Process costing
(Relevant to AAT Examination Paper 3 – Management Accounting)
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Process costing
Process costing is a costing system used to calculate the product cost when a company produces masses of identical or similar products through continuous processes. Examples of companies whose operations suit process costing include oil refining companies and fast-food restaurants.

Important terms
Because of spoilage, evaporation, wastage and other reasons, losses usually happen during the production process.

Losses can be classified into normal and abnormal losses, where
● *Normal loss* is loss that is inherent in the production process and cannot be avoided even though the production process is efficient. This may be due to reasons like evaporation and limitation of production technology. Normal loss is usually expected as a percentage of output.
● *Abnormal loss* is excess loss other than normal loss. One example is loss caused by inappropriately running a machine. If the actual loss is less than the normal loss, then the difference is called the *abnormal gain*.
● If the result of the loss can be sold, its sales value is called the *scrap value*.

By end of period, units that are still incomplete in a process are called closing *work in process (WIP)*. These units will be carried forward to next period as opening WIP.

Equivalent units are notional completed units that are used to assign process costs of completed output to the next process, WIP and losses. Equivalent units may be different from physical units (i.e., units with physical form). They represent completed output units that could be produced with inputs actually consumed by completed output, WIP and losses. These derived output units are then used as basis to assign process costs to completed output, closing WIP and abnormal losses/gains.

When different inputs (i.e., materials, labour and overheads) are added to the production process at different time, equivalent units for different inputs may be different. Therefore equivalent units should be calculated separately for different inputs.

Process account
There is a process account for each production process. A process account has two columns on each side. One column is for volume and the other one is for cost. The balance of the volume column and cost column should be the same on both sides.

Process Account

	Units	$		Units	$
Opening WIP	X	X	Output to next process	X	X
Materials	X	X	Normal loss	X	
Labour		X	Scrap value of normal loss		X
Overheads		X	Abnormal loss	X	X
			Closing WIP	X	X
	X	X		X	X

Steps for preparing process account

1) Fill in given information
2) Calculate normal and abnormal loss in units, and calculate scrap value of normal loss (if any)
3) Calculate the equivalent units and cost per equivalent unit (use either weighted average method or first-in-first-out method)
   ➢ When opening WIP exists, there are two layers of process costs: costs incurred in the previous period (i.e. included in opening WIP) and costs incurred in the current period. The weighted-average method mixes costs of opening WIP with costs incurred in current period, calculates the cost per equivalent unit using equivalent units to date and the mixed costs (i.e. all process costs incurred to date), and then assigns the mixed costs to completed output, closing WIP and abnormal loss/gain. The first-in-first-out (FIFO) method assumes the company finishes opening WIP first before starting working on new units. Therefore costs of opening WIP are assigned to completed output only. When calculating cost per equivalent unit, equivalent units in the current period and costs incurred in the current period are used.
4) Assign process costs to completed output to the next process, closing WIP and abnormal loss or gain (there won't be both)
5) Open a T account for any abnormal loss or gain
6) Repeat above steps if there is a second process

Key point:
● When calculating equivalent units, normal losses must be excluded because they do not absorb any of the process costs. The scrap value of a normal loss is treated as a deduction from the process costs. However abnormal losses/gains should always be taken into consideration when calculating equivalent units because part of process costs are assigned to them and then reported as separate items on the statement of comprehensive income. The scrap value of abnormal losses/gains is treated as a deduction from the abnormal loss/gain.

Example

MeeWood Company produces products through two processes: cutting and assembly. At the beginning of July 2012, the cutting process has opening WIP of 200 units at $8,102 and its breakdown was:

	Degree of Completion	$
Materials	100%	4,950
Labour	30%	968
Overheads	20%	2,184
		8,102

In July 2012, 1,000 units of materials were added to the cutting process. Due to limitations of the cutting machine, 10% of materials added to the cutting process were expected to become loss with a scrap value of $9 per unit. It is the company's cost accounting policy to deduct the scrap value of normal losses from the cost of materials in the current process. By end of July, 940 units of finished cutting process were transferred out to the next process: assembly. 100 units remained in closing WIP and their degrees of completion of individual inputs were:

Materials	100%
Labour	60%
Overheads	40%

Costs incurred in July were:

Materials	$20,700
Labour	$5,074
Overheads	$10,920

Required:

Prepare the following accounts for the month of July 2012 using the weighted average method and first-in-first-out method:
(i)   Process account; and
(ii)   Abnormal loss account

Detailed workings on equivalent units and the cost per equivalent unit of individual cost elements must be shown.

