted Variable and Fixed Overhead are $75,000 and $300,000; respectively.**

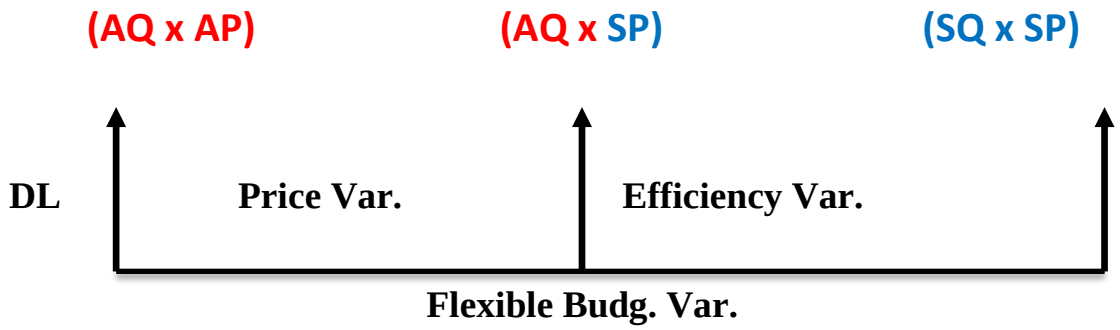
Actual results of operations are summarized below:

Number of units completed.....	8,000	units
Actual DM (4 feet per unit @$10 per feet)…	$320,000	
Actual direct labor hours.....	18,000	DLHs
Actual total direct labor costs……	$252,000	
Actual manufacturing overhead cost:		
Variable.....	$ 81,000	
Fixed	305,000	
Total	$386,000	

Required:

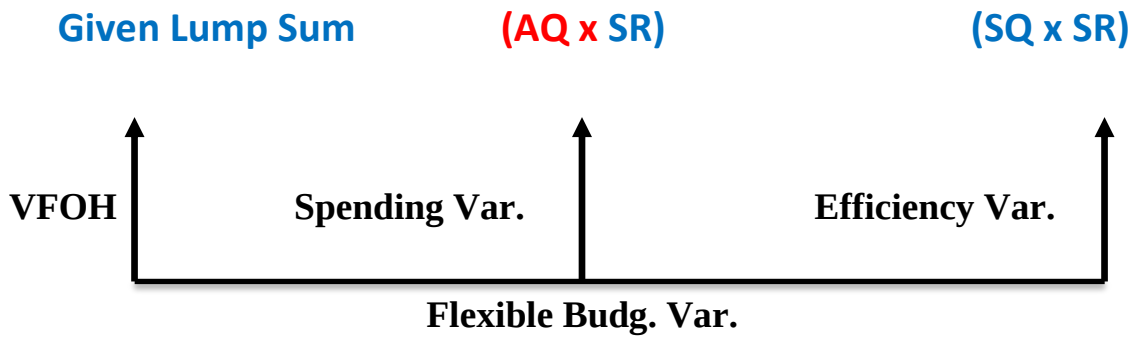
Compute all the variances related to production activities during 2006.





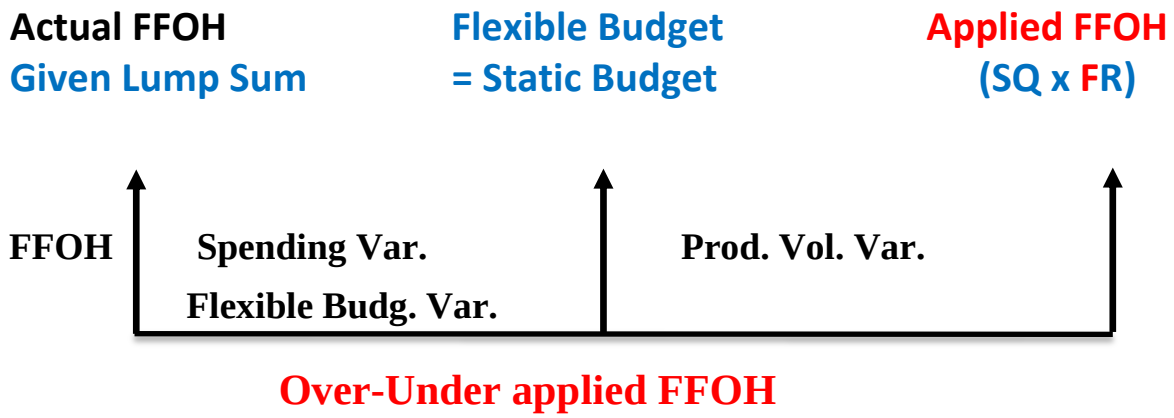
App. R. (VFOH) = **Budgeted Variable FOH**
Budgeted "BASE

