

# Methods used for process costing



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A process costing method is used for industries producing chemical, petroleum, textile, and flour, pharmaceutical, shoes and coal. This type of costing is also used by firms manufacturing such things as the assembly type industry which manufactures such things as typewriters, automobiles, airplanes and household electric appliances. Finally certain service industries, such as gas, water, and heat, cost their products by using process costing methods. In fact process costing procedures are often termed "continuous or mass production cost accounting procedure."

<http://www.principlesofaccounting.com/ART/c20art/steelprocess.JPG>

## **What is Process Costing?**

Process costing is a type of costing system that is used for uniform, or homogeneous, products. Process costing averages the costs over all units to come to the per unit cost. This is in contrast to other types of costing systems, such as job-order costing that is used for products that are in differentiated batches. Unlike job-order costing, process costing is tracked using a work-in-process account for each department, rather than through subsidiary ledgers]

## **Process Costing**

In accounting, process costing is a method of assigning production costs to units of output. In process costing systems, production costs are not traced to individual units of output. Costs are assigned first to production departments and then to units of output as they move through the departments. The process costing method is typically used for processes that produce large quantities of homogeneous products.

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The process costing method is in contrast to other costing methods, such as product costing, job costing, or operation costing systems. Using the process costing method is optimal under certain conditions. If the output products are homogeneous, that is, the units of output are relatively indistinguishable from one another, it may be beneficial to use process costing. If the output products are of low value, meaning each individual unit of output is not worth much, it may be beneficial to use process costing. And if it is difficult or infeasible to trace production costs directly to individual units of output, it may be beneficial to use the process costing method.

Examples of operations that are likely to use the process costing method as opposed to another costing method include a cola bottling plant, a breakfast cereal maker, a company that makes computer chips, and company that produces lumber, and a company that produces bricks. For example, for the company that bottles cola, it would not be feasible or worthwhile to separate and record the cost of each bottle of cola in the bottling process. Therefore, the company would assign costs to the bottling process as a whole for a period of time, and then divide that overall process cost by the number of bottles produced during that period of time to assign production costs to each bottle of cola.

## **Process Costing Methods**

### 5 Steps for Process Costing

1. Analyze inventory flow
2. Convert in-process inventory to equivalent units
3. Compute all applicable costs

4. Calculate the cost per unit of finished and in-process inventory
5. Allocate costs to units of finished and in-process inventory

First, analyze the cost-flow model of the relevant inventory account to determine how much inventory was there at the beginning of the period, how much was started during the period, how much was completed during the period, and how much is left as work-in-process at the end of the period.

Second, convert the work-in-process ending inventory into a number of equivalent units produced. This means if there are 1,000 units of inventory in work-in-process, and these units are all 50% complete, then you consider this as the equivalent of 500 units produced ( $500 = .50 \times 1,000$ ).

Third, compute the total direct and indirect costs incurred by the production process that need to be assigned to the units completed and the units still in process. This includes the costs associated with the beginning inventory and the costs incurred during the relevant period.

Fourth, calculate the amount of cost to be assigned to the completed units of output and the equivalent of completed units of output still in the ending inventory. For example, if 2,000 units were completed, and 1,000 units were left half-finished, then you would divide the applicable costs by 2,500 units.

Fifth, allocate the relevant costs to the units of product that were completed and to the units of product that remain in the work-in-process account.

**Source:**

Hilton, Ronald W., Michael W. Maher, Frank H. Selto. “ Cost Management Strategies for Business Decision”, Mcgraw-Hill Irwin, New York, NY, 2008.

**Process Costing Procedures**

Process costing systems follow specific procedures, and while exact procedures may vary by company or by industry, they will generally follow these steps:

While other types of costing start with a sales order, a sales order is not needed for process costing as it is a continuous process

The work-in-process accounts are divided by department and are named as such – for example: Work-in-process – Department Name

The first department in the process makes the first entry into the work-in-process account, generally for the direct raw materials

As the products move from department to department, entries are made to each work-in-process department account

Direct labor costs are recorded by period

Actual overhead costs are recorded; no contra-account is needed because there is no over- or under-applied overhead due to the actual cost being applied

Indirect costs are applied to the overhead account in actual amounts

Normal spoilage is recorded as a cost to the work-in-process account; abnormal spoilage is removed from the work-in-process account and applied to a separate account so it can be addressed by management.

## **When Is Process Costing Appropriate?**

Process costing is appropriate when products are homogeneous (or identical). Where job-order and other types of costing seek to find the cost per unit for batches of differentiated products, process costing seeks to find the average cost of all units over a period of time. Therefore, process costing is only appropriate when all units are the same. For example, a manufacturing company that produces only one homogeneous product may elect to use process costing.

