

# Process Costing

Process costing is a cost accumulation method where continuous production of **uniform** items occurs in large quantities or mass production occurs passing through many stages/ processes which produce a large amount of **units of production** . This differs from job costing system mainly because cost is accumulated for a **unique** item in job costing whereas in process costing cost is accumulated for a process which produces a large quantity of **like/ uniform/ homogeneous** products.

Examples:

- 1 Manufacturing of garments
- 2 Manufacturing of electrical appliances
- 3 Oil refining both petroleum and edible oils

In process costing, an unit of product is a result of a bulky production which passes through a number of production processes. Therefore, output of one process becomes the input of the next process until the production is complete in the final process, when it is transferred to finished goods.

## Process costing identifies two types of losses.

### a **Normal loss/ uncontrollable loss/expected loss**

This is the type of cost that a process incurs due to inherent factors. So it is an expected loss due to known unavoidable reasons. This loss expected to occur at normal operational conditions which is assumed to be the most efficient production environment.

For example, when shirts are cut from a reel of cloth, part of the cloth may be lost. This requires that cloth input to cutting process should take into account this loss which has to be incurred however efficient the production process is.

### b **Abnormal Loss/ Avoidable loss**

This is the type of loss resulting from inefficiencies in the production process. So this is a loss which can be avoided under an efficient production environment. Mathematically it is the difference between actual loss and normal loss when the actual loss is higher than the expected loss/ normal loss.

## What is abnormal gain?

Abnormal gain is the unexpected gain in the production process under normal operational efficiency. Mathematically, this is the difference between the actual output and expected output when the actual output is higher than the expected output.

Alternatively, this is the gain resulting when actual loss is less than the normal/ expected loss.

## Scrap value of losses

Scrap value is the value at which the loss items can be sold off.

## Accounting for scrap values

- i scrap value of normal loss is deducted from the process cost i.e. conventionally from the material cost/ input material from previous process.
- ii a scrap value of abnormal loss is set off against the abnormal loss by crediting the abnormal loss account
  - b scrap value of abnormal gain units is debited to abnormal gain account considering that it is a loss of income due to the reason that actual loss is less than the normal loss (Number of units in abnormal gain x scrap value per unit of normal loss) .

## Double entries

- 1 Input materials, labour and direct overheads  
Process account debit  
    Respective payable account/ Cost control account credit
- 2 Normal loss  
Scrap account/ Normal loss account @ **Scrap value** debit  
    Process account @ Scrap Value credit
- 3 Abnormal loss  
Abnormal loss account @ **Output Cost** debit  
    Process account @ Output Cost credit
- 4 Abnormal gain  
Process account @ **Output Cost** debit  
    Abnormal gain account@Output Cost credit
- 5 Sale of scrap items  
Cash debit  
    Scrap account/ Normal loss account credit
- 6 Cost of abnormal gain (Opportunity cost/ lost scrap value of normal loss)  
Abnormal gain account debit  
    Scrap account/normal loss account@ Scrap Value credit
- 7 Disposal cost of normal loss ( when there is a incremental cost exist to dispose)  
Process account debit  
    Cash credit
- 8 Disposal cost of abnormal loss ( when there is a incremental cost exist to dispose)  
Abnormal loss account debit  
    Cash credit
- 9 Cost of production of intemediary processes  
Current Process Account debit  
    Previous Process Account credit
- 10 Finished goods of final process  
Inventory-Finished Goods debit  
    Final Process Account credit
- 11 Opening WIP should be brought down in the relevent process account and Closing WIP should be carried down in the relevent process account.
- 12  
Balances in abnormal gain and loss accounts are transferred to manufacturing profit & loss account

### Steps followed in questions involving

- Multiple process
- Abnormal losses and abnormal gains
- Disposal costs
- Opening and closing WIPs valued at WAC (AVCO)

#### **Step 1** Determine output and losses

- i. Determine expected output
- ii. Calculate normal loss, abnormal loss/gain
- iii. Calculate equivalent units when WIP presents

#### **Step 2** Calculate cost per unit of output, losses and WIP

#### **Step 3** Calculate total cost of output, losses and WIP

#### **Step 4** Complete accounts

- i. Process accounts
- ii. Abnormal loss accounts
- iii. Abnormal gain accounts
- iv. Normal loss/ scrap account

### Meaning of Equivalent Units

Number of completed units that could be produced out of the given number of incomplete physical units with respect to given element of cost.