Solution:
Weighted average method

	Materials	Labour	Overheads
Completed units	940	940	940
Abnormal loss (W3)	60	60	60
Closing WIP	100	60	40
Equivalent units	**1,100**	**1,060**	**1,040**

	$	$	$
Opening WIP	4,950	968	2,184
Costs incurred in current period	20,700	5,074	10,920
Scrap value of normal loss (W2)	(900)		
Process costs to account for	24,750	6,042	13,104
Cost per equivalent unit (24,750/1,100; 6,042/1,060; 13,104/1,040)	**22.5**	**5.7**	**12.6**

Cutting Process Account

	Units	$		Units	$
Opening WIP	200	8,102	To next process (W5)	940	38,352
Materials	1,000	20,700	Normal loss (W1)	100	
Labour		5,074	Scrap value		900
Overheads		10,920	Abnormal loss	60	2,448
			Closing WIP (W4)	100	3,096
	1,200	44,796		1,200	44,796

Abnormal Loss Account

	Units	$		Units	$
Cutting process	60	2,448	Scrap value	60	540
			Income statement		1,908
	60	2,448		60	2,448

Workings:

Step 1: Create Cutting Process Account and fill in given information, as shown in solution.

Step 2: Calculate normal and abnormal loss in units, and calculate scrap value of normal loss.

(W1) Normal loss = 1,000 x 10% = 100 units

(W2) Scrap value of normal loss = 9 x 100 = $900

(W3) Abnormal loss = 200 + 1,000 – 100 – 940 – 100 = 60 units

Step 3: Use the exhibit shown in solution to calculate equivalent units and cost per equivalent unit.

Step 4: Assign process costs of completed output to next process, closing WIP and abnormal loss.

(W4) Closing WIP valuation

Materials (100 x $22.5)	$2,250
Labour (60 x $5.7)	342
Overheads (40 x $12.6)	504
	3,096

(W5) Valuation of output (completed units) to next process

Materials (940 x $22.5)	$21,150
Labour (940 x $5.7)	5,358
Overheads (940 x $12.6)	11,844
	38,352

Valuation of abnormal loss is then calculated as the difference between total process costs and valuation of closing WIP and output to next process.

Step 5: open T account for abnormal loss, which is shown in solution.

Step 6: not needed in this example.

First-in-first-out (FIFO) method

	Materials	Labor	Overheads
Completed units	940	940	940
Closing WIP	100	60	40
Abnormal loss (W3)	60	60	60
Opening WIP	(200)	(60)	(40)
Equivalent units	**900**	**1,000**	**1,000**
	$	$	$
Opening WIP	4,950	968	2,184
Costs incurred in current period	20,700	5,074	10,920
Scrap value of normal loss (W2)	(900)		
Process costs to account for	24,750	6,042	13,104
Cost per equivalent unit ((20,700 - 900)/900; 5,074/1,000; 10,920/1,000)	**22**	**5.074**	**10.92**

Cutting Process Account

	Units	$		Units	$
			To next process		38,675
Opening WIP	200	8,102	(W5)	940	
Materials	1,000	20,700	Normal loss (W1)	100	
Labour		5,074	Scrap value		900
Overheads		10,920	Abnormal loss	60	2,280
			Closing WIP (W4)	100	2,941
	1,200	44,796		1,200	44,796

Abnormal Loss Account

	Units	$		Units	$
Cutting process	60	2,280	Scrap value	60	540
			Income statement		1,740
	60	2,280		60	2,280

Workings:

Step 1: Create Cutting Process Account and fill in given information, as shown in solution.

Step 2: Calculate normal and abnormal loss in units, and calculate scrap value of normal loss.

(W1) Normal loss = 1,000 x 10% = 100 units

(W2) Scrap value of normal loss = 9 x 100 = $900

(W3) Abnormal loss = 200 + 1,000 – 100 – 940 – 100 = 60 units

Step 3: Use the exhibit shown in solution to calculate equivalent units and cost per equivalent unit.

Step 4: Assign process costs to completed output to next process, closing WIP and abnormal loss.

(W4) Closing WIP valuation

Materials (100 x $22)	$2,200
Labour (60 x $5.074)	304
Overheads (40 x $10.92)	437
	2,941

(W5) Valuation of output (completed units) to next process

Opening WIP	$8,102
Cost incurred in July to complete opening WIP	
Materials	0
Labour (200 x 70% x $5.074)	710
Overheads (200 x 80% x $10.92)	1,747
Units started and completed in July	
Materials (740 x $22)	16,280
Labour (740 x $5.074)	3,755
Overheads (740 x $10.92)	8,081
	38,675

Valuation of abnormal loss is then calculated as the difference between total process costs and valuation of closing WIP and output to next process.

Step 5: open T account for abnormal loss, which is shown in solution.

Step 6: not needed in this example.