Chapter 6
MANAGEMENT ACCOUNTING AND THE CONTROL PROCESS – 1

Key Learning Objectives

By the time you have finished studying this chapter, you should be able to:

- explain the nature of organisational control;
- understand the key nature of control information;
- prepare flexible budgets for control;
- calculate standard costs and variances for purposes of control;
- examine the interpretation of variances and other control data.

The Nature of Organisation Control

This section looks at two aspects of control: the control process itself and feedback concepts.

The Control Process

You have seen in the previous two chapters that all organisations need to engage in planning. Planning is essential in order to achieve the objectives of the organisation. These objectives can be very diverse, and examples are: to achieve a target profit for the year, to manufacture 25,000 items in a year, and to teach 300 students in the period from September to June.

Plans that are stated in money or financial terms are called budgets. Therefore a company will have a profit budget, a factory will have a production budget and a school will have a teacher budget.

Many organisations will also have a multi-year budget, say a three-year budget. The detailed annual budget will form the first year of this three-year period. The budget rolls forward through time, with the second year becoming the first year as another year is added in to make the third year.

The budget sets out in financial terms what the organisation plans to achieve in the forthcoming year. It is essential if the organisation is to succeed and represents an important first step on the road to success. The organisation should follow this up by checking on progress regularly in order to achieve its goals by the year's end. This process of regular checking is termed *management control*. Management control has two important aspects:

- There must be a regular (e.g. monthly) comparison of the budget against what is actually achieved.
- Having made such a comparison, managers must make the necessary changes to ensure that any underachievement can be corrected and the budget achieved.

Feedback Concepts

The process of comparing plans against actual output and expenditure is termed *feedback*. It has two different dimensions. *Feedback control* is the process of looking back in time and comparing the budget against actions. This is a regular and recurring process so that every month, say, the budget is compared with actual outcomes. An example of a feedback statement is shown in Table 6.1. This statement is for the third month in the university's financial year, which commences on 1 August. It shows in the second, third and fourth columns the cumulative figures for the first three months of the year. The variance shows the difference between budget and actual; as actual expenditure exceeds budget, this is signified by the letter A for 'adverse'. The last three columns show the figures for the month of October; October is the third and most recent month. Of the cumulative variance of £10,400 adverse, £2000 was generated in October. As you can see, the statement looks backwards and is an example of feedback control; by informing the head of department of the significant overspending on salaries, it should lead to investigation of the problem and to steps to correct the situation.

For a feedback system to operate effectively there is a need for:

- objectives for the period that can be quantified;
- outputs for the period that can be compared with the objectives;
- a reporting system that effectively compares the objectives and the outputs;
- the capacity to take action if objectives and outputs are not the same.

Table 6.1 Expenditure control statement for a university department

Expenditure head	Cumulative budget £	Cumulative expenditure £	Cumulative variance £	October Budget £	October Exp. £	October variance £
Salaries	150,000	160,400	10,400 A	50,000	52,000	2000 A

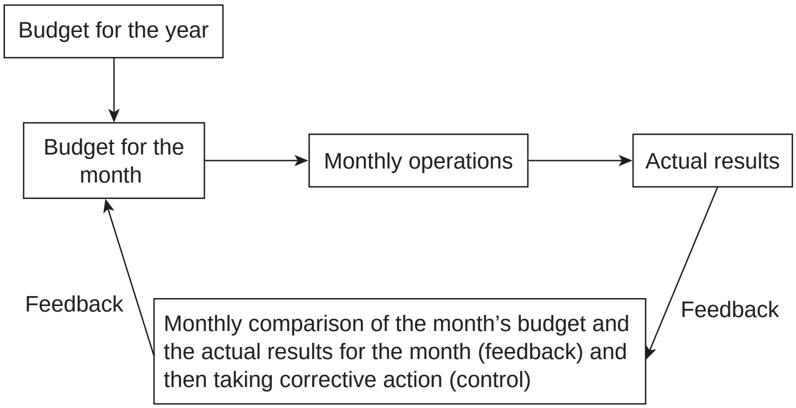

Figure 6.1 Feedback control loop

The feedback control loop in Figure 6.1 illustrates this diagrammatically:

- The budget for the month is derived from the budget for the year so that the annual objective is broken down into monthly objectives.
- Feedback involves monitoring the actual results for the period by comparing them against the budget for the period and identifying differences.
- If the differences require action then control involves carrying out that action. It may be necessary to take action to improve operations so that they are more effective next month. Alternatively, action on the budget itself may be required if, for example, material prices have increased significantly since the start of the year, rendering the budget out of date.

Feed-forward control involves trying to predict outputs against desired outputs. An example is the monthly cash budget. If this shows that a negative cash balance is likely to occur in a specific month, it alerts management who can then try to take preventative action by rephasing expenditure or by ensuring that overdraft facilities will be in place. So, feed-forward control is about trying to take action before an event occurs in order to influence the sequence of events.

Feed-forward control attempts to take corrective action before an event, whereas feedback control takes corrective action after the event. But, sometimes it will prove impossible to predict problems, however refined the forecasting process. It has been pointed out by Lyne (1995) that the development of a predictive model requires more than technical proficiency. He argues that in order to get the individuals to perform at a predicted level of activity, it is necessary to know how those individuals are motivated. Lyne's article is summarised at the end of this chapter. We will return to the issue of motivation later in this chapter and in the next.

Information for Control

This section considers the issues of summarising information and qualities of control information.

Summarising Information

The control system consists of layers of feedback systems, each of which involves summarising lower-level reports. In this process, information is lost. Figure 6.2 illustrates this process, showing how information is summarised or filtered. The head of the Machine Department sees a detailed performance report for that department as this is the manager's responsibility. However, the factory manager has to oversee the management of the factory and the three production departments. In consequence, the factory manager sees a summarised report of each department's performance. At a higher level of summary, the managing director is responsible for three factories, finance and marketing and receives a summarised report on each factory. The information has to be summarised in this fashion in order to make it manageable. However, at each stage of summarisation, information is lost; one consequence of the system may be to conceal important detailed information from top management.

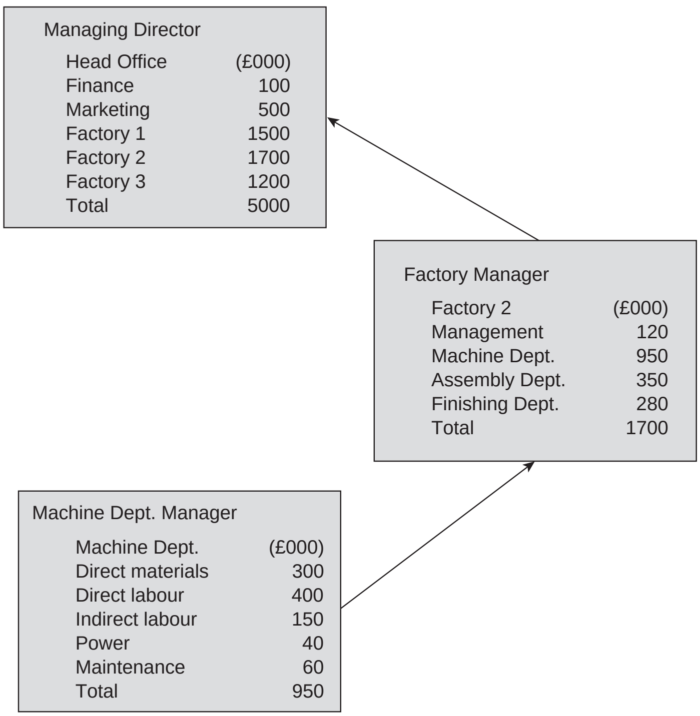

Figure 6.2 The information summarising process

Qualities of Control Information

The summarised reports in Figure 6.2 would form the focus for the preparation of control information. For such information to be effective and be valuable to the user, it should meet the following criteria:

- *Timeliness*. The information should be made available by a certain date. For example, the monthly control statement should be provided by, at most, a week after month's end in order to give the appropriate manager time to use the information in the most effective way.
- *Clarity*. The user should be able to read and assimilate the information quickly. The information should be clear and unambiguous, avoiding unnecessarily complex technical terminology. Clarity is assisted by the use of subtotals, totals and the use of graphs. Superfluous detail may be sacrificed.
- *Succinctness*. Information should not be excessive as this will waste the manager's time. There should be communication between providers and users of information to determine what the latter require.
- *Relevance*. The information should be relevant to the requirements of the user. Although the information should be succinct, it should also be complete so that the user does not need to access other sources of information. The provision of irrelevant information is unhelpful to the user.
- *Accuracy*. If the statement lacks accuracy, this may embarrass the user and lead to a loss of confidence in the information. However, not every manager needs the same level of accuracy. In Figure 6.2, the assembly manager will need much more detailed information about the different elements of the Assembly Department than will the managing director.
- *Cost-effectiveness*. The benefit to the user manager must exceed the cost of providing the information.