Applied VFOH = App**. R** (VFOH) x **SQ** Allowed of BASE



App. R. (FFOH) = **Budgeted Variable FOH**
Budgeted "BASE

Applied FFOH = App**. R** (FFOH) x **SQ** Allowed of BASE



Journalizing overhead costs and recognizing overhead variances

1. Occurrence of actual VFOH

Actual VFOH Control..... (Given)
    Cash/Ap ..... (Given)

2. Occurrence of actual FFOH

Actual FFOH Control..... (Given)
    Cash/Ap ..... (Given)

3. Applying VFOH to Production

Work in Process ..... (SQ * App. R)
    Applied VFOH ..... (SQ * App. R)

4. Applying FFOH to Production

Work in Process ..... (SQ * App. R)
    Applied FFOH..... (SQ * App. R)

5. At the End of Period; Close both VFOH Control and Applied VFO

Applied VFOH ..... (SQ * App. R)
Spending Variance ..... (U)
Efficiency Vol. Variance .... (U)
    Actual VFOH (Control) ..... (Given)
    Spending Variance ..... (F)
    Efficiency Vol. Variance ..... (F)

6. At the End of Period; Close both FFOH Control and Applied VFO

Applied FFOH..... (SQ * App. R)
Spending Variance ..... (U)
Production Vol. Variance .... (U)
    Actual FFOH (Control)..... (Given)
    Spending Variance ..... (F)
    Production Vol. Variance ..... (F)

Closing the Variances at the end of the period

If a standard cost *system* is used, variances related to overhead costs can be recorded formally in the accounting records. Such variances, however, are considered "temporary accounts," which at the end of the year must be closed out. Most companies close them to the Cost of Goods Sold.

The following steps summarize the journal entries to close the variances to CGS:

1. Debit any favorable variances to close them
2. Credit any unfavorable variances to close them
3. Debit or credit the difference to the cost of goods sold

Comprehensive Example

Xonic Inc. planned to produce and sell **1,100 units** of a product called Weed-O (one kilogram each). Xonic Inc. has the following are ***standard costs*** to manufacture one kilogram of *Weed-O*

MD: 4 litres per unit at $3 per liter
DL: 2 hours per unit at $15 per hour
FOH: Xonic Inc. has the following budgeted manufacturing overhead are based on expected production of 1,100 kilograms (units) of *Weed-O* per period:

VFOH	$6,600
FFOH	$4,400
Total	11,000

- The company uses DL hours as an allocation base.
- Budgeted DL hours = 1,100 units x 2hrs = 2,200 DL hours
  Application Rate for VFOH = 6,600 / 2,200 = $3/DLH
  Application Rate for FFOH = 4.400 / 2,200 = $2/DLH

Actual Performance:

Following are the ***actual costs*** incurred to make ***1,000 units (kilograms)***:

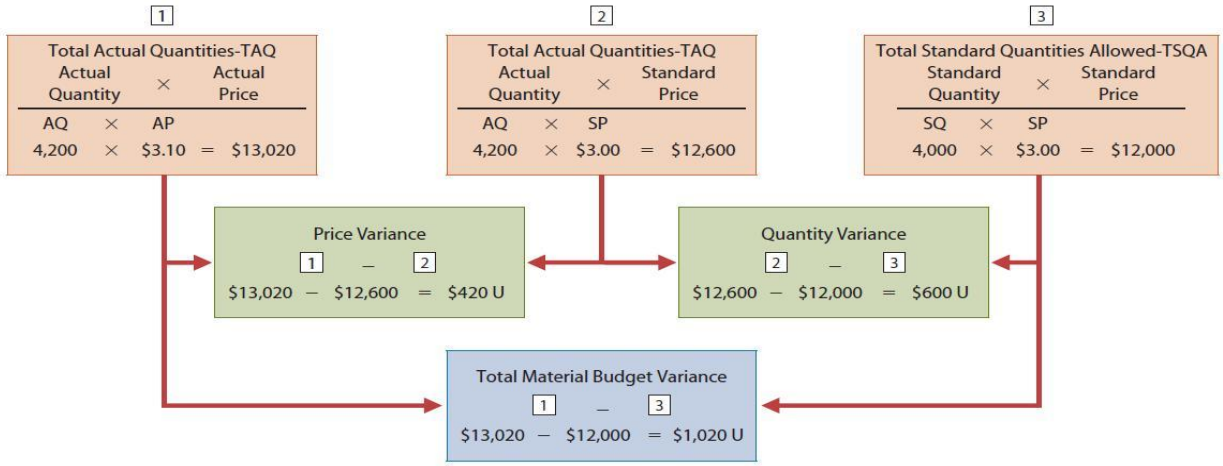
DM: 4,200 liters of material was purchased and used @ a price of $3.1per liter.
DL: 2,100 hours used. The total labor cost was $31,080.
Actual overhead incurred during the month are:

VFOH:	$6,500
FFOH:	$4,900
Total	11,400

- **All production is sold at a total of sales revenues of $70,000**

Required:
Calculate all variances related to production costs.