For example:

If there are 2000 half completed units in terms of labour input, this is equivalent to 1000 completed units in terms of labour input.

### Dealing with WIP under weighted average stock valuation method

Simply calculate the equivalent number of full units obtainable from incomplete physical units given in the question for each input item. **In doing so, opening WIP should not be considered as point in time at which the opening WIP is completed is not of interest under weighted average cost method of stock valuation** . Then, use these equivalent numbers in calculating per unit cost of each input item. **Refer Example 3**

### Point to Remember

Under weighted average stock valuation method, only closing WIP should be converted to equivalent units.

**Example 1.**

The manufacturing company has two process in its manufacturing factory. Output of process I becomes the input for process II and process II production is ready for sale.

Expected loss in each process is expected to be at 10% of input material of each process and scrap value is Rs. 2 per unit.

Relevant information for Period Y is given below.

	Process I		Process II	
	Units	Rs	Units	Rs
Input materials	2,000	8,100.00		
Transferred to Process II	1,750			
Material from Process I			1750	
Added materials				1,900.00
Labour & overheads		10,000.00		22,000.00
Output to finish goods			1600	

**Prepare the following accounts**

- 1 Process I
- 2 Process II
- 3 Normal Loss/ Scrap
- 4 Abnormal Loss
- 5 Abnormal Gain

**Answer****Process I****Step 1 Determine output and losses**

i.	Determine expected output	
	(Units) Input	2000
	Expected loss @ 10%	(200)
		<u>1800</u>
ii.	Abnormal loss/gain (Units)	
	Expected output	1800
	Actual output	1750
	Abnormal loss	<u>50</u>

**Step 2 Calculate cost per unit of output and losses.**

First, find the disposal cost of

loss. Total loss (2000-1750)-Units	250
Disposal cost per unit -Rs.	<u>2.00</u>
	<u>500.00</u>

Then separate out the disposal cost between normal loss and abnormal

loss. Disposal cost of normal loss (200 UnitsxRs.2)	400.00
Disposal cost of abnormal loss (50 UnitsxRs.2)	100.00

First deduct the disposal cost of normal loss to the cost of material.

Cost of input material	8,100.00
Disposal cost of normal loss	<u>(400.00)</u>
	<u>7,700.00</u>

Calculate cost per unit by dividing each cost element by expected output

	Total Cost	Cost per Unit
Material	7,700.00 (/expected output of 1800)	<u>4.28</u>
Labour & Overheads	10,000.00 (/expected output of 1800)	<u>5.56</u>
	<u>17,700.00</u>	<u>9.84</u>

**Step 3 Calculate total cost of output and losses**

Cost of output (1750 Unitsx Rs. 9.84)	17,220
Cost of Normal Loss (200 Units x Rs. 2)	400
Cost of Abnormal Loss (50Units x Rs. 9.84)	480
	<u>18,100.00</u>

**Step 4 Complete accounts**

Accounts are completed together with Process II accounts.

**Process II**

**Step 1 Determine output and losses**

i.	Determine expected output	
	(Units) <u>Input</u>	
	From Process I	1750
		<u>1750</u>
	Total Input	1750
	Expected loss @ 10%	<u>(175)</u>
		<u>1575</u>
ii.	Abnormal loss/gain (Units)	
	Expected output	1575
	Actual output	<u>1600</u>
	Abnormal gain	<u>25</u>

**Step 2 Calculate cost per unit of output and losses.**

Total scrap value of normal loss could have been (175Units x Rs 2) Rs.350. However, actual loss is less than normal loss and, therefore, scrap value is limited to (150 Units x Rs. 2) Rs.300 . The difference between these two is the scrap value of the abnormal gain which can be calculated as shown below.