## **Characteristics and process of costing.**

### **The characteristics of process costing are:**

A cost of production report is used to collect, summarize, and compute total and unit cost.

Production is accumulated and reported by departments.

Costs are posted to departmental work in process accounts.

Production in process at the end of a period is restated in terms of completed units.

Total costs charged to a department are divided by total computed production of the department in order to determine a unit cost for a specific period.

Costs of completed units of a department are transferred to the next processing department in order to arrive at the total costs of the finished products during a period. At the same time, costs are assigned to units still in process.

### **Characteristics and procedure.**

Accumulate material, labor, and factory over head costs by departments.

Determine a unit cost for each department.

Transfer costs from one department.

Assign cost to the inventory of work still in process.

If accurate unit and inventory costs are to be established by process costing procedure, costs of a period must be identified with units produced in the same period.

### **Features/Characteristics of Process Costing**

Process Costing Method is applicable where the output results from a sequence of continuous or repetitive operations or processes and products are identical and cannot be segregated.

Process Costing enables the ascertainment of cost of the product at each process or stage of manufacture.

The following features may be identified with process costing:

The output consists of products which are homogenous.

Production is carried on in different stages (each of which is called a process) having a continuous flow.

Production takes place continuously except in cases where the plant and machinery are shut down for maintenance etc. Output is uniform and all units are identical during each process. It would not be possible to trace the identity of any particular lot of output to any lot of input.

The input will pass through two or more processes before it takes the shape of the output. The output of each process becomes the input for the next process until the final product is obtained, with the last process giving the final product.

The output of a process (except the last) may also be saleable in which case the process may generate some profit.

The input of a process (except the first) may be capable of being acquired from the outside sources.

The output of a process is transferred to the next process generally at cost to the process. It may also be transferred at market price to enable checking efficiency of operations in comparison to the market conditions.

Normal and abnormal losses may arise in the processes

There are a number of industries in which process costing can be applied.

## **Elements/Components of Cost**

Process, cost, accounting, recording, direct, indirect, costs



For the purpose of cost accounting, the process industry is divided into separate departments with each department representing a specific process. The Direct Material and Direct Labor/Labor Costs are collected for each department separately and the overheads which are collected over all the departments/processes are apportioned over the various departments/processes on some rational basis.

The following are the main elements/components of costs involved in the manufacturing process where process costing method is adopted.

### Direct Materials

There are two types of materials that we come across in process costing.

#### Primary Material

Materials which are introduced in the initial process and passed on to the next process as a part of output after completion of processing.

#### Secondary Material

Materials which are introduced in the first or subsequent processes in addition to the main material introduced in the initial process. This gets mixed up with the main material and is passed on to the subsequent processes as a part of the output.

### Direct Labor/Labor

The direct labour/labor cost is generally incurred in every process.

Identification of direct labour cost is also relatively easy in process costing industry

### Direct Expenses

Expenses in addition to Direct Material and Labor which can be directly attributable to a particular process. These are costs relevant to specific processes.

### Production Overheads

The overhead expenses are generally expended over all the processes involved in production. These are to be apportioned over the various processes in an amicable manner.

### Methodology of Recording/Accounting Costs

Financial Accounting Methodology is adopted for recording costs involved.

### Process Accounts

A nominal account for each process is used to record all the costs relevant to a process.

Each process account is

Debited with

The Primary Direct Material Cost

Secondary Direct Material Cost

Direct Labor Cost

Direct Expenses and

Production Overheads allocated and/or apportioned to the process.

Credited with

The value of output transferred to the subsequent process or finished stocks.

Numbers, Alphabets or any word or phrase representing the process are used as suffixes/prefixes in the names (“ Process I a/c”, “ Process A a/c”, “ Refining Process A a/c”,... etc.,) to distinctly identify the processes accounts.

Process Stock Accounts

Stocks relevant to a process are maintained in a separate stock account.

Stock accounts for input may be maintained where all the input acquired/received for a process during a period is not used up.

Stock accounts for output may be maintained where all the output produced/completed in a process during a period is not disposed off either by transfer to the next process or by sale.

Where the output relevant to a process is sold apart from being transferred to the next process, it generates revenue. These revenues relevant to a process, are generally recorded using the process account or the stock account.