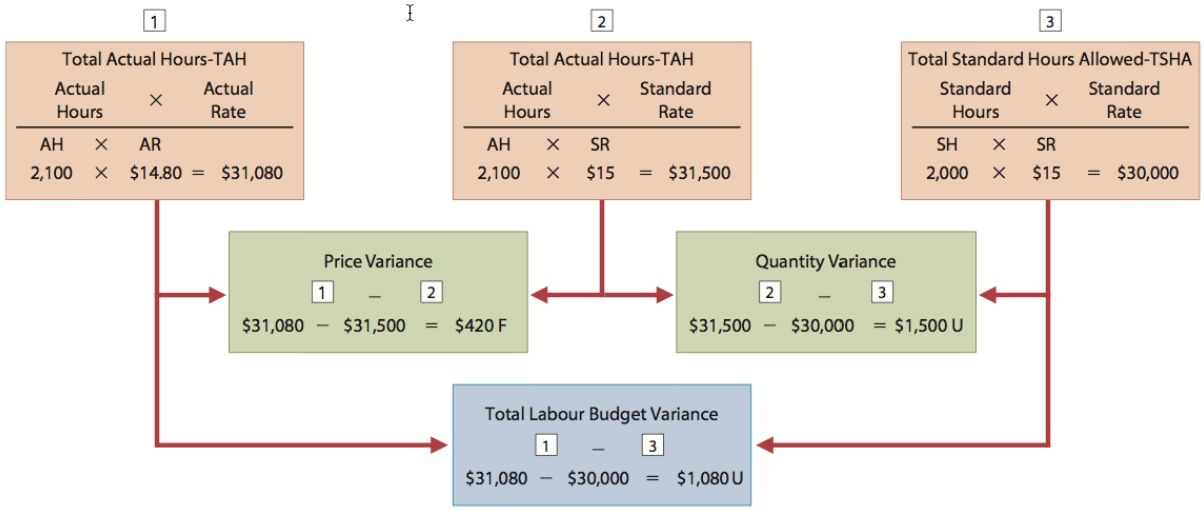
DM Analysis:



DM-Purchased	13,020	
Accounts Payable		13,020

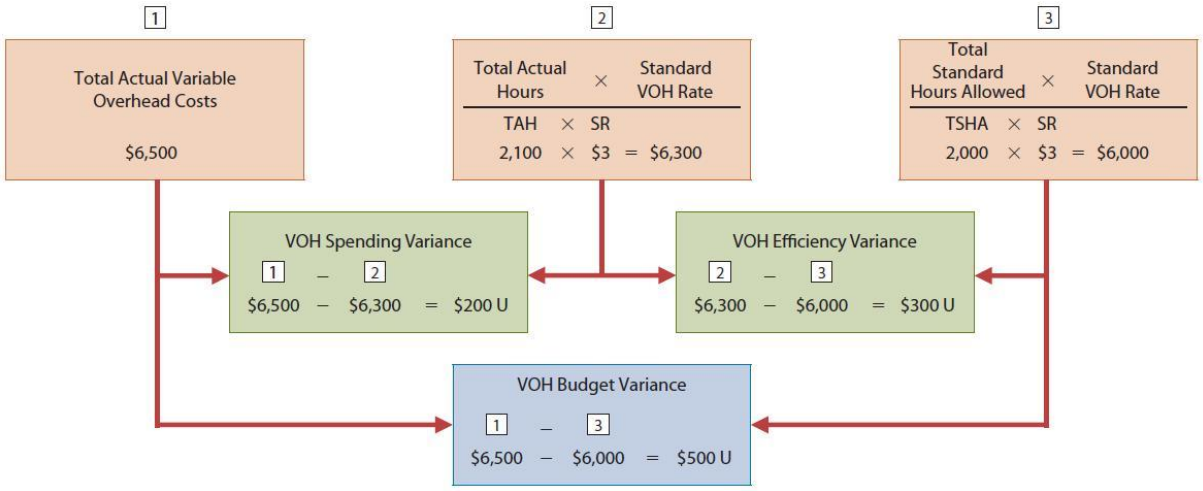
WIP (SQ x SP)	12,000	
DM Price Var.		420
DM Quant. Var.	600	
DM-Used (AQ x AP)		13,020

DL Analysis:



