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BUDGETARY CONTROL

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Preface

DESPITE the growing number of excellent books on the subject, development of budgetary control still seems to be hampered by a lack of understanding of its aims and methods. This may be due, perhaps, to the highly individualistic approaches adopted by British and American writers who tend to describe methods they have successfully adopted in specific cases, rather than methods which may be adopted for general use. In the following pages an attempt has been made to remedy this defect.

Stress is laid on the co-ordination of methods and practice. Criticism is often levelled at budgetary control, because of the spate of paper work with which it is sometimes accompanied. This growth can be avoided, however, if the aim of the system " to co-ordinate all functions of a business . . . " is continually kept in mind. Careful attention is usually given to the planning of sales, stocks, production, buying, capital, etc., but the fact that accounting, wage payment, costing and production control, etc., are also functions requiring just as careful planning is often overlooked. Too little attention has been paid in the past to obtaining the maximum use from the minimum number of printed forms, and it is amazing how the preparation of control statements can be speeded up and the number of clerks reduced, when the work involved is planned and programmed and the paperwork properly routed. This extension of budgetary control has been borne in mind throughout the following pages.

H. P. C.

MIDLAND BANK CHAMBERS,
MARKET PLACE,
WEDNESBURY, STAFFS.

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I

What is Budgetary Control?

What is Budgetary Control?

Definition

Budgetary Control in industry may be defined as:—

" The planning and co-ordinating of all functions in advance in order to achieve the maximum profit and efficiency compatible with the stabilising of the business, and controlling all operations so that actual results compare favourably with such budgeted plans."

The three key words to be kept continually in mind are:—

(1) Planning.
(2) Co-ordinating.
(3) Controlling.

The system operates through budgets or schedules of expense—suitably coded and defined—predetermined in relation to an assumed output from each function.

After allowing for likely changes in future conditions and adjustments for changes in the volume of output, the same budgets may also be used as a basis for forecasting the results of future operations.

Functions of Business

The major functions to be considered are:—

(1) Sales—with subsidiaries for:—
  (a) Selling and Distribution Expenses.
  (b) Debtors.
(2) Production—with subsidiaries for:—
  (a) Overheads.
  (b) Stores.
  (c) Purchases.
  (d) Creditors.
(3) Stock—this is a co-ordinating function between sales and production.
(4) Capital or Plant—the capital invested in the plant necessary for production.
(5) Cash or Finance—a function which is directly concerned with all functions of the business.

(6) Profit and Loss—which summarises the results of sales and production and may be influenced by stocks and other functions. It measures not only the budgeted profit but also efficiency, and is thus a means to one of the goals towards which budgetary control aims.

(7) Balance Sheet—this is a means to the ultimate aim of the system as it demonstrates the stability of the business or the nicety of balance of all its functions.

Figure 1 illustrates the relationships existing between the various functions comprising the system which, in effect, culminate in presentation IN ADVANCE of a set of financial accounts for the whole budget period. There are two additional functions, however, which are not shown, and in order to control every aspect of the business, they, too, are included in a comprehensive system of budgetary control. They are:—

(1) Commitments—*i.e.*, the contingent liability for orders placed where goods or services have not been received or rendered.

(2) Developments—*i.e.*, the future plans or hopes of the business for which commitments may be made at some indeterminate future time.

Comparison of the actual result with the predetermined budgets at the end of a complete year reveals where planned performances have or have not been achieved. It does not aid, however, in control because the period has ended; the matter is history. But by basing the budgets for a full period upon budgets for shorter control periods and effecting the comparisons at these more frequent intervals, control may be assisted. Events are still fresh in peoples' memories; reasons for failures are forthcoming; prompt action by the responsible officials prevents their recurrence; and what is already lost may be offset by gains through greater efficiency before the end of the full period, so that the final, cumulative, actual accounts coincide with the budgeted plan.

Costing and Planning

It is popularly presumed that the prime object of costing is to ascertain costs as a basis for estimating and price fixing. While the importance of these two requirements is undeniable—and cannot be satisfied by budgetary control alone—maximum control of expenditure and efficiency in operation actually take precedence.

