

# Paper C01

## Fundamentals of Management Accounting

When you're applying process costing, it's important to take note of the manufacturing method used. In scenarios where ingredients are mixed up together, the concept of normal and abnormal loss comes into play

**By Grahame Steven, FCMA, CGMA**

**M**y previous article about process costing, published in the April issue of *Velocity*, focused on a company that made finished products by assembling components ([bit.ly/ProcessCostingPart1](http://bit.ly/ProcessCostingPart1)). In this article I'll consider a firm in the process industry using the first in, first out (Fifo) method. Manufacturers in this sector mix ingredients to make goods such as food, paint and chemicals.

The company, Slap It On, makes paint in batches. All of the ingredients (raw materials) are put in at the start of the mixing process and the normal loss occurs during the initial stage of manufacturing. At the end of every month some batches are partially completed (work in progress). Unfinished batches are finished in order of completeness – ie, the batch closest to completion is finished first, the second-closest is finished next and so on.

The following figures are obtained for July:

- Opening WIP: 800kg (£1,080, 100 per cent complete), plus mixing work (£200, 50 per cent complete), making a total value of £1,280.
- Costs incurred: 1,000kg of material A at £1.24 per kg (£1,240); 4,000kg of material B at £1.40 per kg (£5,600); and £2,996 for the mixing work.
- Normal loss: 5 per cent (applies to new inputs of raw materials only).
- Output: 5,110kg.
- Closing WIP: 390kg (100 per cent complete; mixing work 60 per cent complete).

The main difference between Slap It On and the component manufacturer in my *Velocity* article is the assumption of a normal loss. Losses occur in manufacturing processes that mix ingredients for

many reasons. Losses occur in baking, for instance, because it's impossible to transfer all of a mixture in a bowl to the next stage of the manufacturing process and because of evaporation during cooking.

Based on its experience, Slap It On expects a normal loss of 5 per cent, which will occur early in the manufacturing process. July's normal loss is expected to be 5% x (1,000kg + 4,000kg) = 250kg. In practice, this figure will be higher or lower owing to factors such as manufacturing efficiency and material quality.

The first step towards a process account is to work out how much of July's output was started and finished that month by subtracting the opening WIP from the total output: 5,510kg – 800kg = 4,310kg.

The next step is to work out whether or not there was an abnormal loss (or gain) as follows:

### Determining abnormal gain or loss

|                            |         |
|----------------------------|---------|
| Opening WIP                | 800kg   |
| Material A                 | 1,000kg |
| Material B                 | 4,000kg |
| Normal loss                | -250kg  |
| Closing WIP                | -390kg  |
| Expected output            | 5,160kg |
| Actual output              | 5,110kg |
| Difference (abnormal loss) | 50kg    |

The next step is to calculate the number of equivalent units for materials and mixing. For materials, the figure for the opening WIP is zero, as no more material was used in relation to opening WIP; 4,310 is included for the paint that was started and finished in July; 390 is included for the closing WIP, since all the materials were issued in July; and 50 is included for the abnormal loss, because this must be valued.

For mixing, 800 x (100% – 50%) = 400 is included for opening WIP in relation

to the work done in July; 4,310 is included for paint started and finished in July; 390 x 60% = 234 is included for the mixing done in July in relation to the closing WIP; and 50 is again included for the abnormal loss. The two workings can be summarised as follows:

### Equivalent units of work in July

|                      | Materials | Mixing |
|----------------------|-----------|--------|
| Opening WIP          | 0         | 400    |
| Started and finished | 4,310     | 4,310  |
| Output               | 4,310     | 4,710  |
| Closing WIP          | 390       | 234    |
| Abnormal loss        | 50        | 50     |
|                      | 4,750     | 4,994  |

The cost per equivalent unit for materials is therefore [(1,000kg x £1.24) + (4,000kg x £1.40)] ÷ 4,750 = £1.44. And the cost per equivalent unit for mixing is £2,996 ÷ 4,994 = £0.60.

The output, closing WIP and abnormal loss can now be valued as follows:

- Output: £1,280 + (400kg x £0.60 per kg) + (4,310kg x £1.44 per kg) + (4,310kg x £0.60 per kg) = £10,312.
- Closing WIP: (390kg x £1.44 per kg) + (234kg x £0.60 per kg) = £702.
- Abnormal loss: (50kg x £1.44 per kg) + (50kg x £0.60 per kg) = £102.