If these criteria are followed, user managers will gain confidence in the control information and this may assist in raising the profile and prestige of the management accounting function.

Fixed and Flexible Budgets

This section considers:

- the different objectives of fixed and flexible budgets;
- the benefits of flexible budgets;
- the preparation of flexible budgets;
- the calculation of variances from flexible budgets.

Fixed Budgets

Chapters 4 and 5 introduced you to budgets and budgeting. The budgets discussed were fixed budgets. A fixed budget is one that is based on one level of output; it is not usually changed after it is agreed. The fixed budget is used for planning purposes. The budgeted profit and loss account, budgeted balance sheet and cash budget constitute the highest level of fixed budgets and together may be termed the master budget. The master budget, including the budgeted net profit, will be discussed by and approved by the board of directors. Once approved by the board, the master budget becomes officially the company's target for the forthcoming financial year.

Flexible Budgets

A flexible budget is designed to change as the underlying volume of activity changes. It does this by considering the factors that cause costs to change as the volume of activity changes. Flexible budgets have two principal benefits:

- They allow the firm to project outcomes, including key variables such as profit, at different levels of activity. This is useful if the firm is unsure about some key issues, such as the potential sales for the year. A firm may also engage in 'what if' or sensitivity analysis in order to determine the impact on profitability and cash of changes in key variables such as sales, production and costs.
- They can be used for feedback control after the actual costs for a specific period have been determined. There can be valuable control information if the actual costs for a period are compared with the flexed budget for the period rather than with the fixed budget. The following illustration demonstrates this.

	Fixed budget for June	Actual data for June
Output	3,000 units	3,500 units
Production costs		
Variable costs (£, at £3 per unit)	9,000	10,400
Fixed costs (£)	10,000	10,000

First we will consider the comparison of the actual data with the fixed budget and then with a flexible budget. Comparison with the fixed budget for June gives the results shown in Table 6.2.

The cost variance is calculated by subtracting the actual costs from the budgeted costs. If the actual costs exceed the budget, this is termed an adverse variance as it increases costs over budget. On the other hand, if budget exceeds actual, this is termed a favourable variance. In this case, we have an adverse variance of £1,400. However, as can be seen,

Table 6.2 Comparison with a fixed budget

	Fixed budget	Actuals	Variances
Output	3,000 units	3,500 units	
Costs			
Variable costs (£)	9,000	10,400	1,400 Adverse
Fixed costs (£)	10,000	10,000	0
Totals (£)	19,000	20,400	1,400 Adverse

Table 6.3 Comparison with a flexible budget

	Flexible budget	Actuals	Variances
Output	3,500 units	3,500 units	
Costs			
Variable costs (£, at £3 per unit in the flexible budget)	10,500	10,400	100 Favourable
Fixed costs (£)	10,000	10,000	0
Totals (£)	20,500	20,400	100 Favourable

the variance arises because output is 500 units more than the budget; it would be expected that the variable costs of producing 3500 units exceeds the budgeted variable cost of producing 3000 units. In this situation, a better comparison is between the actual costs and a flexible budget. The flexible budget restates the fixed budget for June, making allowance for the actual output of 3500 units and the actual costs of producing 500 more units. This is demonstrated in Table 6.3.

Comparison with a flexible budget for 3500 units demonstrates that in June the actual costs are less than the flexed budget, and this is reflected by the £100 favourable variance.

The Development of Flexible Budgets

In order to develop flexible budgets, we need to understand the way that costs behave. Direct costs (direct labour and direct materials) will often have a linear relationship with output, so that costs double as output doubles. At the other end of the cost spectrum, fixed costs such as rent and managerial salaries are unlikely to change as volume changes. You read in Chapter 2 that some fixed costs increase in a step cost fashion. An example is foremen's salaries that double when a factory moves from a single-shift system to a two-shift system. Other indirect costs such as power may be semi-variable in nature, reflecting an annual standing charge and a variable cost element that is related to the amount of power consumed.

We will now give an example to demonstrate the construction of a flexible budget. Using the following information, we will produce flexible budgets for the production of 3000, 6000 and 9000 units:

Variable costs		
Direct material A	£4 per unit of output	
Direct material B	£1.50 per unit of output	
Semi-variable costs:	Output	Costs (£)
	3,000	13,000
	5,000	19,000
	8,000	28,000
	10,000	34,000
Fixed overhead:	Output	Costs (£)
	0–4,000	25,000
	4,001–8,000	35,000
	8,001–12,000	47,000

The first task is to segregate the different elements of the semi-variable overheads. This involves the use of the technique termed the 'high-low' method, which you met in Chapter 5. It involves the selection of the lowest and highest levels of output and costs, calculating the differences between them, and uses this information to identify the variable costs.

	Output	**Costs (£)**
High	10,000	34,000
Low	3,000	13,000
Change	7,000	21,000

The costs that change must be variable, and the variable cost per unit is £21,000/7,000 = £3. The variable cost information can now be used to calculate the fixed cost element:

	£
Total costs at 3000 units	13,000
Less variable cost at 3000 units = 3000 × £3 =	9,000
Therefore, fixed costs	4,000

We are now able to prepare the flexible budgets, as shown in Table 6.4. These demonstrate how total costs behave at the different levels of output shown. Also of interest are the total variable costs, which can be calculated by multiplying the output by the unit cost. As the fixed costs have also been identified, flexible budgets can be prepared for any level of output.

Table 6.4 Flexible budgets at different levels of output (£)

	Unit cost	3,000	Output 6,000	9,000
Variable costs				
Direct material A	4	12,000	24,000	36,000
Direct material B	1.50	4,500	9,000	13,500
Direct labour	6	18,000	36,000	54,000
Semi-variable overhead: variable costs	3	9,000	18,000	27,000
Total variable costs	14.50	43,500	87,000	130,500
Semi-variable overhead: fixed costs		4,000	4,000	4,000
Fixed costs		25,000	35,000	47,000
Total costs		72,500	126,000	181,500

Calculating Budget Variances

We can use the power of the flexible budget to generate variances. Let us assume that in the month of May, output was 5560 units and the costs were as shown in the 'actual' column in Table 6.5. The flexible budgets for the variable costs are calculated by multiplying the unit costs by May's output. The fixed costs are taken from the data in the previous illustration. The last column contains details of the variances between the flexed budget and actual costs. As has been indicated above, if the flexed budget exceeds the actual cost, this generates a favourable (F) variance, while if the actual cost exceeds the flexed budget, this results in an adverse (A) variance.

Table 6.5 Calculating flexed budget variances

Cost element	Output: Cost per unit £	5560 units Flexed budget £	Actual costs £	Variances £
Variable costs				
Direct material A	4	22,240	22,220	20 (F)
Direct material B	1.50	8,340	8,440	100 (A)
Direct labour	6	33,360	33,550	190 (A)
Semi-variable	3	16,680	15,040	1,640 (F)
Total variable costs	14.50	80,620	79,250	1,370 (F)
Fixed costs				
Semi-variable		4,000	3,920	80 (F)
Fixed 4001–8000		35,000	35,050	50 (A)
Total fixed costs		39,000	38,970	30 (F)
Total costs		119,620	118,220	1,400 (F)

The variances in the final column show that in total the actual cost is £1400 less than the flexible budget cost. Examination of the individual variances shows that to a large extent the overall favourable variance is largely due to the semi-variable favourable variance of £1,640.

Standard Costing and Variance Analysis

This section considers:

- the definition of a standard cost;
- the construction of standard costs, including behavioural issues;
- the advantages of standard costing;
- the concept of standard time;
- the use of standard costs in variance analysis;
- the interpretation of variances;
- performance ratios.