	<b>Rs.</b>
Scrap value of Normal Loss	350.00
Scrap value of Actual Loss	<u>(300.00)</u>
Scrap value of abnormal gain	<u>50.00</u>

As the actual loss is less than the normal loss, Rs. 50 worth of hidden cost is there. This can be considered as a loss of opportunity to earn Rs. 50 which was possible if the actual loss was equal to the expected/ normal loss.

	Total Cost	Cost per Unit
Material from Process I	17220.00	
Additional Materials	1,900.00	
Scrap value of normal loss	<u>(350.00)</u>	
	18,770.00 (/expected output of 1575)	11.91
Labour & Overheads	<u>22,000.00 (/expected output of 1575)</u>	<u>13.97</u>
	<u>40,770.00</u>	<u>25.88</u>

**Step 3 Calculate total cost of output and losses**

Cost of output (1600 Unitsx Rs. 25.88)	41,408.00
Cost of Normal Loss (175Units x Rs. 2)	350.00
Cost of Abnormal Gain (25Units x Rs. 25.88)	<u>(638.00)</u>
	<u>41,120.00</u>

**Step 4 Complete accounts**

Process I							
	Unit	Price	Value		Unit	Price	Value
Input Material	2000		8,100.00	Output to Process II	1750	9.84	17,220.00
Labour and overheads			10,000.00	Normal Loss	200	-	400.00
				Abnormal Loss	50	9.84	480.00
	<u>2000</u>		<u>18,100.00</u>		<u>2000</u>		<u>18,100.00</u>

**Process II**

	Unit	Price	Value		Unit	Price	Value
From Process II	1750		17,220.00				
Input - Additional Material			1,900.00				
Labour and overheads			22,000.00	Output	1600	25.88	41,408.00
Abnormal Gain	25		638	Normal Loss	175	2.00	350.00
							-
	<u>3100</u>		<u>41,758</u>		<u>3100</u>		<u>41,758.00</u>

**Scrap/ Normal Loss**

	Units	Price	Value		Units	Price	Value
Process I	200	2	400				
Process II	175	2	350	Cash	400	2.00	800.00
Abnormal loss	50	2	100	Abnormal Gain	25	2.00	50.00
			<u>850.00</u>				<u>850.00</u>

**Abnormal Loss**

	Value		Value
Process I	480.00	Abnormal Loss	100.00
		Profit & Loss Account	380.00
	<u>480.00</u>		<u>480.00</u>

**Abnormal Gain**

	Value		Value
Normal Loss/ Scrap Account	50	Process II	638.00
Profit & Loss Account	588.00		
	<u>638.00</u>		<u>638.00</u>

## Example 2

How do we value the finished goods and closing WIP using the following information if the entity uses weighted average cost method of valuation

Process Account					
	Units	Rs		Units	Rs
Opening WIP	300	800			
Materials	700	5,400	Finished Goods	800	?
Labour & overheads		2,850	Closing WIP	200	?
	<u>1,000</u>	<u>9,050</u>		<u>1,000</u>	<u>-</u>

### Additional information

- Closing WIP is 100% complete in terms of material
- Closing WIP is 25% complete in terms of labour & overheads
- Total cost Opening WIP consists Rs 550 direct material and Rs 250 labour and overheads.

### Answer

When there is a closing WIP, it is required to apportion costs between output and closing WIP. Therefore, equivalent units concept is required to use here to convert closing WIP to equivalent fully completed units.

#### Step 1 Determine output and losses

	Total Units	Equivalent Units	
		Material	Labour & OH
Finished Goods	800	800	800
Closing WIP	200	200	50
	<u>1,000</u>	<u>1,000</u>	<u>850</u>

#### Step 2 Calculate cost per unit of output, losses, WIP.

	Material	Labour & OH
Cost incurred for the period	5,400	2,850
Cost of opening WIP	550	250
	<u>5,950</u>	<u>3,100</u>
Equivalent units of work done	1,000	850
Cost per <b>Equivalent Unit</b>	5.95	3.65

#### Step 3 Calculate total cost of output, losses and WIP

	Units	Material	Labour & OH	Total
Finished Goods	800	4,760	2,918	7,678
		(800*5.95)	(800*3.65)	
Closing WIP	200	1,190	182	1,372
		(200*5.95)	(200*25%*3.65)	
				<u>9,050</u>

#### Step 4 Complete accounts

Process Account					
	Units	Rs		Units	Rs
Opening WIP	300	800			
Materials	700	5,400	Finished Goods	800	7,678
Labour & overheads		2,850	Closing WIP	200	1,372
	<u>1000</u>	<u>9,050</u>		<u>1000</u>	<u>9,050</u>

### Example 3

The following information relates to Process 2 of three-stage production process for period X.