## **FEATURES of Process Costing**

The product of one process becomes the INPUT OR RAW MATERIAL of the next process;

There is a CONTINUOUS FLOW OF IDENTICAL OUTPUT;

It is DIFFICULT TO IDENTIFY A COST UNIT because each cost unit is part of a process;

It is difficult to cost a cost unit hence we can only find the AVERAGE COST PER UNIT over period of time;

COST CENTRES are set up and costs are collected by the cost centers;

It is possible that JOINT PRODUCTS may be produced in the processes;

WASTE may arise during processing eg due to evaporation, etc

Each process or department performs a particular operation(s). A certain stage of production is completed in each process. Each process is carried out by a certain department. A person is usually responsible for a process.

An account called a PROCESS ACCOUNT is maintained for each process. This process account captures/records the following:

All costs-materials, labor and overheads;

Scrap

Output

Opening work-in-process

Closing work-in-process

Transfers from previous process

Losses or gains

## **Reasons for use**

Companies need to allocate total product costs to units of product for the following reasons:

A conducts are manufactured in large quantities, but products may be sold in small quantities, sometimes one at a time (automobiles, loaves of bread), a dozen or two at a time (eggs, cookies), etc.

Product costs must be transferred from Finished Goods to Cost of Goods Sold as sales are made. This requires a correct and accurate accounting of product costs per unit, to have a proper matching of product costs against related sales revenue.

Managers need to maintain cost control over the manufacturing process.

Process costing provides managers with feedback that can be used to compare similar product costs from one month to the next, keeping costs in line with projected manufacturing budgets.

A fraction-of-a-cent cost change can represent a large dollar change in overall profitability, when selling millions of units of product a month.

Managers must carefully watch per unit costs on a daily basis through the production process, while at the same time dealing with materials and output in huge quantities.

Materials part way through a process (e. g. chemicals) might need to be given a value, process costing allows for this. By determining what cost the part processed material has incurred such as labor or overhead an “equivalent unit” relative to the value of a finished process can be calculated.

## **Comparisons**

Similarities between job order and process costing include:

Both systems have the same basic purpose-to calculate unit cost

Both systems use the same manufacturing accounts

The flow of costs through the manufacturing accounts is basically the Same.

However, there are some important differences between job order and processing costing as described below.

Job Order Costing

Process Costing

Each job is different

All products are identical

Costs are accumulated by job

Costs are accumulated by department

Costs are captured on a job cost sheet

Costs are accumulated on a department production report

Unit costs are computed by job

Unit costs are computed by department

Study the production flow and the cost flows of companies which use process costing in Exhibits 4-2, 4-3, and 4-4. Note that as units are partially completed in one department they proceed onto another department for further processing. This will require a journal entry such as:

Work in Process – Department B

Work in Process – Department A

When the products are completed they are transferred from the final processing department to Finished Goods. Study the model journal entries on Pages 149-150.

A complication arising in process costing is that not all units may be completed at the balance sheet date. To calculate unit costs, it will be necessary to compute equivalent units of production. Equivalent units can be defined as the product of the number of partially completed units times the percentage completion of these units. If there are 300 of partially completed units at year-end which are 40% complete, then there are 120 equivalent units. If say 5000 units were completed during the period, the managerial accountant would add 5000 and 120 to arrive at 5120 equivalent units completed during the period. Then total department costs for the period (direct material, direct labor, and overhead) would be divided by the 5120

equivalent units to arrive at cost per unit. Equivalent units can be computed in two different ways, the weighted average method and the FIFO method. We only cover the weighted average method in this course and therefore skip Appendix 4A.

Companies using process costing prepare departmental production reports. Exhibit 4-9, Page 158, is a production report for Double Diamond Skis' Shaping and Milling Department. Note that the production report consists of three parts as follows:

1. A quantity schedule which shows the flow of units through the department and a computation of equivalent units
2. A computation of costs per equivalent unit
3. A reconciliation of all cost flows into and out of the department

Also note in Exhibit 4-9 that the equivalent unit totals are different for material costs and for conversion costs. This frequently happens as all material is input at the start of the production process but the direct labor and overhead costs are incurred sometime later.

## **7. Mention of sources used**

### **1. Process Costing Systems – What is it and when is it used?**

A process-costing system is a costing system in which the cost of a product or service is obtained by assigning costs to masses of like or similar units.

Unit costs are then computed on an average basis. Process-costing systems are used in industries that produce like or similar units which are often mass produced. In these industries, products are manufactured in a very similar way. The companies usually use the same amount of direct materials, direct



manufacturing labor costs and manufacturing overhead costs. Industries that use process costing systems are for example: chemical processing, oil refining, pharmaceuticals, plastics, brick and tile manufacturing, semiconductor chips, beverages and breakfast cereals.