The Definition of a Standard Cost

A *standard cost* is the planned unit cost of a product or service. It normally has a physical and a financial component. For example, a bicycle factory has a wheel-building department and within this the standard costs of a wheel are shown in Table 6.6.

Table 6.6 Standard cost statement for one wheel build

Item	Quantity	Price (£)	Standard cost (£)
Wheel rim	1	7	7.00
Spokes	36	0.15 each	5.40
Hub	1	3.30	3.30
Labour	0.75 hours	6 per hour	4.50
Variable overhead	0.75 hours	2 per hour	1.50
Fixed overhead	0.75 hours	4 per hour	3.00
Total			24.70

The Construction of Standard Costs

There are two methods for setting cost standards: the analysis of past costs and functional analysis.

- Analysis of past costs. Companies with a history of production experience will have a record of past costs, and these can provide a reliable basis for generating standard costs. Where these are used, adjustments to past costs will need to be made to reflect changes in price levels and wage costs. However, even where historical data are available, their use may be invalidated by technological change. Of course, this approach cannot be used for new production methods.

- Functional analysis. This requires the involvement of engineering and work study staff. Engineers will be required to specify material requirements and calculate how much should be used to produce the product. The purchasing department will be required to determine the price of raw materials and components. Work study experts and engineers will work together to determine the labour time required, whilst representatives from human resources will advise on rates of pay for the grades of labour stipulated. However, the overhead element of the standard cost may be difficult to estimate. The figure may simply be related to labour hours or, preferably, will be related to cost driver consumption in an activity-based costing environment.

The level of difficulty of standards should be considered when they are set. It is possible to distinguish between 'ideal' and 'attainable' standards. Ideal standards assume that employees work at 100% efficiency as they make no allowance for wastage or inefficiency. They assume ideal technological conditions, and it is invariably impossible to do better than the standard. They are unlikely to be used in practice as they may be expected to demoralise workers due to an expected preponderance of adverse variances.

Attainable standards are set at high but achievable levels. They assume a brisk level of working. They also assume normal working conditions and make allowance for idle time and breakages. There are opportunities for workers to do better than attainable standards so that they generate a mix of favourable and adverse variances. The combination of standards that are attainable and favourable variances that result from effective working is likely to motivate employees. Preston (1995) argues that budgetary systems risk stifling creativity within organisations. The article is summarised at the end of this chapter.

Argyris (1953) raised awareness of the dangers of setting impossible standards over 50 years ago. He observed that such standards led to the formation of informal anti-company subgroups amongst workers whose objective was to frustrate attainment of the standard. He also pointed out the intolerable pressure felt by supervisors caught between the demands of senior management and the workforce. Argyris proposed that budget holders should participate in the budget-setting process (the term budget holders refers to managers who are responsible for controlling budgets). He argued that participation was likely to produce more realistic budgets and lead to feelings of ownership and commitment as the budget was internalised by participants. Participation can also improve communication in a company; the act of participating spreads knowledge about the company's objectives and activities. Additionally, it allows an opportunity for managers to input their detailed knowledge into the budgeting process.

Ouchi (1979) discusses several types of control; the article is summarised at the end of this chapter.

However, other writers have indicated that participating managers may seek to build in 'budgetary slack' so that the budget is set at a slightly lower level, making it easier to achieve. To guard against this, it may be necessary to establish reference points such as past performance or performance in another part of the company. Even so, senior managers have the responsibility for achieving profit targets that may have been agreed by the board of directors, and as such targets will invariably override the results of participative budgets, many companies impose budgets but allow managers a certain amount of freedom in achieving them. For example, a report in the *Daily Telegraph* on 22 January 2004 on the UK telecom company mmO_2 quotes its chief executive, Dave McGlade, attributing a large part of the company's success to 'setting managers from one end of the business to the other a few clear, simple targets then giving them the freedom to get on with their jobs and make decisions on the spot'.

Advantages of Standard Costing

- They are of help in building up costs for budgeting. They also provide a significant input to flexible budgeting to assist with decision making and control.
- They lead to a detailed comparison of standard and actual costs. This forms a very important feedback control function. The size of variances alerts managers as to the costs that are most in need of attention and corrective action.
- They assist in evaluating managerial performance by highlighting fixed and variable variances.
- They provide targets for managers and employees to aim at and to achieve. By achieving or improving on standard costs, they are more likely to achieve the budget.
- A standard costing system simplifies inventory valuation as goods are taken into closing stock at the standard cost of production made up of direct material, direct labour, variable production overhead and fixed production overhead.

The Concept of Standard Time

Standard time refers to the quantity of output that should be produced in a specific period. Thus, a standard minute refers to the amount of work that should be produced in a minute and a standard hour the amount of work to be produced in an hour. Standard time is not an input measure. It does not refer to the actual time worked. Instead it refers to the amount of time represented by the output of the period.

For example, the standard amount of time to build a cycle wheel in Table 6.6 is 0.75 hours or 45 minutes. In a six-hour period, a wheel-builder completes seven wheels. The standard time represented by the production of seven wheels is 7×45 minutes = 5 hours 15 minutes. As can be seen, the wheel-builder has taken 6 hours to complete 5 hours 15 minutes of output and would be regarded as inefficient.

As well as a measure of efficiency, standard time also offers a way of adding together different products or different types of activity as the following examples illustrate.

Different Products

A factory produces three types of office furniture, and the standard times for the production of one of each are as follows:

Product	Standard time (minutes)
Chair	30
Stool	20
Desk	70

Table 6.7 Standard times of output

Product	Standard time (minutes)	Units	Total standard time (minutes)
Chair	30	25	750
Stool	20	49	980
Desk	70	25	1750
Total			3480

In a week the factory produces 25 chairs, 49 stools and 25 desks. The total standard time represented by this output is shown in Table 6.7.

This demonstrates that the different products can be added together through their standard times of production. From a control perspective, the 3480 standard minutes (= 58 standard hours) of output of Table 6.7 could be compared with the budgeted total of standard hours.

If actual hours worked exceeded 58 hours, it would indicate the workforce was inefficient.

Different Types of Activity

In a garage the standard times shown in Table 6.8 have been established for different tasks. These form the basis of charges to customers so it is important that mechanics keep to them. Table 6.8 also shows the activities completed in a 37.5-hour week.

As can be seen, the mechanic has completed 39.5 standard hours of work, which exceeds his 37.5 hours of actual input. For the company there is a monetary benefit

Table 6.8 Standard times of activities

		Activities completed	
Activity	Standard time (hours)	Number	Standard Time (hours)
Short service	0.75	10	7.5
Long service	1.5	14	21
Clutch change	2	5	10
Wheel bearing change	0.5	2	1
Total			39.5

Table 6.9 Standard costs per unit and annual budget

Standard costs per unit			
Cost element	Components of standard cost	Standard cost per unit (£)	Annual budget for 120,000 units (£)
Direct materials	2 kg at £1 per kg	2.00	240,000
Direct labour	30 minutes at £5 per hour	2.50	300,000
Variable overhead	30 minutes at £3 per hour	1.50	180,000
Fixed overhead	30 minutes at £4 per hour	2.00	240,000
Totals		8.00	960,000

because it is able to charge out to customers an additional 2 standard hours over and above the 37.5 hours that it has paid the mechanic for.

The Use of Standard Costs in Variance Analysis

To illustrate the use of standard costs in control, we now consider the calculation and interpretation of cost variances. In order to illustrate this, we will consider the example of a company that manufactures a single product and has established a system of standard costing. The standard costs and annual budget for the current year are shown in Table 6.9.

The overhead costs, both variable and fixed, are charged to the product via the direct labour time. As can be seen, the product consumes 30 minutes of both overhead cost elements, the amount of labour time required to produce one unit. The total budget for the year is calculated by multiplying each standard cost by the annual output of 120,000 units.

It is planned to produce the annual output of 120,000 units evenly through the year, with 10,000 units produced each month. The fixed overheads are planned to amount to £20,000 per month.