Budgetary control and costing have a common objective in cost control. The assumed output—expressed in physical terms—upon which budgets are based, is also the basis for planning plant requirements, factory layout, production progress, and stores and material control. Budgets are also the basis of Standard Costing. So close becomes the integration of production and

material control, budgetary control and costing and accounting that one set of documents may usually be designed to supply information concerning all these functions. And if such documents are carefully time-tabled and routed, the extra work and delays which usually accompany the *separate* compilation of virtually the same data by all functions—a very frequent occurrence in practice—are reduced to a minimum, effecting a great increase in accuracy and reduction in overhead costs.

The layout of forms and their routing, together with introduction of newer, cheaper and more effective clerical methods, deserve as much forethought as is given by technical officials to modifications in product design, factory operations and planning.

Control

Control is achieved by two main methods:—

(1) Direct supervision by responsible officials with the requisite knowledge of the particular function—*e.g.*, production. This may be assisted by basic output data expressed in physical units—as distinct from financial—such as total labour hours involved; total articles produced, etc.

(2) Operating statements setting out in money terms, under a number of carefully coded and defined account headings, the predetermined expenditure allowable, the actual expenses incurred and the differences between them—known as Cost Variations or Variances—under suitable explanatory headings.

The second is, of course, the method of budgetary control. Alone, it is powerless to achieve control. It does not replace, but assists, the responsible official whose ACTION in the light of the information supplied leads to fuller control, economy and realisation of the budgeted targets.

Expense Classification

Classification of expenditure follows very closely the methods adopted in costing under which expense is analysed into:—

Direct Labour
„ Material } Prime Cost
„ Expense
Factory Overhead } Factory Cost
Administration Overhead
Selling Overhead
Distribution Overhead } Total Cost

Under budgetary control, prime cost—*i.e.*, Direct Labour, Direct Material and Direct Expense—arises in connection with the production function which is broken down into production departments, according to the operations and processes carried on, and auxiliary service departments. Other functions are included in separate accounts in the overhead budgets.

All cost arising in the course of business is chargeable against one or other of the production or auxiliary service departments, or one of the overhead departments. There are also one or two special items which may be charged direct to the Profit and Loss Account, subject to which all expense comes within the control of the responsible head of each department or overhead account. As a result, all expense may be pre-budgeted for a given volume of output and the corresponding actual expenditure charged against the departmental head. Expenses incurred in a department, but not within the control of the responsible official—*e.g.*, electricity, where there are no departmental meters or switches—may be included in a separate account in the factory overhead budget and controlled by another official of either a specialist or higher rank.

For budgeting purposes, then, overhead comprises a number of accounts relating to *indirect* expenditure, together with accounts for certain *direct* expenditure where the items are not fully controllable in the production or auxiliary service departments, each of which is the responsibility of a particular person.

For instance, electricity throughout the works may be the responsibility of a Fuel Officer, where close control cannot be obtained in the actual departments for reasons suggested above. Certain auxiliary services may also be included in overhead, where their size and importance does not warrant full departmental status.

Fixed Costs

It is preferable, however, to budget all fixed expenditure—whether normally factory, administration, selling, distribution or direct expense—in a separate Fixed Expense Budget. This will permit greater flexibility in Costing and the resolving of problems in regard to relative profitability. Even if such information is not required at the moment by management, the greater degree of control obtained over both fixed and variable expenses makes it worth while.

Although the department is the unit for budgetary control purposes and operating statements will be prepared on this basis, the department may comprise more than one costing centre, in which case the departmental budget will be based on budgets for each centre. Actual costs, however, need be charged only against the department.

Fundamentals of Budgetary Control

The fundamentals of budgetary control may be briefly summarised as:—

(1) The compilation of departmental budgets of expense based upon standards of performance set in advance of production.

(2) Measurement of actual performance in money terms.

(3) Comparison of actual performance with the budget or predetermined standard performance.

(4) Ascertainment of reasons for variations from standard performance.

