

ACCT 102 - Professor Johnson
Lecture Notes – Chapter 16: PROCESS COSTING AND ANALYSIS

PROCESS OPERATIONS

In Chapter 15, we studied the job order cost accounting system used when a company manufactures products customized to customer specifications. We will now look at process costing, used when a company manufactures standard (non-custom) products.

In process manufacturing, products are manufactured by passing through a series of steps. Each product must pass through the same series of steps, or *processes*. While the focus in a job order system is on the individual job, the focus in process costing systems is on the process itself and on the standardized units produced. Features of process production systems include:

- a. Repetitive production
- b. Homogeneous products & services
- c. High production volume
- d. Low product flexibility
- e. High standardization

Process operations are organized as follows:

- a. Each process is identified as a separate production department.
- b. Raw materials are introduced in the first department.
- c. Except for the first department, each department or process receives the output (i.e., partially processed product, or work in process) of the prior department.
- d. The last department produces the finished goods that are ready for sale.

PROCESS COST ACCOUNTING

In a job order cost accounting system, product costs were assigned to jobs. The goal was to determine the cost per job. In a process cost accounting system, product costs are assigned to specific processes, or manufacturing departments. The goal in a process costing accounting system is to calculate the cost per unit.

The accounting for materials, labor and factory overhead in a process costing system is summarized below.

Accounting for Materials Costs

1. Record cost of materials acquired on credit for use in factory by debiting Raw Materials Inventory and crediting Accounts Payable.
2. Assign costs of direct materials used in production by debiting the Work in Process Inventory and crediting Raw Materials Inventory.
3. Assign cost of indirect materials used by debiting Factory Overhead and crediting Raw Materials Inventory.

Accounting for Labor Costs

1. Record payment of factory wages (direct labor) by debiting Work in Process and crediting Cash.
2. Assign cost of indirect labor used by debiting Factory Overhead and crediting Cash.

Accounting for Factory Overhead

1. Record other production overhead items incurred by debiting Factory Overhead and crediting the related accounts.
2. Compute the predetermined overhead rate.
3. Determine amount of overhead that should be applied to production.
4. Apply factory overhead costs by debiting the Work in Process Inventory for each department and crediting Factory Overhead.
5. If not significant, close the overapplied or underapplied balance of Factory Overhead to Cost of Goods Sold. If material, allocate the balance of Factory Overhead among costs of goods sold, work in process, and finished goods inventories.

EQUIVALENT UNITS OF PRODUCTION (EUP)

If a processing department has no beginning or ending work in process, the calculation of cost per unit is simple:

$$\frac{\text{Direct materials} + \text{Direct Labor} + \text{Factory Overhead}}{\text{Total units started and completed during the period}}$$

If a process has beginning or ending units in process (work in process inventory), then the denominator in the equation above is adjusted to include work performed on work in process inventory. The denominator must measure the entire production activity during the period, called equivalent units of production (EUP). EUP is the number of units that *could have been* started and completed during a period.

For example, assume you worked on an accounting homework assignment and an English term paper over the weekend. The accounting assignment would take two hours, from start to finish, and the English assignment would take two hours, from start to finish, as well. You worked two hours and completed 50% of your accounting assignment and 50% of your English term paper. Had you devoted the entire two hours of work to the accounting assignment, you would have finished 100% of it. So, your “EUP” for your weekend work would be one assignment, even though you did not complete either assignment.

STEPS IN PROCESS COSTING

We will use the weighted-average method for inventory costs, which is in the body of Chapter 16. We will not cover the first-in, first-out method, contained in Appendix 16A.

There are four steps in accounting for production activity in a period. They are summarized as follows.

A. Step 1: Determine Physical Flow of Units

1. A reconciliation of physical units started with physical units completed.
2. The weighted average method does not separately track beginning work in process from those started this period, but instead treats the units as part of a large pool with an average cost per unit.
3. This reconciliation of units can be summarized as:

$$\text{Beginning WIP} + \text{Units Started} = \text{Units completed} + \text{Ending WIP}$$

Here is a guided example video on preparing a physical flow of units reconciliation:

[</iframe>](http://www.viddler.com/embed/e3302912/?f=1&autoplay=0&player=full&disablebranding=0)

B. Step 2: Compute Equivalent Units of Production (EUP)

1. Focus is on what was done during the period.
2. Equivalent Units—compute separate EUP for direct materials, direct labor, and factory overhead. Overhead is applied using direct labor as the allocation base.
 - a. Units completed and transferred out during the period have 100% of the materials, labor and overhead required and are therefore 100% complete.
 - b. The units in ending work in process (WIP) are multiplied by percent of materials applied, labor used and overhead applied.
 - c. Add the totals of EUP for goods completed in a. above plus the EUP for WIP in b. above to arrive at total EUP for the period.

Before discussing Step 3, there is a brief example of EUP calculations below.

Example of the EUP Calculation

The Melbourne Company uses a process costing system. There was no WIP on July 1. During July, 10,000 units were started in production; of these, 7,000 were completed and transferred to the next department. Materials are added in the beginning of the process. On July 31, the remaining 3,000 units were 20% complete with regard to labor and overhead.

Required:

Calculate EUP of

1. Direct Materials
2. Direct Labor and Factory Overhead

SOLUTION:

	<u>Direct Materials</u>	<u>Direct Labor and Factory Overhead</u>
Equivalent Units completed and transferred out (100% x 7,000)	7,000	7,000
Equivalent units in ending inventory		
3,000 units x 100% for materials	3,000	
3,000 units x 20% for conversion*		<u>600</u>
Total equivalent units	<u>10,000</u>	<u>7,600</u>

*Many companies refer to the sum of direct labor + FOH as conversion costs.

C. Step 3: Compute Cost per Equivalent Unit

1. Costs of beginning work in process inventory plus costs incurred this period, divided by EUP determined in Step 2 above equals the cost per equivalent unit for the period.
2. Perform calculation separately for direct materials, direct labor, and overhead.
3. Total cost per equivalent unit equals the sum of the three individual costs per equivalent unit (direct materials, direct labor, and factory overhead).

Here are two guided videos on computing cost per equivalent unit:

[<</iframe>](http://www.viddler.com/embed/9d521d69/?f=1&autoplay=0&player=full&disablebranding=0)

[<</iframe>](http://www.viddler.com/embed/da1267ee/?f=1&autoplay=0&player=full&disablebranding=0)

D. Step 4: Cost Assignment and Reconciliation

1. The EUP from step 2 and the cost per EUP from step 3 are used to assign costs to units completed and transferred out and to units in ending work in process inventory.
2. The following totals should agree:

The cost of units completed and transferred out + cost of ending WIP = the cost of beginning WIP + Costs incurred this period.

Here is a guided example video on computing EUP and calculating costs assigned to finished goods and to ending WIP:

[<</iframe>](http://www.viddler.com/embed/cc87805a/?f=1&autoplay=0&player=full&disablebranding=0)

The Process Cost Summary Report

The process cost summary is an important managerial accounting report. It is prepared separately for each processing department. The summary is intended to:

1. Help department managers control and monitor their departments
2. Help factory managers evaluate department managers' performances
3. Provide cost data for financial statements.

Transfers to Finished Goods Inventory

The journal entry to transfer finished goods debits Finished Goods Inventory and credits Work in Process Inventory.