Material input from Process I	5,000 Units @Rs 1.85 per unit
Added Material	Rs 2,245
Labour	Rs 4,320
Overhead	Rs 3,090
Actual Loss	800 Units
Opening WIP	600 Units

Opening WIP complete as to:		Rs
Material	100%	945
Added Material	60%	180
Labour	30%	405
Overhead	30%	135
		<u>1,665</u>

1000Units of Closing WIP complete as to:

Material from Process 1	100%
Added Material	75%
Labour	40%
Overhead	20%

Expected loss is 10% of input materials and scrap value is 50 Cents.

### Required

Prepare the following accounts

- Process II
- Normal Loss
- Abnormal gain or loss

### Answer

#### Step 1 Determine output, losses, WIP

Normal loss (5000 Units x 10%)	500
Actual Loss	800
So, abnormal loss	300

#### Output

Opening WIP	600
Input Material	5000
Closing WIP	(1,000)
Actual Loss	(800)
Output to Process III	<u>3800</u>

#### Statement of equivalent units

	Total Units	Proces I Material	Added Material	Labour	Overhead
Output to Process III	3,800	3,800	3,800	3,800	3,800
Normal Loss*	500	-	-	-	-
Abnormal Loss	300	300	300	300	300
Closing WIP	1,000	1,000	750	400	200
		<u>5,100</u>	<u>4,850</u>	<u>4,500</u>	<u>4,300</u>

\* Cost of normal loss is absorbed by the output

**Step 2 Calculate cost per unit of output, losses, WIP.**

	Proces I Material Rs	Added Material Rs	Labour Rs	Overhead Rs	
Cost of opening WIP	945	180	405	135	
Cost incurred for the period*	9,000	2,245	4,320	3,090	
Total cost incurred	9,945	2,425	4,725	3,225A	
Equivalent Units	5,100	4,850	4,500	4,300B	
Cost per equivalent unit(A/B)	1.95	0.50	1.05	0.75	
Total cost of equivalent unit(Rs)	4.25				

\* Material cost net of scrap vale of normal loss (9250- 500 units x 50 Cents)

**Step 3 Calculate total cost of output, losses and WIP**

	Units	Proces I Material Rs	Added Material Rs	Labour Rs	Overhead Rs	Total
Output to Process III	3800	7,410.00	1,900.00	3,990.00	2,850.00	16,150.00
Abnormal loss	300	585.00	150.00	315.00	225.00	1,275.00
Closing WIP(consider Equivalent Units)	1000	1,950.00	375.00	420.00	150.00	2,895.00
						<u>20,320.00</u>

**Step 4 Complete accounts**

<b>Process II</b>					
	Units	Rs		Units	Rs
Opening WIP	600	1,665			
Process I Materials	5,000	9,250	Finished Goods	3,800	16,150
Added Material		2,245	Normal Loss	500	250
Labour		4,320	Abnormal loss	300	1,275
Overheads		3,090	Closing WIP	1000	2,895
	<u>5,600</u>	<u>20,570</u>		<u>5,600</u>	<u>20,570</u>

<b>Normal Loss</b>					
	Units	Rs		Units	Rs
Process II	500	250	Cash	500	250
	<u>500</u>	<u>250</u>		<u>500</u>	<u>250</u>

<b>Abnormal Loss</b>					
	Units	Rs		Units	Rs
Process II	300	1,275	Cash	300	150
			Profit & Loss		1,125
	<u>300</u>	<u>1,275</u>		<u>300</u>	<u>1,275</u>