(5) Action to maintain any improved performance or to correct adverse variation and to recoup losses already sustained.

While most benefit may accrue to a business through adoption and integration of budgetary control, standard costs and production and material control, budgetary control may be used successfully in conjunction with any other method of costing. Its partial adoption in very small businesses in relation to specific functions—such as overheads—may also give good results. Disappointment, however, may come later, if it is required to extend the system to other functions, for many excellent ways of budgeting individual functions do not allow for economical extension or co-ordination with other functions. It is desirable, therefore, to adopt methods which form part of an efficient, integrated whole. The methods outlined in the following chapters unite to form such a system, and may, in consequence, be installed piecemeal without risk of building a top-heavy system.

II

The Budget Period

The Budget Period

IN the previous chapter it was stated that the degree of control over business functions may be demonstrated by comparison of actual costs with budgeted costs at frequent intervals within the budget period, such intervals or control periods representing fractions of a complete budget period. Beyond the limits of this complete period, budgeting becomes increasingly vague. Nevertheless, many businesses have long-term policies extending over many years ahead. These are not co-ordinated plans for all functions, but statements of the ambitions of the management in various directions such as plant development, research, welfare, etc. As time passes, these ideals become more detailed, and, if all goes well, they may be marshalled into priorities and incorporated in the budget plan for specific periods. Meanwhile, other vague ideals may be taking form to await their turn for fuller consideration and, perhaps, adoption.

The budget period may thus be considered in three phases:—

1. The Control Period.
2. The Budget Period.
3. The Long-Term Policy.

1. *The Control Period*

The following general factors influence the length of the control period :—

(1) *Morale*

The control period may be longer if the responsible departmental officials work conscientiously to their budgets, rather than to their own ideas. This is, of course, largely a matter of the degree of control—and enthusiasm for the system—exercised by still higher officials.

(2) *Control in Physical Units*

Where functions are continually subject to rigid physical controls—evidenced by suitable statistics—the control period may also be lengthened. For instance, where the material element of cost is high and valuable, and output of scrap, loss and waste, as well as good production, are expressed as percentages of material input for each batch or job, or at daily intervals for operations and

processes; or where daily comparisons of output are made with direct labour hours; in both these cases the need for frequent cost comparisons under budgetary control is not so necessary as where no statistical checks are used. Conversely, where overhead is the most significant element of cost, a shorter control period is desirable.

(3) *Length of Production Cycle*

If the production cycle extends over, say, ten days, a fortnightly control period would be more suitable than a weekly one.

(4) *Length of Budget Period*

Although the budgets for the whole period are derived from the budgets for control periods, the length of the former should be considered at the same time as the latter to ensure proper integration.

(5) *Cost of Control*

To prepare control or operating statements at frequent intervals may necessitate a large clerical staff, with a commensurably high pay-roll and stationery cost. The value of the control must be balanced against its cost. Where the savings through closer control are less than the cost of obtaining them, a longer control period in conjunction with a running statistical control of labour or material may reduce the cost of control. It is frequently argued that the apparently excessive cost of control is due to the fact that management fails to take advantage of the information supplied by budgetary control and, consequently, does not reap the full reward. Often this is true, but nothing is gained by churning out expensive information to a management that is not ready to assimilate and act upon it. Budgetary control should be designed in anticipation of its ultimate full use, so that when its need becomes apparent to management, fullest information can be given at economic intervals, speedily and without undue labour. Psychology and salesmanship are, perhaps, the most important attributes of the budget controller.

(6) *Cash Budget Control Period*

A cash or finance budget will be produced for each control period, carefully co-ordinated with all other budgets. But because expenditure is connected with all other budgets and revenue comes from outside sources not within the control of the management, the actual cash position frequently differs considerably from that planned, so that a day-to-day balance is essential with a continual forecast prepared at weekly intervals and based on current actual conditions

as to production and revenue for, say, four weeks ahead, to ensure that production does not stop through lack of money to pay wages, etc. The cash budget is thus, in effect, always on a continually progressing four-weekly basis.

