**Case study on cost classification, cost behaviour, flexible budgets, profit and cash flow statements**

**Questions and solutions**

XYZ plc manufactures and sells various products. The management are considering revising its budgets for quarter 3. You are provided with the following information relating to this.

The budget for one of its products the first 2 quarters are shown below:

|  |  |  |
| --- | --- | --- |
|  | Quarter 1 | Quarter 2 |
| Production (in 000s units) | 25 | 30 |
| Sales (in 000s units) | 20 | 24 |

|  |  |  |
| --- | --- | --- |
| Costs (in £000s) | Quarter 1 | Quarter 2 |
| Direct materials | 250 | 300 |
| Factory wages | 475 | 550 |
| Production overheads | 700 | 800 |
| Administration overheads | 250 | 250 |
| Selling & distribution overheads | 600 | 688 |

Additional information for Quarters 1 and 2 cost budgets:

1) The variable elements of factory costs vary with production volume and the variable elements of the period costs vary with sales volume.

2) Production overheads include £50,000 per quarter for depreciation of machinery.

Forecasts for quarter 3:

a) In Quarter 3 the sales volume could range from an extreme low volume of 12,000 units to an extreme high volume of 32,000 units but with a most likely volume of 22,000 units. In Quarter 2 it would be possible to estimate accurately sales for Quarter 3. The production and sales volume are expected to remain the same in Quarter 3.

b) Costs in Quarter 3 are expected to differ from those in Quarters 1 to 2 as follows:

1) Material costs will rise in price by 5%.

2) All factory labour wage rates will rise by 7.5%

3) All fixed costs (except administration overheads) will increase by 10%.

For all 3 quarters:

a) Inventory will be valued at a standard cost of £60 per unit and selling price for the year at £100 per unit.

b) All sales are on credit. 70% these are expected to be received in 2 months and the remaining in 3 months.

c) All production related cash expenses are paid in the month production takes place. All other expenses are paid in the month of the sales.

**Required (with workings and explanation where relevant):**

**Question (a)**

**Produce a statement which analyses, under each cost classification given in the budgets, the variable per unit and fixed costs which are expected to apply during Quarter 3.**

**Answer (a)**

**Cost analysis for quarters 1 and 2**

**Direct materials cost/unit = £250,000 / 25,000 units = £10 per unit or…**

**Factory wages: Explain why this is not a variable cost or fixed cost or semi – fixed cost. Justify this is a semi-variable cost by using any method of analysis: high-low method / incremental cost analysis, simultaneous equation method or graphical analysis. Explain the methods.**

**Using incremental cost analysis method:**

**Variable factory wages cost / unit**

**= Incremental costs / Incremental production volumes**

**= £ [550,000 – 475,000] / [30,000 – 25,000]**

**= £75,000 / 5,000 units**

**= £15 per unit produced.**

**Total fixed factory wages costs**

**= £550,000 - £15 x 30,000**

**= £100,000 per quarter or……**

**Show proof that the above analysis is correct.**

**Production overheads [again justify this as a semi-variable cost and use any method of analysis as above:**

**Using the high-low method:**

**Variable production overhead / unit**

**= £ [800,000 – 700,000] / [30,000 – 25,000] units**

**= £100,000 / 5000 units = £20 per unit produced**

**Total fixed production overheads**

**= £800,000 - £20 x 30,000 = £200,000 or….**

**Show proof that the above analysis is correct.**

**Administration overheads is a fixed cost of £250,000 per quarter…. explain why this is fixed cost**

**Selling & distribution overheads [again justify this as a semi-variable cost and use any method of analysis as above:**

**Using the simultaneous equation method:**

**y = a + bx where ‘y’ is the total semi-variable, ‘a’ is the fixed cost, ‘b’ is the variable cost per unit and ‘x’ *is the number of units sold.***