During October, actual output and costs were as shown in Table 6.10. The total cost variance for the period is calculated by comparing what it should cost to produce 8,000 units (the standard cost of 8,000 units) with the actual costs as follows:

Table 6.10 Actual output and costs for October

Output: 8000 units	
Costs	£
Direct materials: 16,300 kg at £0.98 per kg	15,974
Labour: 3950 hours at £5.06 per hour	19,987
Variable overhead: 3950 hours at £3 per hour	11,850
Fixed overhead	20,400
Total	68,211

$$\begin{aligned}\text{Total cost variance} &= \text{Standard cost of output} - \text{Actual costs}\\ &= (8000 \text{ units} \times £8) - £68{,}211\\ &= £64{,}000 - £68{,}211\\ &= -\,£4{,}211.\end{aligned}$$

As the actual costs exceed the standard costs, there is an adverse variance of £4,211.

The variances for each of the costs can be calculated using the same formula and the variances can be set up in a table as shown in Table 6.11.

Table 6.11 Variances for October (£)

Cost element	Standard cost per unit	Standard costs of 8000 units	Actual costs	Variances (standard cost – actual)
Direct materials	2	16,000	15,974	26 (F)
Direct labour	2.50	20,000	19,987	13 (F)
Variable overhead	1.50	12,000	11,850	150 (F)
Fixed overhead	2	16,000	20,400	4,400 (A)
Totals	8	64,000	68,211	4,211 (A)

As may be seen in the table:

- Direct materials, direct labour and variable overhead all show favourable variances.
- Fixed overhead shows a large adverse variance that swamps the three favourable variances and produces a large adverse total cost variance.
- The bottom row shows the make-up of the total cost variance, which comes to £4,211 adverse.

Subvariances

The next stage is to analyse each variance further. We will use the data in Tables 6.10 and 6.11 to calculate the subvariances described in Table 6.12.

The material price subvariance is given by

$$\begin{aligned}&(\text{Standard price per kg} - \text{Actual price per kg}) \times \text{Actual kg}\\ &\quad = (£1 \text{ per kg} - £0.98 \text{ per kg}) \times 16{,}300 \text{ kg}\\ &\quad = £326 \text{ F.}\end{aligned}$$

This variance is favourable because the actual price paid per kilo is less than the standard price of £1 per kilo, Material price variances may be caused by: purchasing in favourable market conditions, price increases since the budget was set, taking advantage of quantity discounts or purchasing non-standard quality materials.

Table 6.12 Subvariances

Variance	Subvariance 1	Subvariance 2
Direct materials	This is the materials ***price*** subvariance and is calculated by comparing the standard purchase price of raw materials with the actual price paid	This is the materials ***usage*** subvariance and is calculated by comparing the standard quantity of raw materials used (for the output achieved) with the actual quantities used
Direct labour	This is the ***rate*** subvariance and is calculated by comparing the standard wage rate with the actual wage rate	This is the ***efficiency*** subvariance and is calculated by comparing the standard number of labour hours (for the output achieved) with the actual labour hours
Variable overhead	This is the ***expenditure*** subvariance and is calculated by comparing the standard variable overhead based on actual hours worked with the actual variable overhead. That is, it calculates what the variable overhead should be for the hours worked and compares this with the actual overhead	This is the ***efficiency*** subvariance and is calculated by comparing the standard hours of production with the actual labour hours. That is, it compares the standard hours of output with the actual hours of input
Fixed overhead	This is the ***expenditure*** subvariance and is calculated by comparing the fixed overhead budget with the actual fixed overhead	This is the ***volume*** subvariance and is calculated by comparing the overheads absorbed by the actual output and the fixed overhead budget

Material usage variance is

$$
\begin{aligned}
&(\text{Standard material use} - \text{Actual material use}) \times \text{Standard price per kg}\\
&\quad ((8000 \text{ units of output} \times 2 \text{ kg per unit}) - 16{,}300 \text{ kg}) \times £1 \text{ per kg}\\
&\quad = (16{,}000 \text{ kg} - 16{,}300 \text{ kg}) \times £1 \text{ per kg}\\
&\quad = £300 \text{ A.}
\end{aligned}
$$

In this case the variance is adverse because we have used 300 kg more than the standard use of 16,000 kg for the output of 8000 units. Material usage variances may be caused by excessive waste due to a poorly trained workforce or due to substandard materials. It may also be caused by poor storage or machine breakdown resulting in damage to raw materials. In this case, there is a favourable price variance that may have been due to the purchase of slightly lower-grade materials. The adverse use variance may reflect higher waste associated with the purchase of poor quality materials.

The two materials subvariances of £326F and £300A sum to the materials variance of £26F calculated in Table 6.11.

The wage rate subvariance is given by

(Standard rate per hour − Actual rate per hour) × Actual hours worked
(£5 per hour − £5.06 per hour) × 3950 hours
= £237 A.

The variance is adverse because the actual rate of pay per hour is greater than the standard hourly rate. Wage rate variances can be caused by recruiting the incorrect grade of labour, by inadequate supply of the right grade of labour in the labour market, by unplanned overtime working and by an increase in wage rates since the start of the year.

The wage efficiency sub-variance is calculated as

(Standard labour hours − Actual labour hours) × Standard wage rate
((8000 units × 0.5 hours per unit) − 3950 hours) × £5 per hour
= (4000 hours − 3950 hours) × £5 per hour
= £250 F.

This variance is favourable because the actual hours worked are 250 hours less than the standard of 4000 hours. Efficiency subvariances may also be caused by recruiting the wrong grade of labour or by inadequate training. They may also be caused by machine breakdown or by wasting time dealing with poor-quality materials. Low levels of motivation in the workforce may also be a contributing factor, and this might be attributed to a range of things including levels of pay, stress levels and poor working conditions. In this case the rate variance is adverse as the rate paid was £5.06 rather than £5.00 and this may have led to the favourable efficiency variance.

The two wage rate subvariances of £237A and £250F sum to the wages variance of £13F calculated in Table 6.11.

The variable overhead expenditure subvariance is given by

(Standard variable overhead rate per hour × Actual hour worked) − Actual cost.
(£3 per hour × 3950 hours) − £11,850
= £11,850 − £11,850 = 0.

Causes of the overhead variable expenditure subvariance would depend on the constituent elements of variable overheads, For example, there could be an increase in the costs of power (a variable overhead).

The variable overhead efficiency subvariance is calculated as

(Standard hours of output − Actual hours of input) × Standard variable overhead rate per hour
= ((8000 units × 0.5 hours) − 3950 hours) × £3
= (4000 standard hrs − 3950 hours) × £3 per hour
= 50 hours × £3
= £150F.

This variance is favourable because we have produced 8000 units in 50 hours less than the standard time of 4000 hours. The causes of this variance are similar to the causes of the labour efficiency variance listed above.

Again, it can be seen that when the variable overhead variances of £0 and £150F are added together they equal the variable overhead variance in Table 6.11.

The fixed overhead expenditure subvariance is given by

(Budgeted fixed overhead – Actual fixed overhead)
= £20,000 per month – £20,400
= £400 A.

This variance is adverse because actual expenditure is £400 more than the budgeted fixed overhead for the month. As these are fixed overheads, we would expect that actual overheads would equal budget overhead. For the precise causes of fixed overhead variances we would need to examine the constituent elements of the fixed overhead cost. For example, it may be that we have (erroneously) paid next month's rent as well as this month's.

The fixed overhead volume subvariance is calculated as

(Standard fixed overhead cost per unit × Output) – Budgeted fixed overhead
= (8000 units × £2 per unit) – £20,000 per month
= £16,000 – £20,000
= £4,000A.

This variance is associated with the total absorption costing system dicussed in Chapter 2. The standard overhead cost per unit is the same as the fixed overhead absorption rate per unit. Therefore, in this case the variance is adverse because our output of 8000 units absorbs only £16,000 of fixed overhead whereas the fixed overhead budget for the period is £20,000. We have failed to recover all the budgeted fixed overhead from the month's production. The budget for the month planned for the production of 10,000 units, each of which would have absorbed £2 of fixed overheads, amounting to £20,000. As we have produced 2000 units less than the budget, this means that we have failed to recover 2000 units × £2 of fixed overhead. The adverse variance is the result of failing to produce at the budgeted level. However, the underproduction may be the result of either or both of the following factors:

- The failure of the labour force to work sufficient hours. In this case 3950 hours were worked, but budgeted hours were 30 minutes per unit × 10,000 units = 5000 hours.
- Inefficient working by the labour force in their working hours. In this case 3950 hours were worked and 4000 hours of output (8000 units) produced. Therefore, the labour force was efficient and the failure to produce 10,000 units is due to working 3950 rather than 5000 hours in the month. The reasons for this need to be investigated.