(7) *Purchase Budget Period*

Purchasing, too, is of this continually moving nature and the length of its control period should be considered in the light of:—

(a) Required stock levels.
(b) Delivery times.
(c) Characteristics of the materials—*e.g.*, volatility, stability, etc.
(d) Trade customs relative to purchases.
(e) Economic ordering quantities.
(f) Material turnover cycles.

Where production is on a day-to-day basis, very short purchasing periods will suffice. Where there is a lengthy production cycle, however, they may be longer.

Except for the cash and, perhaps, the purchase budgets, control periods of less than four weeks' duration are not generally advocated—unless, of course, the benefits derived do, undoubtedly, more than offset the costs of such close control.

Whether or not the whole budget period coincides with the financial year will be discussed shortly. It is necessary to state here, however, that it should be capable of reconciliation with it. By implication, therefore, the control period should be a common multiple of both the budget period and the financial year, and the following divisions of a year for control purposes are often used:—

(a) Quarterly control periods which may be broken down into:—
    (i) Thirteen weekly periods.
    (ii) Two four-weekly periods followed by a five-weekly period.
(b) Thirteen four-weekly control periods.
(c) Twelve monthly control periods.

Comparison of the costs of a four-weekly period with those of a succeeding five-weekly period are bound to be unsatisfactory. For that matter, comparison of the costs arising in successive four-weekly periods may be just as unsatisfactory unless the output remains constant. The significant factor is cost per unit of output and when all figures are put on this basis inequalities in the length of the control period become unimportant.

Four-weekly control periods introduce problems of reconciliation with financial accounts prepared on a monthly calendar basis and, owing to the

external nature of bought and sales ledger accounting, it may not be possible to resolve the situation by adoption of a four-weekly accounting period. Fortunately, however, it is not essential to reconcile the two continuously. Provided the basic information for both is derived from the same documents—as is advocated throughout this book—budgeted results and financial accounts may go their respective ways until the end of the financial year, when a reconciliation may be effected.

Altogether, the balance is in favour of four-weekly control periods, each terminating on the last day of the pay-week, in order to facilitate wage analysis —an important feature of budgetary control.

2. *The Budget Period*

The following influences may affect the length of the complete budget period:—

A. *The Product*

(a) *Degree of Permanency.* To warrant a period longer than one year the product would need to be of a stable or very durable nature with, perhaps, monopolistic tendencies—unless a flexible budget were introduced.

(b) *Changes in Design or Style.* The length of period may depend upon the degree of control exercisable by the producer over design or style. If this control is INTERNAL to the business—*e.g.*, motor cars—a term may be used corresponding to the life of the style—*e.g.*, one year. Where, however, control of style is EXTERNAL to the producer, a shorter period is essential. The light garment industry, for instance, is largely dependent upon fashions originating OUTSIDE the industry, so that conditions cannot be foreseen further ahead than, say, six months.

B. *Optimum Usefulness of the Period*

Generally speaking, this will not usually exceed one year.

C. *Trade Cycle*

The length of the trade cycle may be used as a basis for the budget period in cases where it is pronounced and fairly regular.

D. *Trade Season*

Where the business is highly seasonal, and the controlling factors external, but there is no pronounced change in product or service from one season to

the next, the full budget period should cover, not only the busy season, but also the slack time and an annual budget period may be found most suitable. Typical trades of this nature are holiday catering, ice cream, etc.

E. *Flexible Budgets*

Flexible budgets—as distinct from Forecast or Control budgets so far considered—are related to a normal volume of output and subject to adjustments so that they always coincide with the actual level of output anticipated. In this way, production may be treated as a never-ending flow, and the budget period may extend over a number of years, subject only to adoption of control periods of suitable length and reconciliation with the annual financial accounts. Operating statements published at the close of each control period may then refer to:—

(1) The current control period.
(2) The cumulative results of all control periods included in the financial year to date.
(3) The current and cumulative results adjacent to each other.

