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AcF 213: Principles of Management Accounting

Course Work Assignment

Part (a)

Under the old system, we have a two-stage allocation of the support (overhead) costs. The first being the allocation of the support costs in cost pool S to the Photolithography and Assembly departments based on the number of machine hours. With the second being the allocation of these support costs and the support costs of cost pools P1 and P2 to the cost objects, i.e. W101 and W202.

Stage 1 Allocation

Allocate S on basis of machine hours, the total support costs in cost pool S being £1,740,000.

$$\begin{array}{l} \text{No. of machine hours:} \\ \text{P1} = 110,000 \\ \text{P2} = \underline{35,000} \\ \hline 145,000 \end{array}$$

Therefore, departmental cost driver rates are as follows:

$$\text{P1} = \frac{110,000}{145,000} \times 100\% = 75.86\%$$

$$\text{P2} = \frac{35,000}{145,000} \times 100\% = 24.14\%$$

Thus, the support costs allocated in stage 1 are as follows:

$$\text{P1} = 75.86\% \times £1,740,000 = £1,320,000$$

$$\text{P2} = 24.14\% \times £1,740,000 = £ 420,000$$

Stage 2 Allocation

Now, we need to allocate the above support costs, along with the support costs from cost pools P1 and P2 to the cost objects.

The accumulated costs in P1 and P2 being the sum of the costs from the stage 1 allocation and the support costs from cost pools P1 / P2.

$$\text{P1} = £1,320,000 + £680,000 = £2,000,000$$

$$\text{P2} = £ 420,000 + £240,000 = £ 660,000$$

These costs now need to be allocated to the cost objects on the basis of direct labour hours, so let's work out the cost driver rates:

$$\text{W101 / P1} = \frac{80,000}{100,000} \times 100\% = 80.00\%$$

$$W202 / P1 = \frac{20,000}{100,000} \times 100\% = 20.00\%$$

$$W101 / P2 = \frac{40,000}{60,000} \times 100\% = 66.67\%$$

$$W202 / P2 = \frac{20,000}{60,000} \times 100\% = 33.33\%$$

Thus the allocation of these costs to W101 and W202 using the above cost driver rates is as follows:

$$\begin{aligned} W101: \quad W101 / P1 &= 80.00\% \times \text{£}2,000,000 = \text{£}1,600,000 \\ W101 / P2 &= 66.67\% \times \text{£} 660,000 = \underline{\text{£} 440,000} \\ &\text{£}2,040,000 \end{aligned}$$

$$\begin{aligned} W202: \quad W202 / P1 &= 20.00\% \times \text{£}2,000,000 = \text{£} 400,000 \\ W202 / P2 &= 33.33\% \times \text{£} 660,000 = \underline{\text{£} 220,000} \\ &\text{£} 620,000 \end{aligned}$$

Therefore, the support costs per unit for W101 and W202 are as follows:

$$W101: \quad \frac{\text{£}2,040,000}{600,000} = \text{£}3.40$$

$$W202: \quad \frac{\text{£}620,000}{300,000} = \text{£}2.07$$

Direct Labour Cost

We also need to calculate the direct labour cost per unit:

$$W101: \quad \frac{120,000 \text{hours} @ \text{£}20.\text{hour}^{-1}}{600,000 \text{units}} = \text{£}4.00.\text{unit}^{-1}$$

$$W202: \quad \frac{40,000 \text{hours} @ \text{£}20.\text{hour}^{-1}}{300,000 \text{units}} = \text{£}2.67.\text{unit}^{-1}$$

Total Unit Cost

Thus, the total unit cost is the sum of the support costs, the direct labour costs, and the direct materials cost per unit:

	W101	W202
Support Costs	£3.40	£2.07
Direct Labour Costs	£4.00	£2.67
Direct Materials Costs	£4.00	£2.00
	£11.40	£6.74

Assumptions:

In the above calculations, I have assumed that setup times are negligible, since they are not a volume-related activity.

I have also assumed that the production level is exactly equal to the sales level, and that there is no beginning or ending inventory, else the product costs would be affected, and there is insufficient information in the question to deduce what the product costs would otherwise have been.

Part (b)

Because ABC-Quick requires that costs are allocated for a certain time period, I arbitrarily chose July 19x7 and "actual costs", whilst working in the program.

The first part of the ABC model consists of the resource module, in which I decided to open three accounts - one for each of the cost pools S, P1 and P2, crediting each with £1,740,000, £680,000 and £240,000 respectively. This seemed more appropriate than opening one account for the total support costs and then allocating out to the three cost pools, since the resource module is already an "umbrella" over the three accounts.

Next, I created five accounts in the activity module of the ABC model - one each for setup, P1 direct labour, P2 direct labour, P1 machining and P2 machining* . Finally, I created the two accounts in the cost objects module - one each for W101 and W202.

The next steps were to allocate the costs from the resource module to the cost objects via the activity module.

Given the information of how the amounts from the old cost pools were traced to each of the new activity cost pools, it seemed reasonable to allocate the costs to the activities on the basis of percentages, so I therefore converted each column in the table into percentages as follows:

Activity Cost Pools	S	P1	P2
P1 DL	10.34%	20.59%	-
P2 DL	6.90%	-	25.00%
Setting Up	51.72%	57.35%	60.42%
P1 M	22.99%	22.06%	-
P2 M	8.05%	-	14.58%
	100.00%	100.00%	100.00%

Therefore, the amounts allocated to each activity cost pool is as follows:

Activity Cost Pools	S	P1	P2	Total
P1 DL	£179,916	£140,012	-	£319,928
P2 DL	£120,060	-	£60,000	£180,060
Setting Up	£899,928	£389,980	£145,008	£1,434,916
P1 M	£400,026	£150,008	-	£550,034
P2 M	£140,070	-	£34,992	£175,062
	£1,740,000	£680,000	£240,000	£2,660,000

To allocate the costs in the activity cost pools to the cost objects, five activity cost drivers were required - one for each activity cost pool. The direct labour and the machining cost drivers were based on the number of hours spent on each wafer, and were taken directly from the question paper.