When the expenditure variance (£400A) is added to the volume variance (£4,000A), they sum to the total fixed overhead variance of £4,400A in Table 6.11.

Table 6.13 Reconciliation of standard and actual costs of production

	£	£
Standard costs of production*		64,000
Direct material variances		
Price subvariance	326 F	
Use subvariance	300 A	26 F
Direct wages variance		
Rate subvariance	237 A	
Efficiency subvariance	250 F	13 F
Variable overhead		
Expenditure subvariance	0	
Efficiency subvariance	150 F	150 F
Fixed overhead		
Expenditure subvariance	400 A	
Volume subvariance	4000 A	4400 A
Actual costs		68,211

*See Table 6.11.

The variances may be summarised as in Table 6.13 in a statement that reconciles the standard cost of production to the actual costs, showing the subvariances in detail.

Interpretation of Variances

The individual variances described in the previous section may have one or more causes, which may or may not be clear. Before we can correct such variances, we need to understand the reasons for them. Only then can we identify what steps should be taken to address them. Five types of causes may be identified:

- *Inefficiency in operations,* for example, purchasing raw materials at an uneconomic price, leading to an adverse price variance; productive inefficiency by labour, so that actual hours worked exceed standard hours of output, or the recruitment of the wrong grade of labour.
- *Incorrect plans or standards*. These include plans that were originally incorrect, such as the incorrect price per litre for materials, and plans that were originally correct but have been invalidated by environmental changes.
- *Poor communication of standards*. Standards may contain errors, may arrive after work has started, or may be set out in such a way as to cause confusion.
- *Interdependence of variances*. One variance may be influenced by another. For example, the employment of unskilled labour may give a favourable rate variance, but if the work is skilled it will probably result in a unfavourable efficiency variance;

a favourable material price variance may be the result of buying poor-quality materials and this may lead to an adverse material use variance (as more waste is likely to result) and an adverse labour efficiency variance as workers take longer to process substandard materials.

- *Random fluctuation around standards*. Humans are not machines and cannot be expected to work as consistently as machines. Efficiency will fluctuate. Consequently, a labour standard, for example, may be viewed as a long-run average that performance will conform to. In this situation, one must accept that in some periods performance will be better than the standard and at some times worse.

Performance Measures

There are three non-financial performance measures that provide a perspective on factory operations. The *production volume* (PV) ratio, given by

$$\text{PV ratio} = \frac{\text{Standard hours of actual output}}{\text{Budgeted standard hours}} \times 100,$$

expresses actual output as a percentage of budgeted output. If actual output is more than budgeted output the ratio will be more than 100% and if lower than budgeted output it will be less than 100%. Using the data in Tables 6.9 and 6.10, we can calculate the PV ratio for the factory:

$$\begin{aligned}\text{PV ratio} &= \frac{4000 \text{ std. hours}}{5000 \text{ std. hours}} \times 100\\ &= 80\%.\end{aligned}$$

Standard hours of actual output is 30 minutes per unit multiplied by actual output of 8000 units. Budgeted standard hours is 30 minutes per unit multiplied by the budgeted output of 10,000 units. This ratio reflects the fact that output was only 8000 units compared with the budget of 10,000 units.

The efficiency ratio,

$$\text{Efficiency Ratio} = \frac{\text{Standard hours of actual output}}{\text{Actual hours worked}} \times 100,$$

expresses output as a percentage of hours worked. If the workforce is as efficient as the standard, the ratio will be 100%. If the workforce is less efficient, standard hours will be less than hours worked and the percentage less than 100%. Using the data in Tables 6.9 and 6.10:

$$\begin{aligned}\text{Efficiency ratio} &= \frac{4000 \text{ standard hours}}{3950 \text{ hours worked}} \times 100\\ &= 101\%.\end{aligned}$$

The workforce has thus been more efficient than the standard – something that we knew from the variance analysis.

Finally, the *capacity usage* ratio

$$\text{Capacity Usage Ratio} = \frac{\text{Actual hours worked}}{\text{Budgeted working hours}} \times 100,$$

as its name implies, measures to what extent factory capacity has been used in the period. It expresses actual hours as a percentage of budgeted working hours. If actual hours are less than budgeted hours, this produces a percentage below 100%, signifying that capacity was not used fully. Using the data in Tables 6.9 and 6.10,

$$\text{Capacity usage ratio} = \frac{\text{3950 hours worked}}{\text{5000 budgeted hours}} \times 100$$
$$= 79\%.$$

In this case we used only 79% of the planned working hours in the month; in itself this would lead to the failure to achieve the month's planned output.

Conclusions

This chapter has demonstrated that:

- budgets are an essential tool of control. Control can be feed-forward or feedback.
- control information should possess various key qualities if it is to be effective.
- flexible budgets are useful for projecting different outcomes and also serve as a basis for control. They allow the calculation of variances.
- a standard cost represents the planned unit cost of a product or service. They can form the basis of cost systems and they are also used to generate a wealth of variance information.
- generating the variances has to be followed by their interpretation in order to make managerial use of the control information.

Summary

All organisations need to engage in planning, but in order that planned outcomes are achieved it is essential that organisations engage in control. Control information alerts managers to deviations from plan and allows them to take action to change the course of events. The master budget is of little value for monthly control. Instead, flexible budgets may be used; they flex budgeted costs to reflect actual outputs. Variances are then generated by comparing the flexed budget costs with the actual costs.

Standard costs are developed relating to one unit of output or one unit of a service. It is important to set standards that are achievable but challenging. If standards are set at too difficult a level they may lead to a demoralised workforce. In a standard cost system, closing stocks are valued at standard cost of production. Standard costs themselves can be used to generate a range of variances; these include direct materials, direct labour, variable overhead and fixed overhead. The interpretation of each of these variances is important. Finally, we examined three performance ratios (production volume, efficiency and capacity usage) and saw how they were related to the variances.

Recommended Further Reading

Ouchi, W. G. (1979) 'A conceptual framework for the design of organisational control mechanisms', *Management Science*, 25(9): 833–848.

Ouchi describes three mechanisms to cope with evaluation and control:

- *markets*, precisely measuring and rewarding individual contributions;
- *bureaucracies*, relying on a mix of close evaluation and social acceptance of common objectives;
- *clans*, relying on relatively complete socialisation to remove incongruent objectives.

He uses a case based in a large organisation's parts division to show how an organisation can use control mechanisms to move towards achieving its objectives.

In the warehouse, the supervisor uses a mix of formal authority and the trust and respect of the workers for him (i.e. formal and implicit informal agreements).

In the purchasing department, the relationship of supervisor and workers is more at 'arm's length' (i.e. a 'market' mechanism), purchasing agents needing only market/price information to make purchasing decisions. Markets are not perfect, however, therefore a degree of bureaucratic control over purchasing officers is needed (i.e. a mix of market and bureaucratic controls).

Where bureaucratic control is used, administrative costs will be high if qualitative as well as quantitative control measures are needed. In the warehouse, he points to the problems of using a market-based mechanism to control and explains that, if teamwork is required, the allocation of rewards may be problematic. He demonstrates that trying to set up an internal market will often result in over-bureaucratisation. Bureaucratic control is preferred where frictionless markets do not exist.

He concludes that where objectives are clear but tasks are often uncertain, complex and involve teamwork, the formation of clans removes much of the need for close bureaucratic control.

Ouchi provides a model that tries to relate the control type used (market, bureaucracy or clan) to the social and information requirements of such control systems. Hence, depending upon the control type used, prices, rules or tradition will have varying degrees of legitimacy. This model also assumes the existence of the self-interest of all participants.

He points to the problems of obtaining perfect transfer prices and hence the need for a layer of imposed bureaucratic control, which in turn requires acceptance of authority, to work. He criticises existing organisational theory (Simon, March, Parsons, etc.) for concentrating on the bureaucratic form and overlooking the others' importance.

Ouchi compares the costs of obtaining the 'right' people and using (simpler/cheaper) results (market) controls, with having to use the more expensive action (bureaucratic) controls. He suggests the former results in a higher level of staff commitment, whereas the latter may alienate employees. He proposes another model that interrelates three factors – people treatment, form of commitment and control type – and suggests that the degree of employee commitment is related directly to the type of control required. He describes how the type of control used may lead the organisation to become coercive, with associated ethical issues.