WIP (SQ x SP)	30,000	
DL Quant. Var.	1,500	
DL Price Var.		420
Wages Payable (AQ x AP)		31,080

VFOH



Incurrence Actual VMOH

Actual VMOH (Given)	6,500	
Accounts Payable		6,500

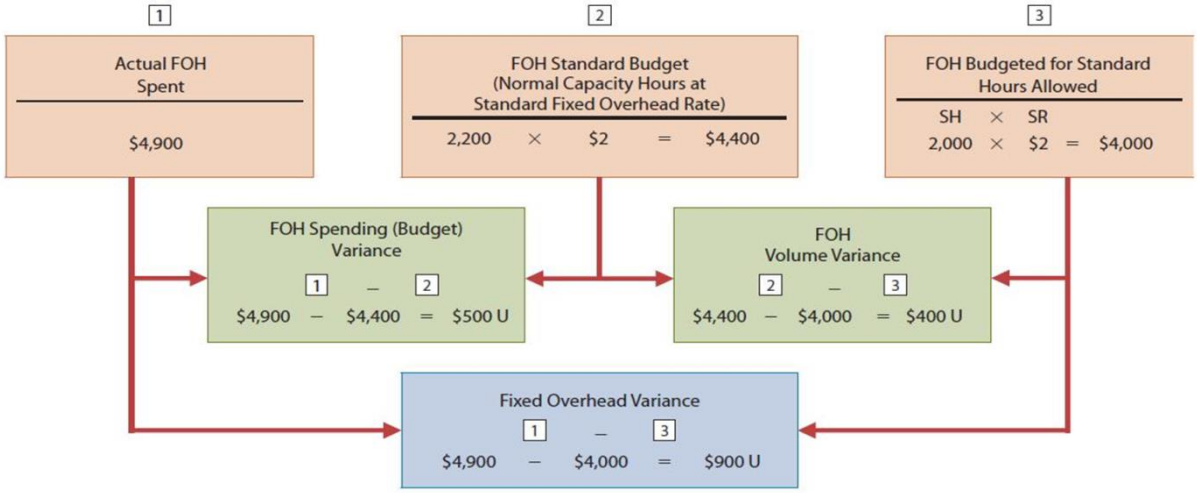
Application (Assigning) VFHO to production (WIP)

WIP (SQ x SR)	6,000	
Applied VFOH (SQ x SR)		6,000

Recognition of VFHO Variances at the End of the Period: *(Close Applied and Actual MOH)*

Applied VFOH (SQ x SR)	6,000		
VMOH Spending Var.	200		
VMOH efficiency Var.	300		
Actual VFOH (Given)			6,500

FFOH



Incurrence Actual FMOH

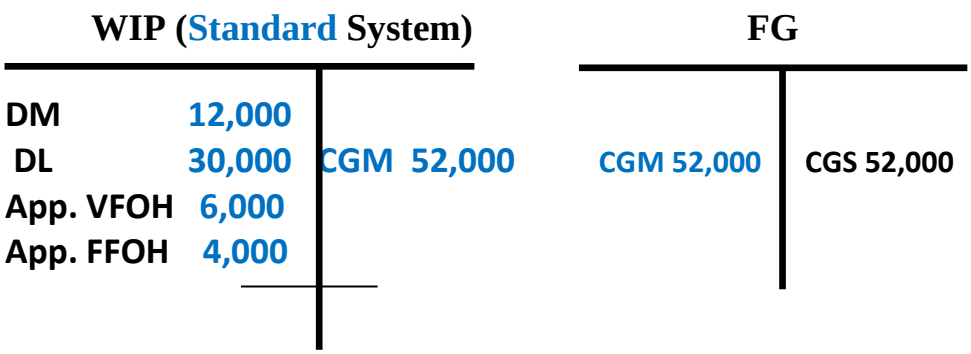
Actual VMOH (Given)		4,900	
Accounts Payable			4,900

Application (Assigning) FFHO to production (WIP)

WIP (SQ x SR)	4,000		
Applied VFOH (SQ x SR)		4,000	

Recognition of FFHO Variances at the End of the Period: *(Close Applied and Actual MOH)*

Applied FFOH (SQ x SR)	4,000		
FMOH Spending Var.	500		
Production Volume Var.		400	
Actual FFOH (Given)			4,900



Close All variances to CGS

Cost of Goods Sold	3,500		
DL Price Var.	420		
		DM Quant. Var.	600
		DM Price Var.	420
		DL Quant. Var.	1,500
		VMOH Spending Var.	200
		VMOH efficiency Var.	300
		FMOH Spending Var.	500
		Production Volume Var.	400

Income Statement

Sales Revenues		**70,000**
CGM	**52,000**	
+ Adjustment	**3,500**	**55,500**
Gross Profit		**14,500**