The abnormal loss is valued, because this is the cost of failing to achieve the expected level of output in July. But the normal loss is not valued, since Slap It On expected to incur this.

The figures we have can now be used to prepare the process account:

### Process account for July

|                 | £      |             | £      |
|-----------------|--------|-------------|--------|
| Opening WIP     | 1,280  | Output      | 10,312 |
| Material A      | 1,240  | Ab loss     | 102    |
| Material B      | 5,600  | Closing WIP | 702    |
| Conversion cost | 2,996  |             |        |
|                 | 11,116 |             | 11,116 |

Before going through the following worked example – covering the assembly of components rather than the mixing of materials – you may wish to review my original *Velocity* article using the web link at the start of this piece.

### Worked example on assembly

A company called Picture This assembles camcorders from parts bought in from suppliers. A camcorder component kit is issued from stores to the assembly

line whenever another camcorder has to be assembled. There are partially completed camcorders (WIP) at the end of each month. Incomplete camcorders are assembled in order of completeness – ie, the one closest to completion is finished first, the second-closest to completion is finished next and so on.

The following figures were obtained for July:

- Opening WIP: 30 component kits (£2,460, 100 per cent complete), plus assembly work done in relation to the opening WIP (£1,650, 50 per cent complete), making a total value of £4,110.
- Costs incurred: 120 component kits at £9,960; £12,096 on the assembly line.
- Output: 105 camcorders.
- Closing WIP: 45 component kits (100 per cent complete; assembly work 40 per cent complete).

The first step in getting to the process account for July is to subtract the opening WIP from the total output to calculate how many camcorders were started and finished that month:  $105 - 30 = 75$ .

The next step is to determine the number of equivalent units for components and their assembly. For components, the figure for opening WIP is zero, as no more component kits were used in

relation to opening WIP; 75 is included for kits started and finished in July; and 45 is included for the closing WIP.

For assembly,  $30 \times (100\% - 50\%) = 15$  is included for the opening WIP in relation to the work done in July; 75 is included for camcorders started and finished in July; and  $45 \times 40\% = 18$  is included for camcorders assembled in July in relation to the closing WIP. The two workings can be summarised as follows:

#### Equivalent units of work in July

|                      | Component kits | Assembly |
|----------------------|----------------|----------|
| Opening WIP          | 0              | 15       |
| Started and finished | 75             | 75       |
| Output               | 75             | 90       |
| Closing WIP          | 45             | 18       |
|                      | 120            | 108      |

The cost per equivalent unit for the component kits is therefore  $\frac{£9,960}{120} = £83$ . And the cost per equivalent unit for assembly is  $\frac{£12,096}{108} = £112$ .

The output and closing WIP can now be valued as follows:

- Output:  $£4,110 + (15 \text{ units} \times £112 \text{ per unit}) + (75 \text{ units} \times £83 \text{ per unit}) = £20,415$ .
- Closing WIP:  $(45 \text{ units} \times £83 \text{ per unit}) + (18 \text{ units} \times £112 \text{ per unit}) = £5,751$ .

The figures we have can now be used to prepare the process account:

#### Process account for July

|               | £      |             | £      |
|---------------|--------|-------------|--------|
| Opening WIP   | 4,110  | Output      | 20,415 |
| Components    | 9,960  | Closing WIP | 5,751  |
| Assembly cost | 12,096 |             |        |
|               | 26,166 |             | 26,166 |

#### Practice question on mixing

Now return to the paint firm, Slap It On, and test yourself by producing a process account from the following figures for August (the solution can be found on FM's website at [www.tinyurl.com/nt3j4t5](http://www.tinyurl.com/nt3j4t5)):

- Opening WIP: 390kg (£562, 100 per cent complete), plus mixing work (£140, 60 per cent complete), making a total of £702.
- Costs incurred: 14,000kg of material A at £1.19 per kg; 49,000kg of material B at £1.37 per kg; £38,244 for mixing process.
- Normal loss: 5 per cent (applies to new raw material inputs only).
- Output: 59,800kg.
- Closing WIP: 1,240kg (100 per cent complete; mixing work 80 per cent complete).

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