F. *Moving Annual Total*

A similar effect may be obtained by using a moving total method, whereby output and cost are continually assessed for a fixed number of control periods ahead, together with sufficient past periods to make up, say, a complete year. As each new control period is added so the oldest one is deleted. Published figures at the close of each control period thus refer to:—

(1) The current control period.
(2) The moving annual total.
(3) The current and moving total results adjacent to each other.

3. *The Long-Term Policy*

Except where a business is created for a specific purpose and ceases to exist when this is achieved—*e.g.*, quarrying—or on the happening of a certain event, it should be regarded as a continuous, never-ending affair. The adoption of budget periods and control periods may tend to curtail this conception and, despite the large measure of control it achieves, sometimes develops a lack of direction, purpose and confidence in management in the face of problems, which seems at the time insuperable, and which may be corrected by adoption of a long-term plan or policy. This frequently leads to anticipation of crises

and allows management to review them more dispassionately as a trend, say, in the trade cycle, and so enables a more considered course to be steered.

Formulation of such a plan—which is ancillary to the complete budget system—should lead to a constant study of external economic, political and trade trends as well as to plant development, and will have a beneficial effect on the stability, progress and profitability of the business.

Capital Budget Period

The period for the capital budget—which deals with plant renewals, alterations and additions—may be considered in three stages:—

(1) A memorandum record of all nebulous ideas for development projects.
(2) A moving quinquennial record of development projects marshalled into priorities compiled from the memorandum.
(3) The annual capital budget compiled from the quinquennial record.

Adopted Periods

In order to simplify exposition in the following chapters, a budget period of one year is considered, comprising thirteen four-weekly control periods, unless there is specific mention to the contrary.

III

The Sales Estimate

The Sales Estimate

THE object of industry is to make the maximum profit compatible with the stability of the business, and this is achieved through sale and production—or simply sale—of goods and services. Estimated sales or production, then, are the dominant factors in budgetary control and require first attention. Owing to the close relationship existing between the budgets of all functions of a business—as demonstrated in Figure 1—the first conception of maximum sales or maximum production, may undergo several modifications in the light of influences exerted by almost all other functions. While it is only possible to explain with clarity the budgeting of one function at a time—indicating the theoretical sequence to be adopted—in practice work will commence simultaneously on most budgets, and frequent co-ordination will be needed to ensure obtaining the maximum profitability and stability.

Sales or Production?

Over a number of years the physical amount of goods produced and sold coincide, after allowance has been made for wastage, obsolete stock, etc. From year to year, however, they frequently differ owing to the necessity of creating stocks. This is noticeably so in many of the light industries, in which the selling function dominates the production and sales may be budgeted in advance with the aid of market research and actually attained through sales effort. The production budgets in such cases are based upon the sales budget after allowing for plant capacity, necessary stock levels and other modifying influences.

In the heavy industries, however, such as iron and steel, involving heavy expenditure on plant and equipment, the production factor is predominant. Such capital goods industries cannot make demand; they follow it and the state of their order books and general trading conditions are preferable to sales as an initial guide to budgeting. The sales and production budgets in these cases are assumed to coincide as to physical quantities.

This coincidence of sales and production budgets may again be experienced in jobbing production, but in such cases, as well as in the heavy industries, it is necessary to predetermine the likely demand for the product throughout the whole market as accurately as possible.

Other less desirable starting points

In industries where small business units are customary, or where it is alleged that a business is unable to develop for the time being, budgetary control may start from a predetermined " desirable " profit and, working backwards *via* known profit margins, the required sales value may be obtained and used as the key to compilation of most other budgets.

The " desired " profit is frequently based upon the average actually obtained over a long term. When conditions external to the business change, and the probability of achieving the necessary sales is in doubt, arbitrary economies are sometimes enforced to ensure maintaining the desired profit—which suggests that if scientific standards of expenditure had been determined in the first place, the resulting increase in profits and efficiency would allow for development. " Desired " profit as a starting point for budgetary control savours of complacency, and is out of step with the modern trend towards a higher standard of management together with maximum profits.

Budgets are also, sometimes, based upon plant capacity. Here, again, the normal or " desired " profits may have been achieved, but the basis is undesirable, as it does not take into account potential demand and maximum profits.