The bureaucratic control type, argues Ouchi, may be unsuitable for many organisations. In order for the organisation to make rational decisions, it must be able to measure relevant information. He gives examples of conditions affecting the measurement of behaviour and output. In some organisations, such as research laboratories, schools and government agencies, outputs and behaviour are both difficult to measure, thus the clan approach may work best, along with careful selection of employees – a *loose coupling* approach.

He points to two main underlying issues affecting the form of control – the degree of clarity with which performance can be assessed, and the degree of goal incongruence – and to the fact that, to enable co-operation in organisations, people must be able to trust each other.

Lyne, S. (1995) 'Accounting measures, motivation and performance appraisal', in D. Ashton, T. Hooper and R. Scapens (eds), *Issues in Management Accounting*, pp. 237–257. Hemel Hempstead: Prentice Hall.

Lyne's article attempts to produce a compendium of recent ideas in control system and motivation theories. He defines control as the 'regulation and monitoring of activities' and regulation as ' fulfilling what has been laid down' and as 'adapting to requirements'. He comments that control has two aspects – motivation and performance measurement.

Lyne refers to Hopwood (1974) who identifies four classes of control – *administrative, organisational, social* and *self* – each having an effect on motivation. He notes the limited application/value of accounting controls. He quotes Otley and Berry's (1980) ideas of prerequisites for effective control systems (i.e. clear objectives, output measure related to objectives, good predictive models and the ability to take action). He comments on the need for *dual-loop feedback* and *feedforward* and notes that organisations often seem to lack the flexibility to consider altering objectives.

He goes on to give an overview of four recognised groups of theories of motivation:

- *needs-satisfying* theories – Maslow's hierarchy of needs;
- *achievement* theories – McClelland's hierarchy of motivators;
- *motivation/hygiene* theories – Herzberg;
- *equity* theories – based around the demotivating dissatisfaction arising from a sense of inequity.

Lyne next discusses e*xpectancy theory* (Ronen and Livingstone, 1975) in some detail. Such theories are based on ideas from psychology and incorporate a wide range of internal and external factors in an attempt to predict/explain motivation in terms of expected utility. He does not, however, suggest that such ideas have great practical applicability.

Lyne comments on the need to use realistic targets in order to maintain motivation and avoid reducing aspiration levels – see Stedry and Hofstede (1968) and Locke's (1968) questionable lab-based experiments. He also argues that flexible budgeting with regularly adjusted targets is necessary for effective motivation.

In discussing the relationship between accounting measures and performance evaluation, he refers to the usefulness of *ex post* measures (e.g. planning and operational variances) as a way of improving the validity of performance monitoring. He also identifies the problem of budgetary *slack* as a 'predetermined attempt to manipulate the objective or target'. He argues that it arises when two conditions exist – incongruent personal and organisational goals; and information asymmetry. He relates the latter idea to those prevalent in *agency theory* and cites the work of Walker and Choudhury (1987).

In terms of the effects of the style of use of budgets (in order to optimise their motivational effects), he notes the work of Hopwood (1972) who identified four different styles:

- budget constrained;
- budget profit style;
- profit conscious;
- non-accounting.

He also refers to Otley (1978) who looked empirically at the effects of such styles on managers in various degrees of task uncertainty.

He refers to Kennis's (1979) study of *participation* on job satisfaction, job tension and job attitudes and how such work relates to Hofstede's improved model of participation and other models which focus on intervening variables which affect performance, such as personality types, organisational attitudes, motivation, uncertainty, and role ambiguity. In this respect he outlines, and criticises as unrealistic, the attempts which have been made at 'management by objectives'.

He concludes that motivation and performance appraisal, whilst involving accounting measures, have a much wider context.

Preston, A. (1995) 'Budgeting, creativity and culture', in D. Ashton, T. Hopper and R. Scapens (eds), *Issues in Management Accounting* (2nd edition) pp. 273–298. Hemel Hempstead: Prentice Hall.

Preston explores ways in which budgeting contributes to or impedes the creative process. He looks at two models of creativity: the rationalist model and the social constructionist model.

The rationalist model represents the view that the 'natural order' is knowable if all relevant variables are identified, along with their relationship rules. Therefore, with perfect information, perfect prediction is possible. In this view, creativity is a mysterious factor, not yet understood but ultimately understandable.

The traditional response of management accounting has been to try to improve quantitative techniques to deal with uncertainty (on the basis that systems work to a predetermined, predictable order), although practical people appreciate that perfect information is not likely and that creativity plays a part. Creativity is seen here in the forms of adaptability and flexibility, and these are enhanced (and creativity promoted) when organisational structure and leadership style are ‘got right’, although different combinations of such factors may be possible.

Preston argues that organisational structure and budgetary style are closely related and that traditional (textbook) budgeting seems to assume mechanistic rather than ‘organic’ structures. He quotes Mintzberg (1975) who criticises budgetary systems for concentrating on easy-to-measure events; providing out-of-date, historical information; oversimplifying or reducing information; and concentrating on internal rather than external factors. This, Preston argues, often leads to managers ‘ignoring traditional budgeting systems’ outputs. Therefore, information is hardly likely to contribute to the essential organisational creativity. Traditional budgeting is based on highly authoritarian systems of management.

Preston refers to Otley (1980) who argues for budgetary systems which (while still essentially rationalist) are tailored around contingent environmental factors, that non-financial, qualitative information often will enhance a system’s outputs and that, by participation (cf. Ouchi’s ‘clans’), the more organic organisational structure can be adapted to by the budgetary system. He argues that organisations and environments reciprocally create each other and that organisational boundaries are difficult to define. Budgetary activities may affect the external environment, for instance, Within organisations, it is the interactions of individuals that ‘construct’ the organisation, therefore the idea of predetermined order is flawed in that it ignores or overlooks the self-determination of individuals. (The rationalist view effectively says that individuals will react in predetermined ways to known stimuli.)

In the *social constructionist* model, behaviour is seen as the product of creative processes. An individual’s response to a stimulus, situation or event depends on the individual’s interpretation of the stimulus; that is, meanings are constructed by social interaction. These meanings are then internalised and shared between individuals. Therefore budgets, accounts and formulae have constructed meanings which can change and which are only symbolic representations of reality, The source of creativity/adaptability is the redefinition of constructed meanings (see his example concerning the NHS on p. 283).

Preston argues that ‘creativity … rests upon the potential in individuals to look at the world anew and to interpret what they see differently’. This reinterpretation is bound, however, to be affected by social interaction and shared meanings. Preston argues (a little like Ouchi) that ‘shared beliefs’ and values lead to the organisation as a ‘constructed order’, but points to the organisation as a set of interrelating individuals. Organisations *are* thus the shared meanings/values/beliefs of the individuals within them. The rules of such systems are not like those in the rationalist model, but rather are ‘rules in process’, continuously changing and reinterpreted.

The meaning of budgets within this social contructionist perspective may not necessarily be the same to all organisational participants. Preston cites NHS budgets as a way of making more informed decisions to optimise the use of resources, or as a cost-cutting tool. Hence doctors' refusing to participate in the 'Trojan horse' of budgeting. Often, Preston notes, managers may go along with budgeting because they think it makes them look good/rational managers, even though they have no faith in budgets. If budgets are interpreted as a pernicious form of control, this may lead to stifled creativity (apart from creative accounting maybe!).

Budgets, states Preston, may not be a neutral process in that they may shape individuals' interpretations by, for example, narrowing focus and hence stifling creativity. Excessive budgeting may change the nature of an organisation's culture from aesthetic to hard-nosed.

Budgets may be seen as a 'political bargaining process' where those with budgets get the allocations they want and big allocations give power (a self-perpetuating process?) – thus budgets are both an *instrument* and *reflection* of power.

Budgeting, Preston argues, may lead to a culture of rationality and consistency, and this, in turn, may limit creativity and promote unidirectional behaviour (as specified in a rigid budget). To create a more appropriate budgeting system, participation is needed and should allow for improved solutions to problems as they arise.