The difference between job costing and process costing is the extent of averaging used to compute unit costs of product and services. The cost object in job costing is a job that constitutes a distinctly identifiable product or service. The quantity of manufacturing resources is different in any job. It would be incorrect to cost each job at the same average manufacturing cost. So, when like or similar units are mass produced, process costing averages manufacturing costs over all units produced.

The costs of a product are important for inventory calculations, pricing decisions and product profitability analysis. It's also important for measuring how well the management is done and if costs are reduced effectively.

## **Illustrating process costing**

The best way to show how process costing works, is by example:

Global Defense, Inc, manufactures thousands of components for missiles and military equipment. One of these is called DG-19. The product-costing system for DG-19 has a single direct-cost strategy (direct materials) and a single indirect-cost category (conversion costs). Each unit passes through two departments: the Assembly Department and the Testing Department. Every effort is made to make sure that all DG-19 products are identical. Direct materials are added at the beginning of the process in Assembly. Additional direct materials are added at the end of processing in the Testing

Department. Conversion costs are added evenly during both processes. They include manufacturing labor, indirect materials, energy, plant depreciation and so on. After leaving the Testing Department, the DG-19 component is transferred to Finished Goods.

## **2. Three cases**

### **2.1 Case 1: Process Costing with no beginning or ending work – in – process inventory**

During January, the first month of the period, Global Defense starts with the manufacturing process. All units will start and end in this period. Altogether, Global Defense will manufacture 400 units of DG-19 during this period.

Direct materials in this period:

\$ 32. 000

Conversion costs in this period:

\$ 24. 000

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Total Assembly costs in January:

\$ 56. 000

Global Defense records direct materials and conversion costs in the Assembly Department as these costs are incurred. By averaging, the assembly cost per unit would be  $\$ 56. 000 / 400 \text{ units} = \$ 140$ :

Direct materials costs by unit ( $\$32. 000 / 400$ )

\$ 80

Conversion costs per unit ( $\$ 24.000 / 400$ )

\$ 60

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Assembly Department cost per unit

\$ 140

Each unit is identical in this case, so we assume that all units receive the same amount of direct materials and conversion costs. The unit costs can be averaged by dividing total costs in a given accounting period by total units manufactured. This approach is for example used by banks to compute the unit costs of 100.000 similar customer deposits made in a month. It is usually used by organizations with mass production of standard units and no incomplete units after the period.

## **2.2 Case 2: Process costing with no beginning but an ending work – in – Process Inventory**

There is no beginning inventory in February, because all 400 units produced in January had been fully completed. Due to customer delays in placing orders, it was only possible to produce 175 units in February.

The 225 partially assembled units as of February 28 were fully processed with respect to direct materials, because all direct materials in the Assembly Department are added at the beginning of the assembly process. Conversion costs are added evenly during the assembly process. Based on the work

completed relative to the total work required to be done, an Assembly Department supervisor estimates that the partially assembled units were, on average, 60 % complete as to conversion costs.

Total costs for February:

Direct materials costs in February

\$ 32. 000

Conversion costs February

\$ 18. 600

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Total Assembly Departments costs

\$ 50. 600

Problem: How should Global Defense calculate the cost of fully assembled units and the cost of the partially assembled units still in process?

The following four steps help us to find the answer:

Step 1:

Summarize the flow of physical unit of output

Step 2:

Compute output in terms of equivalent units

Step 3:

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## Compute equivalent unit costs

## Step 4:

Summarize total costs to account for and assign these cost to units completed and to units in ending work in process

Step 1 tracks the physical unit of output. It shows, where they come from and how many units are there to account for, and where they go and how they are accounted for.

Step 2 measures the output in equivalent units, not in physical units, because not all units had been completed. The 400 units are complete in terms of equivalent units of direct materials, because all direct materials are added in the Assembly Department at the initial stage of the process. So you count all 400 units in equivalent direct costs.

The 175 fully assembled units are completely processed with respect to conversion costs. The partially assembled units in ending process are 60 % complete (on average). Therefore, the conversion costs in 225 partially assembled units is equivalent to conversion costs in 135 (60% of 225) fully assembled units. So, 310 equivalent units of conversion costs are assembled and transferred out and 135 equivalent units are in ending work – in – process inventory.

In step 3, equivalent unit costs are computed by dividing direct materials and conversion costs added during February by the related quantity of equivalent units of work done in February:

Direct costs

Conversion costs

Costs added during February:

\$ 32. 000

\$ 18. 600

Divide by equivalent units work done in February:

/ 400

/ 300

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Cost per equivalent unit of work done in February:

\$ 80

\$ 60

In Step 4, total costs to account for are summarized and assigned to units completed and transferred out and to units still in process at the end of February. Since the beginning balance of the work – in – process is zero, total costs to account for consist of the costs added during February: direct materials \$ 32. 000 and conversion costs \$ 18. 600.