Total Demand

Except in the case of a monopoly, any one business may expect to sell only a portion of the potential demand for a particular product, so that it is necessary to ascertain first what the total demand is likely to be, and secondly, what portion of it may accrue to the particular producer. This is approached by detailed study of:—

(a) Past Sales.
(b) Future Potential Demand.

(a) *Past Sales*

The analysis of past sales for each product, showing the ratio that the sales of the particular business bore to the sales of the whole industry, should cover as many years as possible and show physical units, types, sizes, territories, etc. It may be compiled from all available sources of information—invoices, order files, etc., of the particular producer and his Trade Association, Government, or Chamber of Commerce statistics, etc.

(b) *Future Potential Demand*

Future potential demand will then be similarly analysed, so that a trend from the past through the present to the future may be obtained. Price will enter into consideration only at this stage, where demand is flexible and volume of sales subject to variation according to price manipulation.

The many methods used to determine future potential demand, are known collectively as Market Research, their purpose being:—

(1) To determine the volume of potential demand at varying sales prices.
(2) To determine where such demand exists, and at what times or seasons.
(3) To determine the type of demand as regards preferences for alternative products, types, sizes, finishes, packages and prices.
(4) To ascertain the competition for such markets. In this connection, trade or Government statistics as to plant capacity, if available, may be invaluable.
(5) To create demand where it does not already exist.

Market Research operates through adoption in a varying degree—according to size and financial position of the producer—of some or all of the following:—

(1) Studies by specialists either on a consultative basis or directly employed in the sales division of the producer.
(2) The posting of questionnaires direct to a particular class of the community in a particular area.
(3) Personal interrogation of such persons by area representatives.
(4) Travelling investigators.
(5) Systematic collection of routine information from such sources as:—

    (a) Salesmen's reports.
    (b) Ideas suggested by customers and employees.
    (c) Study of methods of other businesses.
    (d) New development in the industry or allied industries, such as new patents and technical research being undertaken.
    (e) Newspapers and Trade magazines.
    (f) Reports of Companies, Chambers of Commerce, Trade Associations, Government Departments, etc.
    (g) Direct contact with such chambers, associations and departments.
    (h) Government statistics.
    (i) Economic services (*e.g.*, London and Cambridge Universities).

Modifying Influences on Past Sales and Future Potential Demand

Past sales of a product for a whole industry may only be a modification of past potential demand due to certain influences which may also, in turn, modify the future potential demand as determined by market research. These influences, meriting detailed consideration, are:—

(1) The secular or long-term trend of sales.
(2) The normal trade cycle.
(3) The policy of the particular business.
(4) Seasonality of the product.
(5) Plant capacity.
(6) Degree of competition.
(7) Availability of labour and materials.
(8) Random or unforeseen fluctuations.

(1) *The Secular or Long-term Trend*

This is concerned with changes in population which may affect demand. Creation of satellite towns and development areas may exert a considerable influence on sales of many products in the vicinity. Prosperity in a particular area would be a good sign for sellers in the neighbourhood, whereas growing unemployment would indicate a contraction of most markets. Further influences in the secular trend may be:—

(a) Changes in the taste of consumers.
(b) General increase in wages since 1939 and the financial upgrading of sections of the population affecting purchasing power.
(c) Availability of alternative products.

(2) *The Normal Trade Cycle*

Most industries in the past experienced a cycle constituting a number of years and giving rise to fluctuating sales with boom and slump periods recurring at fairly regular intervals. Trade cycles may follow, precede, be caused by, or be the cause of, trade cycles in other industries. Their trend is best observed from a study of the total sales of a product for the whole industry, because individual producers with foresight may have anticipated and countered their effects by additional sales effort and skilful management.

(3) *The Policy of the Business*

This may be towards general expansion or contraction in the light of expected conditions. Or it may be simply a matter of obtaining enough business to maintain profits at their previous average level.