Preston identifies the work of March (1976) who suggests the following ideas to deformalise/destandardise budgeting systems:

- treating goals as hypotheses (where uncertainty is high);
- treating intuition as real;
- treating hypocrisy as transitory, for example, using semi-confusing information systems to provide the inconsistencies necessary to stimulate creativity;
- treating memory as an enemy – breaking the link between the past and the future;
- treating experience as a theory – the past 'reality' can be reinterpreted to have another meaning.

Formalised systems, like budgeting, may eradicate the creative behaviour essential to an organisation's survival.

Case Study: Budget Preparation and Variance Analysis

Eiger PLC manufactures two types of high-quality ice axe, M1 and M2. The current managing director, C. Chaplin, formed the company in 1996. Your position is that of management accountant and you normally report to the finance director; occasionally you are required to report to the managing director.

The company uses a standard cost system and fully absorbs factory overheads into the cost of production. Closing stocks of finished goods are valued at the standard cost of production. Production and sales are planned to be at the same monthly level throughout the year 2004.

The estimated balance sheet for the year ended 31 December 2003 is as follows:

EIGER PLC
Balance Sheet as at 31 December 2003

Assets employed	£000	£000	£000
Fixed assets	Cost	Depn	Net
Plant and machinery	600	120	480
Current assets			
Stock			
Raw materials	54		
Finished goods	79	133	
Debtors		200	
Cash		79	
		412	
less Current liabilities			
Creditors	40		
Proposed dividend (payable March 04)	30		
Provision for taxation (payable Sept. 04)	10	80	
Working capital			332
			812
Financed by			
Share capital			750
Retained profit			62
			812

The following information has been obtained for the purpose of preparing the budget for the year ending 31 December 2004. First, the sales forecast is:

	M1	**M2**
Planned selling price per unit	£125	£180
Forecast sales volume (units)	6,500	6,300

Next, direct costs:

Materials (£)	
Carbon steel - per kilogram	25
Key rubber- per kilogram	13
Direct labour (£/hour)	
Machining department	6.50
Finishing department	5

The standard direct material and standard direct labour content of each unit of the finished product is as follows:

	M1	M2
Steel	2 kg	3 kg
Rubber	1.5 kg	2 kg
Machining direct labour	3 hours	4 hours
Finishing direct labour	2 hours	3 hours

Turning now to the direct labour force, the following numbers of direct employees work in each of the production departments: machining, 22; finishing, 10. All employees work a 38-hour week and receive paid leave for 5 statutory bank holidays and 15 additional days per year. The normal working week is five days. Any overtime is paid at time and a half.

Factory overheads are fully absorbed into production, using direct labour hours. At the planned output levels the following costs (in £000) are forecast:

Indirect labour	30
Indirect materials	22
Repairs	11
Rates	22
Canteen	16
Depreciation	70
Heat and light	3
Power	6
Factory management	49

The factory has three cost centres: machining department, finishing department and a general service department. Data relating to these three cost units for 2004 are as follows:

Data	Machining dept.	Finishing dept.	General service dept.
Indirect labour hours	3500	1000	300
Indirect materials	£13,000	£5,000	£4,000
Repairs	£5,000	£4,000	£2,000
Factory managers	£16,000	£19,000	£14,000
Plant & machinery values	£600,000	£100,000	0
Floor area	2000 sq. metres	500 sq. metres	500 sq. metres
Machine hours	5500	1500	0
Canteen employees			2

The following stock forecasts have been made:

Raw materials	Steel (kg)	Rubber (kg)
Opening stock	1900 (£46,000)	620 (£8,000)
Closing stock	2000	900
Finished goods	M1	M2
Opening stock	90 (£5,000)	920 (£74,000)
Closing stock	700	520

Selling and administrative expenses have been forecast as follows:

Selling expenses (£000)	
Salaries	43
Advertising	20
Administrative expenses (£000)	
Salaries	79
Sundry expenses	12
Professional fees	5

The costs of direct labour, factory overheads, selling and administrative expenses will be met in full in cash. Raw materials are purchased on one month's credit and the amount outstanding on the balance sheet at 31 December 2003 will be paid in January 2004. All sales are made on a two-month credit basis so the debtors in the balance sheet will make their payments in January and February. Tax owing at 31 December 2003 will be paid on 1 September 2004 and proposed dividends will be paid in March 2004. Machinery purchases during the year are estimated to cost £30,000 and will be paid for in June. Rates are paid quarterly in January, April, July and November.

Profits are taxed at the rate of 23%.

The budgets for 2004 are shown below.

Sales Budgets

Product	Units	Selling Price £	Revenue £
M1	6,500	125	812,500
M2	6,300	180	1,134,000
Budgeted Revenue			1,946,500

Production Budget

	M1	M2
Planned sales	6,500	6,300
Planned finished goods closing stock	700	520
Total units required	7,200	6,820
Less finished goods op. stock	90	920
Budgeted production	7,110	5,900

Direct Materials Used Budget

Raw material (kg)	Content per M1	Output of M1	M1 usage of raw material	Content per M2	Output of M2	M2 usage of raw material	Total usage
Steel	2 k.g.	7,110	14,220	3	5,900	17,700	31,920
Rubber	1.5 k.g.	7,110	10,665	2	5,900	11,800	22,465

Direct Materials Purchase Budget

	Steel kg	Rubber kg	Total £
Planned closing stock	2000	900	
Production requirement	31,920	22,465	
Total required	33,920	23,365	
less Opening stock	1,900	620	
Purchase requirment	32,020	22,745	
Cost per unit (£)	25	13	
Budgeted purchase (£)	800,500	295,685	1,096,185
add Opening stock			54,000
			1,150,185
less Closing stock	50,000	11,700	61,700
Cost of raw material used			**1,088,485**

Direct Labour Budgets

	Labour hrs per unit	units of output	total labour hours	wage rate per hour £	total labour costs £
Machining					
M1	3	7,110	21,330	6.5	138,645
M2	4	5,900	23,600	6.5	153,400
Finishing			**44,930**		292,045
M1	2	7,110	14,220	5	71,100
M2	3	5,900	17,700	5	88,500
Totals			**31,920**		159,600

Overtime/Idle Time Working Papers (Hours)

Dept	Total hours required	Available Hrs.	Idle time Hrs.	Overtime Hrs.
Manufacture	44,930	40,128	0	4,802
Finishing	31,920	18,240	0	13,680
(£)	**Total Direct Labour.**	**Overtime Premium**	**Idle Time**	
Manufacture	292,045	15,606.5	0	
Finishing	159,600	34,200	0	
Holiday Pay Working Paper				
Dept	**Employees**	**Days/year**	**Hours/year**	**Cost £**
Manufacture	22	440	3,344	21,736
Finishing	10	200	1,520	7,600
				Total 29,336

Factory Overhead Costs Budget

	Apportionment Basis	Total Costs £	Machining Dept. £	Finishing Dept. £
Canteen	GSd employees	16,000		
Depreciation	P&M Valn.	70,000	60,000	10,000
Heat and light	Floor area	3,000	2,000	500
Indirect labour	ILH	30,000	21,875	6,250
Other ind. Labour		49,807	15,607	34,200
Holiday pay		29,336	21,736	7,600
Indirect materials	Direct	22,000	13,000	5,000
Management	Direct	49,000	16,000	19,000
Power	M/C Hrs.	6,000	4,714	1,286
Rates	Area	22,000	14,667	3,667
Repair	Direct	11,000	5,000	4,000
Total Costs		308,143	174,598	91,502
Reapportion GSD			24,579	17,462
Revised Totals			199,178	108,965
Planned Activity			**44,930**	**31,920**
Rate/dlh			4.43	3.41

	Cost per unit of input £	M1 units in one M1	COST £	M2 units in one M2
Steel	25	2	50	3
Rubber	13	1.5	19.5	2
Direct labour				
Machining	6.5	3	19.5	4
Finishing	5	2	10	3
Unit prime cost			99	
Factory overhead				
Machine	4.43	3	13.30	4
Finishing	3.41	2	6.83	3
Unit production cost			119.13	
Selling Price			125	
Budgeted margin			5.87	

Closing Stock Budget

	Units	Unit Cost	Total Cost
Raw Materials			
Steel	2000	25	50,000
Rubber	900	13	11,700
Total Cost			61,700
Finished goods			
M1	700	119.13	83,388.60
M2	520	169.97	88,386.13
Total cost	1220		171,774.73