Direct material costs are 225 times \$80 (= \$18,000) + Conversion costs: 135 times \$60 (= \$8,100). Total costs are therefore: \$18,000 + \$8,100 = \$26,100.

### **2.3 Case 3: Process costing with both beginning and ending work – in – process inventory**

In March, Global Defense has 225 partially assembled units in the Assembly Department. During March, Global Defense placed another 275 units into production.

Step 1 traces the physical units of production. In March, 400 units are completed and transferred out, 100 units are in ending inventory.

Step 2 computes the output in terms of equivalent units: 275 equivalent units of direct materials and 315 equivalent units of conversion costs.

Step 3 computes equivalent unit costs. Direct materials: \$ 80; conversion materials: \$ 60

Step 4 summarizes total costs to account for and assigns these costs to units completed and to units in ending work in progress.

The costs that get assigned to each of these categories depend, as in all inventory accounting, on the specific assumptions regarding the flow of costs. Next are described two alternative methods, the weighted-average method and the first-in, first-out method.

### **3. Weighted-average method**

The weighted-average process-costing method assigns the average equivalent unit cost of all work done to date (regardless of when it was done) to equivalent units completed and transferred out, and to equivalent units in ending inventory. The weighted-average cost is simply the average of various equivalent unit costs entering the work in process account.

### **4. First-In, First-out Method**

The First-in, first-out (FIFO) process-costing method assigns the cost of the earliest equivalent units available (starting with the equivalent units in beginning work-in-process inventory). This method assumes that the earliest equivalent units in work in process – Assembly account are completed first.

### **5. Transferred-in costs in process costing**

Transferred-in costs (or previous department costs) are costs incurred in a previous department that are carried forward as part of the product's cost as it moves to a subsequent department. That means, costs move with the units when they are transferred to a new department. So, computations of Testing costs must include transferred-in costs, additional direct materials costs and conversion costs added in Testing.

The four -step procedure is used to account for the costs of a subsequent department that has transferred-in costs. Units are fully completed as to transferred-in costs because these costs are just carried forward from the previous process. Direct materials costs have a zero degree of completion in both beginning and ending work-in-process inventories, because in Testing,



direct materials are introduced at the end of the process. That completes steps 1 and 2.

### **5.1 Transferred-in Costs and the weighted-average method**

In step 3, the equivalent unit costs are computed. In step 4, the total costs to account for are summarized, that is the total debits to Work in Process under the weighted-average method. After that, these costs are assigned to units completed and to units in ending work-in-process inventory. Beginning work in process and work done in the current period are totaled and merged together for purposes of computing weighted-average costs.

A company may split the Work in Process account into Work in Process – Testing, Transferred-in Costs, Work in Process – Testing, Direct Materials and Work in Process – Testing, Conversion costs. The journal entries would contain this detail, though the underlying reasoning and techniques would be unaffected.

### **5.2 Transferred-in Costs and the FIFO-Method**

The costs transferred-in from the Assembly Department are different when the weighted-average rather than the FIFO method is used in step 3.

In step 4, the total costs to account for are summarized, consisting of the beginning inventory plus costs added during the current period, under the FIFO-method. These costs differ from the total debits to Work on Process under the weighted-average method, because of the different costs of completed units transferred-in from the Assembly Department under the weighted-average and FIFO methods.

When assigning costs, the FIFO method keeps the beginning inventory separate and distinct from the work done during the current period.

Each department in interdepartmental transfers is regarded as being separate and distinct for accounting purposes. All costs transferred in during a given accounting period are carried at one unit cost figure, regardless of whether previous departments used the weighted-average or the FIFO method.

## **6. Common Mistakes with Transferred-in Costs**

Here are some common pitfalls to avoid when accounting for transferred-in costs:

Remember to include transferred-in costs from previous departments in your calculations. Such costs should be treated as if they were another kind of direct material added at the beginning of the process. In other words, when successive departments are involved, transferred units from one department become all or a part of the direct materials of the next department; however, they are called transferred-in costs, not direct materials costs.

In calculating costs to be transferred on a FIFO basis, do not overlook the costs assigned at the beginning of the period to units that were in process but are now included in the units transferred.

Unit costs may fluctuate between periods. Therefore, transferred units may contain batches accumulated at different unit costs.

Units may be measured in different terms in different departments. Consider each department separately. Unit costs could be based on kilograms in the

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first department and liters in the second , so as units are received by the second department, their measure