* N.B. In both the ABC-Quick model and in the diagram, "P1 Direct Labour" is abbreviated to "P1 DL", "P2 Machining" to "P2 M", "Direct Labour Hours P1" to "DLH P1", and so forth.

However, for the setup costs allocation, it was necessary to alter the number of setups for W202, to take account of the fact that it takes 1.25 times as long to setup for W202 as it does to setup for W101. To this end, I changed the 4,000 hours for W202 to $(4,000 \times 1.25 =)$ 5,000 hours, so that this situation was reflected.

Thus, costs allocated to W101 and W202 are as follows:

<i>W101:</i>	Total Cost	Unit Cost	<i>W202:</i>	Total Cost	Unit Cost
Setting up	£409,976	£0.68	Setting up	£1,024,940	£3.42
P1 DL	£255,942	£0.43	P1 DL	£63,986	£0.21
P2 DL	£120,040	£0.20	P2 DL	£60,020	£0.20
P1 M	£400,025	£0.67	P1 M	£150,009	£0.50
P2 M	£100,035	£0.17	P2 M	£75,027	£0.25
	<u>£1,286,018</u>	<u>£2.14</u>		<u>£1,373,982</u>	<u>£4.58</u>

The diagram on the following page summarises all the above.

However, to get the total unit cost for each wafer, we also need to add on the direct labour and direct materials cost per unit. These are exactly the same as in part (a), since ABC is only concerned with the overhead (support costs) allocation.

Thus, the total unit costs for the two wafers are as follows:

	<u>W101</u>	<u>W202</u>
Support Costs	£2.14	£4.58
Direct Labour Costs	£4.00	£2.67
Direct Materials Costs	£4.00	£2.00
	<u>£10.14</u>	<u>£9.25</u>

Again, in this question I have assumed that sales volume = production volume, and that there is no beginning or ending inventory, for the same reasons as in part a.

Part (c)

First of all, the difference in product costs of the wafers under the two costing systems is due purely to the difference in the way that ABC allocates the support costs (overheads) compared with the old system. It has nothing to do with the direct labour wage rate, nor the direct materials costs, since ABC is only concerned with the support (overhead) costs.

ABC is "a system of costing...which recognises that costs are incurred by each activity that takes place...and that products should bear costs according to activities they use. Cost drivers are identified, together with the appropriate cost pools, which are used to charge costs to products."¹ This is in stark contrast to the traditional system, in which only volume-related bases are used to allocate the support costs to the products.

Cooper and Kaplan, the inductors of ABC in the late 1980's, suggested that "traditional cost systems report distorted product costs whenever the cost of non-volume-related activities is significant."² Indeed, this is true in our example - under ABC, the setting up costs accounted for over half of the support costs, but this fact was not recognised under the traditional system, since setting up is not related to the volume of output. Thus, W202, the low-volume product, was vastly undercosted (by £2.51 per unit), and W101, the high-volume product, was significantly overcosted (by £1.26 per unit). This, again, is in line with Cooper and Kaplan's arguments.

Taking this into account and comparing the two costing systems, the profit recorded on the sale of each type of wafer is as shown in the table.

	Old System		ABC	
	W101	W202	W101	W202
Selling Price	£11.50	£12.25	£11.50	£12.25
Product Cost	£11.40	£6.74	£10.14	£9.25
Profit	£0.10	£5.51	£1.36	£3.00

Clearly, one can see that the old system gave a misleading profit figure per wafer, and that the ABC system gives a truer picture as to the profitability of each product.

¹ pp12, A Dictionary of Accounting, 1995, Oxford University Press

² pp295, Management and Cost Accounting, Drury, 4th Edition, 1996, International Thompson Business Press

Part (d)

Profitability could be improved at the Fishwick plant in a number of ways. Perhaps the most obvious being to increase the batch size and cut down on the number of setups, since setups are a major expense and major cost driver, but caution would need to be exercised that not too much stock is stored, otherwise unwanted storage costs may arise.

Under the traditional costing system, a profit of only £0.10 is made per unit of W101, and there is a profit of £5.51 per unit of W202. At first glance, this would suggest that it would not be worth continuing to make W101, as we could better spend our resources in producing more W202. But, if the production of W101 ceased, then all the support costs would have to be absorbed by W202, thus making it far less profitable. Bearing in mind that W202 is a low-volume product, it would be inadvisable to subscribe to this strategy, since the lack of "subsidisation" from W101 would render the Fishwick plant a loss-making operation. Also, looking at the more accurate reflection in costs given under ABC, it is easily seen that the above argument is even more applicable.

Therefore, the Fishwick plant needs to produce both types of wafer, but produce the mix that optimises their profitability. In the first instance, this could be investigated by performing a simple linear programming analysis.

There are, of course, other more simplistic ways of improving profitability. For example, looking for cheaper supplies of their direct materials, checking-up on employees to ensure that they are working efficiently, and, providing that it is not to the detriment of their sales volume, increase the selling price of their high-volume products.

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