Costs of Goods Sold Budget

	£
Direct Materials used (3)	1,088,485
Direct Labour (5)	451,645
Factory overhead (6)	308,142.5
Add: Finished goods opening stock	79,000
	1,927,273
Less: Finished goods closing stock	171,775
Budgeted cost of goods sold	1,755,498

Selling and Administrative Expense Budget

Selling Expenses		**£**
Salaries	43,000	
Advertising	20,000	63,000
Administrative Expenses		
Office sals.	79,000	
Sundry	12,000	
Prof.fees	5,000	96,000
Totals		159,000

Budgeted Cash Flow

	Total
Cash inflows	
Receipts from debtors	1822.1
Total receipts	1822.1
Cash outflows	
Payments to creditors	1044.8
Wages	451.65
F Overheads	216.14
Rates	22
Selling & admin.	159
Dividends	30
Taxation	10
Machinery	30
Total Payments	1963.6
NCF	–141.5
Balance b/f	79
Balance c/f	–62.54

Balance Sheet as at 31 December 2004

Assets Employed	£000	£000	£000
Fixed Assets	**Cost**	**Depn**	**Net**
Plant and machinery	630,000	190,000	440,000
Current Assets			
Stock			
Raw materials	61,700		
Finished goods	171,775		
Debtors	324,416.7		
Cash	–62,540.42		
		495,351	
Less Current Liabilities			
Creditors	91,348.75		
Provision for taxation	7,361	98,709	
Working capital			396,642
			836,642
Financed by			
Share capital	750,000		
Retained profit	86,642		**836,642**

Budgeted Trading Profit and Loss Account 2004

	£
Sales	1,946,500
less Cost of Sales	1,755,498
Budgeted Gross Profit	191,002
Less Selling and admin. Expenses	159,000
Profit before int. & tax	32,002
Interest	0
Budgeted net profit before tax	32,002
Taxation	7,361
Budgeted net profit after tax	24,642

Having prepared the budgets for 2004, you are now required to deal with the following issues.

You have already been informed that planned outputs and costs will be incurred evenly through the year. The actual output and costs for the first quarter of 2004 were as follows:

Production

Products:	M1	1400
	M2	1150

Costs:

Direct materials usage:	6255 kgs. of Steel at a total cost of £156,375.
	4444 kgs. of Rubber at a total cost of £57,772

Direct labour costs:
Machining Department 9032 direct labour hours at a direct wages cost of £60,966.
Finishing Department 6255 direct labour hours at a wages cost of £31,275.

The fixed factory overheads for the period are appended below. They include an apportionment from the service department.

	Machining £	**Finishing £**
Depreciation	15000	2500
Heat and light	530	130
Indirect labour	5468	1563
Idletime/overtime premium	6500	3655
Holiday pay	5434	760
Indirect materials	2970	1105
Management	4000	4750
Power	1002	289
Rates	3667	917
Repair	1250	1000
Reapportion General Service Department	6145	4366
Total overhead costs	£51,966	£21,035
Notes:		
Overtime hours		1462
Idle time hours	1000	
Holiday hours	836	152

Write a memorandum to the managing director of Eiger PLC in which you interpret the key results of the first quarter. Your objective is also to provide any key recommendations that result from your analysis and interpretation. You should attach to your memorandum a statement of ratios and variances that you have calculated from the information for the first quarter.

Questions

1. Drum Ltd. makes a single product, using a process involving stamping a circle out from sheet steel, covering it with hide and attaching it to a sidepiece.

For 2004 the standard materials costs and requirements have been as follows: 0.4 square metres of sheet steel at £5.20 per square metre; 0.8 square metres of hide at £9.20 per square metre; sidepiece at £4.20. Price increases relating to these raw materials have been notified for the year 2005. Sheet steel will fall in price by 10%, whilst hide will increase in price by 10% and the sidepiece will cost £5.

It takes 30 minutes of labour to punch out the metal, cut the hide and complete the assembly of the product. Labour currently costs the company £4 per hour, and this will increase by 4% with effect from 1 January 2005.

Semi-variable overheads measured at different levels of output in 2004 were:

Output	Costs (£)
30,500	20,225
45,560	27,002
63,620	35,129
81,040	42,968

For the year ended 31 December 2004 fixed factory costs were as follows:

Management	£35,600
Depreciation	12,500
Insurance	5,600
Rates	11,000

With the exception of depreciation, all fixed and semi-variable overheads will increase by 5% with effect from 1 January 2005.

(a) Prepare flexible budgets for monthly output levels of 55,000 and 65,000 units for the year ended 31 December 2005.

(b) Explain the principal benefits that firms obtain from the preparation of flexible budgets.

2. Great Lakes Co. is about to commence the final quarter of activity for the current financial year. The results for the first three quarters of the year have been as follows:

	Q1	Q2	Q3
Sales volume	12,000	20,000	18,000
Production volume	15,000	25,000	18,000
Costs (£000)			
Direct materials	150	250	180
Direct labour	130	190	148
Depreciation of plant	12	12	12
Other production overheads	50	70	56
Administration costs	30	30	30
Selling and distribution costs	38	50	47
Total costs	410	617	473

Notes:

(i) The variable elements of production costs are related to the volume of production. The variable element of selling and distribution costs is related to the volume of sales.

(ii) During the fourth quarter of the year sales volume is expected to range between 18,000 and 24,000 units; production will be set equal to sales in the quarter. The company has been informed that the unit price of materials will increase by 8% in the fourth quarter.

(iii) For the whole of the year the selling price is £30 per unit.

Prepare flexible budgets for the final quarter at production (and sales) levels of 18,000 and 24,000 units. Forecast the profit at these sales levels.

3. Omega PLC manufactures a product for which the standard cost data are as follows:

	Units of input	Cost per input unit (£)	Cost per unit of output (£)
Direct materials	3 kg	5	15
Direct labour	2 hours	4	8
Variable overhead	2 hours	2	4
Fixed overhead	2 hours	10	20
Standard cost			47

The budget for the month of April was set at an output of 5000 units and a total cost of £235,000.

The actual output and costs for the month of April were as follows:

Actual output	4800 units
Actual costs (£)	
Direct materials (14,480 kg)	73,656
Direct labour (9700 DIH)	38,800
Variable overhead	18,960
Fixed overhead	99,000
Total costs	£230,416

(a) Calculate the following variances and associated subvariances for April: total cost; Direct material; Direct labour; Variable overhead; Fixed overhead.

(b) Interpret the information provided by the fixed overhead variances in this case.

4. Trimtone Limited' is a company that manufactures the Trimouse. At the start of the year the budgeted costs per unit of the Trimouse were as follows:

Direct costs

Direct material:	4.5 kg at £12 per kg
Direct labour:	Skilled: 3 hours at £14 per hour
Fixed overheads:	Overheads are budgeted to be £47,250 per annum
	Overheads are absorbed on a basis of total labour hours
Budgeted production:	1,500 units

During the period the following costs were actually incurred:

Direct materials:	7,100 kilograms were used, costing £74,550 in total
Skilled labour:	4,275 hours worked at a total cost of £70,110
Fixed overheads:	Overheads incurred were £52,025
Actual production:	1,450 units

The production manager has expressed concern that the total costs seem to be running at too high a level against budgeted costs forecast at the start of the year. You work in the finance department, and the production manager has approached you to see if you can analyse the causes of the problem.

(a) Calculate the budgeted standard cost of one Trimouse.

(b) Prepare a statement analysing the high level of costs that are worrying the production manager using appropriate materials, labour and overhead variances.

(c) Making use of your results in (b) interpret for management the key features of the firm's performance.

5. Wrycooder Guitars is a manufacturer of one standard type of guitar. Its recent budgetary report for its assembly department for October 2004 is as follows:

Department: Assembly Annual output: 24000 guitars		**Month: October 2004 (Month 7) This month's output: 2300 guitars**		
Cost element	**Annual budget (£)**	**Month's budget (£)**	**Actuals (£)**	**Variances (£)**
Labour	240,000	20,000	21,340	1,340 A
Materials	480,000	40,000	46,500	6,500 A
Power	12,000	1,000	1,100	100 A
Depreciation	96,000	8,000	8,000	0
Totals	828,000	69,000	76,940	7,940 A

Indicate the weaknesses of the cost report presented above and explain how it could be improved.