**Using the information provided for selling & distribution overheads:**

**Quarter 2: £688,000 = a + 24,000b. --- Equation 1**

**Quarter 1: £600,000 = a + 20,000b. --- Equation 2**

**Equation 2 minus Equation 1: £88,000 = 4000b**

**Hence ‘b’ = £88,000 / 4000 units = £22 per unit**

**Variable Selling & distribution overheads or ‘b’ = £22 per unit sold.**

**Fixed Selling & distribution overheads [using equation 1]**

**‘a’ = £688,000 – 24,000 x £22 = £160,000 per quarter.**

**Proof that the above analysis is correct using equation 2:**

**£160,000 + 20,000 x £22 = £600,000**

***If the high-low method is used the results will be the same:***

***Variable Selling & distribution overheads***

***= £ [688,000 – 600,000] / [24,000 – 20,000] = £22 per unit sold***

**Fixed Selling & distribution overheads = £688,000 - £22 x 24,000**

***= £160,000 per quarter or ….***

**Analysis of costs for quarters 1 and 2 [summary]**

|  |  |  |
| --- | --- | --- |
|  | Total fixed  costs | Variable cost  per unit |
|  | £000 | £ |
| Direct materials | -- | 10 |
| Factory wages | 100 | 15 |
| Production overheads | 200 | 20 |
| Administration overheads | 250 | --- |
| Selling & distribution overheads | 160 | 22 |

**Statement for each cost classification the variable per unit and fixed costs expected to apply during Quarter 3.**

**Direct materials cost/unit = £10 x 1.05 = £10.50 per unit**

**Variable factory wages cost / unit = £15 x 1.075 = £16.125 per unit produced**

**Fixed factory wages cost = £100,000 x 1.1 = £110,000 quarter 3**

**Variable production overhead / unit = £20 per unit produced**

**Total fixed production overheads = £200,000 x 1.1 = £220,000 for quarter 3.**

**Administration overheads is a fixed cost of £250,000 for quarter 3 [no change]**

**Variable Selling & distribution overheads = £22 per unit sold**

**Fixed Selling & distribution overheads = £160,000 x 1.1 = £176,000 for quarter 3**

**Analysis of costs for quarter 3 [summary]**

|  |  |  |
| --- | --- | --- |
|  | Total fixed costs | Variable cost per unit |
|  | £000 | £ |
| Direct materials | -- | 10.50 |
| Factory wages | 110 | 16.125 |
| Production overheads | 220 | 20 |
| Administration overheads | 250 | --- |
| Selling & distribution overheads | 176 | 22 |
| Total costs | 756 | 68.625 |

**---------------------------------------------------------------------------------------------------------**

**Question (b)**

**Prepare a flexible budget of estimated production costs for Quarter 3 for the 3 levels of output: 12,000 units, 22,000 units and 32,000 units considering all relevant information provided above.**

**Answer (b)**

**Start by explaining the term ‘flexible budget’.**

**Flexible budget of estimated production costs for Quarter 3**

|  |  |  |  |
| --- | --- | --- | --- |
| **Production Volume [units]** | **12,000** | **22,000** | **32,000** |
| **Production costs** | **£000s** | **£000s** | **£000s** |
| Direct materials @ £10.50 per unit | 126 | 231 | 336 |
| Variable factory wages @ £16.125 | 193.5 | 354.75 | 516 |
| Fixed factory wages | 110 | 110 | 110 |
| Variable production overhead @ £20 per unit | 240 | 440 | 640 |
| Fixed production overheads | 220 | 220 | 220 |
| Total production costs | 889.5 | 1355.75 | 1822 |

**Check for 12,000 units:**

**12,000 units x £ [10.50 + 16.125 + 20] + £ [110,000 + 220,000]**

**= 12,000 x £46.625 + £330,000 = £889,500**

**Question (c)**

**Prepare statements for Quarter 3 to show the budgeted profit and cash flow for the 3 levels of output: 12,000 units, 22,000 units and 32,000 units.**

Profit statements are produced for external use or internal use/management.

For external use / external reporting – Absorption costing principles **must** be used.

For internal use / management’s use – Both absorption costing and marginal / variable costing may be used; Marginal costing is **preferred** for internal reporting.

**Flexible budgeted profit statement for Quarter 3 [using absorption costing principles)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sales and production volumes [units]** | **12,000** | **22,000** | **32,000** |
|  | **£000** | **£000** | **£000** |
| **Sales [£100 per unit]** | **1200** | **2200** | **3200** |
| **Less: Production costs of sales [as per (b)** | **(889.5)** | **(1355.75)** | **(1822)** |
| **Gross profit** | **310.5** | **844.25** | **1378** |
| **Less: Period costs** |  |  |  |
| **Administration costs** | **(250)** | **(250)** | **(250)** |
| **Variable selling & distribution overheads @ £22 per unit sold** | **(264)** | **(484)** | **(704)** |
| **Fixed selling & distribution overheads** | **(176)** | **(176)** | **(176)** |
| **Profit / (loss)** | **(379.5)** | **(65.75)** | **248** |

**Flexible budgeted profit statement for Quarter 3 [using marginal costing principles)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sales and production volumes [units]** | **12,000** | **22,000** | **32,000** |
|  | **£000** | **£000** | **£000** |
| **Sales [£100 per unit]** | **1200** | **2200** | **3200** |
| **Less: Variable costs**  **Production costs of sales [notes 1 & 2]** | **[559.5]** | **[1025.75]** | **[1492]** |
| **Selling & distribution overheads [note 3]** | **[264]** | **[484]** | **[704]** |
| **Contribution @ £ [100 – 68.625] = £31.375 per unit sold** | **376.5** | **690.25** | **1004** |
| **Less: Fixed costs £000** |  |  |  |
| **Factory wages 110** |  |  |  |
| **Production overheads 220** |  |  |  |
| **Administration costs 250** |  |  |  |
| **Selling & distribution overheads 176** | **[756]** | **[756]** | **[756]** |
| **Profit / (loss)** | **(379.5)** | **(65.75)** | **248** |

**Notes**

**1. Direct materials cost / unit + variable factory wages / unit + variable factory overheads / unit = £ [10.50 + 16.125 + 20] = £46.625**

**2. For 12,000 units: 12,000 x £46.625 = £559,500**

**3. For 12,000 units: 12,000 x £22 = £264,000**

**Comment: Both methods, show the same results [profits / loss]. This is because the production and sales volumes are expected to be the same in Quarter 3.**

**Flexible budgeted cash flow statements for Quarter 3**

|  |  |  |  |
| --- | --- | --- | --- |
| Sales and production volumes [units] | 12,000 | 22,000 | 32,000 |
|  | £000 | £000 | £000 |
| Cash inflows |  |  |  |
| Re: Quarter 2 [Note 1] | 1,840 | 1,840 | 1,840 |
| Re: Quarter 3 [Note 2] | 280 | 513 | 747 |
| Total inflows | 2120 | 2,353 | 2,587 |
|  |  |  |  |
| Cash outflows |  |  |  |
| Production costs [excluding depreciation] | 839 | 1,306 | 1,772 |
| Administration costs | 250 | 250 | 250 |
| Selling & distribution overheads | 440 | 660 | 880 |
| Total outflows | 1529 | 2216 | 2902 |
| Net cash inflows/(outflows) | 591 | 137 | [315) |

**Notes:**

**1. Cash receipts in Quarter 3 from Quarter 2 sales.**

**1ST month in Quarter 2: i.e. 30% of sales of month 1 of Quarter 2:**

**{[£100 x 24,000 units] / 3 months} x 0.3 = £240,000**

**2nd month in Quarter 2: i.e. 100% of sales of month 2:**

**£100 x 24,000 units] /3 = £800,000**

**3rd month in Quarter 2: 100% of sales of month 3:**

**£100 x 24,000 units] /3 = £800,000**

**Total cash receipts in Quarter 3 from Quarter 2**

**= £ [240,000 + 800,000 + 800,000] = £1,840,000**

**2. Cash receipts in Quarter 3 from Quarter 3 sales – 70% of the month 1 of**

**Quarter 3**

**1ST month in Quarter 3:**

**If sales = 12,000 units – [12,000 x £100] / 3 x 70% = £280,000**

**If sales = 22,000 units – [22,000 x £100] / 3 x 70%**

**= £513,333 [rounded to £513,000]**

**If sales = 32,000 units – [32,000 x £100[ / 3 x 70%**

**= £746,667 [rounded to £747,000]**

**Question (d)**

**Comment on why the 2 statements in (c) differ.**

* **Profit statement for quarter 3 shows the net profits for the possible production and sales as follows:**

**Production / sales Profits / (losses)**

**000s units £000**

**12 (379.5)**

**22 (65.75)**

**32 248**

**The decreasing pattern of losses followed by profits contrasts with the estimated net cash flows for the same sales and production levels.**

* **Production / sales Net cash inflow / (outflows)**

**000s units £000**

**12. 591**

**22 137**

**32 (315)**

* **This pattern occurs because production costs and period costs are paid for in the month in which they are incurred whereas all sales are on credit terms.**
* **The benefit of higher sales in Quarter 3 will be reflected in the higher cash inflows of Quarter 4.**
* **The main cash inflows affecting Quarter 3 relate to the sales levels in Quarter 2 which is estimated at 24,000 units**
* **In addition, the net cash flows are not affected by depreciation but this affects the costs and hence the profits/losses.**