(4) *Seasonality of the Product*

Seasonality affects many industries and products, and a review of past sales should embrace several complete and consecutive seasons. Yearly seasonality is the most frequent and, as a result, it is not noticeable in the annual financial accounts. To study this tendency it is, therefore, necessary to analyse the turnover in the control periods that make up the complete year. Examples of seasonal trades are calendars, diaries and Christmas cards, hot-cross-buns, ice-cream, fireworks, etc.

(5) *Plant Capacity*

If all producers in an industry work to plant capacity, there may still be unsatisfied consumer demand for the product. This may be confirmed by market research. Under such conditions an increase in capacity may result in increased sales with a minimum of sales effort. On the other hand, if total sales have been below the total plant capacity for the whole industry, an increase in the capacity of an individual producer—whether by plant additions, or through change of layout to conform with better planning, or by increasing labour efficiency—will have no effect on sales volume in open market, unless accompanied by additional sales effort.

(6) *Degree of Competition*

Factors bearing upon this are:—

(a) Number of producers engaged in the industry and their total plant capacity.
(b) Quality and selling price of each producer's product.
(c) Total potential demand for the product.
(d) Intensity of individual sales promotion efforts.

(7) *Availability of Labour and Materials*

Immobility of labour frequently exerts a modifying influence on sales policy in an expanding market. Repercussions of the World War, 1939-1945, may accentuate these difficulties and also affect the availability of materials. The effect on quantity of output in either case is, however, capable of accurate

assessment. Unless methods of production can be altered to require less labour, or unless substitute materials can be used, it may be necessary to base budgetary control on the potential output from the available labour—at a predetermined efficiency—or on material quotas, etc.

(8) *Random or Unforeseen Fluctuations*

These may affect the whole industry or be local to a particular producer—*e.g.*, weather, strike, fire, explosion, power failure or flooding. Past sales of a particular producer should, therefore, be adjusted for the average daily output so lost, before making comparisons.

Preparation of the Sales Estimates

Total potential demand for the whole industry having been determined and then adjusted in the light of the foregoing influences, the portion of this demand likely to accrue to a particular producer may be determined by the compilation of a sales estimate in physical units as a prelude to formulation of a sales budget in money terms. Where production and demand are flexible, several estimates may be necessary at different price levels, from which the most profitable volume may later be determined.

In the following cases it may be impracticable, however, to prepare estimates in physical terms, and the sales budget itself would be the next step:—

(1) Where a service is rendered.
(2) Where finish is non-standard and to customers' choice.
(3) Where jobbing work is undertaken.
(4) In certain heavy industries.

The sales estimate is usually based upon information obtained from the market research into total potential demand—subject to modifications, where necessary, if any of the influences mentioned on page 22 operate—and comprises:—

(1) Details of the unit sales of each product by sizes, types, etc., giving consideration to the number of products involved and the possibility of eliminating those which are unprofitable, with concentration on major lines.

(2) The above analysed according to territories, agents, salesmen, etc. Density of sales may vary for a particular product according to the territory. Grand pianos, for instance, may not sell in great quantities in a highly industrial area. Neither will machine tools sell in a rural or residential area.

(3) The above detailed by classes of goods or services such as:—

(a) Necessities with inelastic demand.
(b) Essentials with elastic demand.
(c) Luxuries.

Capital goods may be for industrial producers, the National or Local Government, or export. Consumer goods may be sold through wholesale, retail, chain-stores or other channels, or direct to the consumer at different selling prices. Hence, again, the advisability of dealing in units rather than in value at this stage.

Before giving an illustration of the procedure necessary in analysing past sales and formulating a sales estimate, the modifying influences of the Capital Budget—concerning plant capacity—and the Stock Budget must be considered.

Plant Capacity

Plant Capacity and Seasonality of Product

Plant capacity imposes a limit to the amount that may be produced in a given time. And if sale of the product is of a seasonal nature, the problem may be intensified. Potential demand and present potential production capacity may not coincide. As a prelude to fixing the most satisfactory sales estimate it is, therefore, necessary to determine whether plant capacity is likely to exert a modifying influence.

Definition of Plant Capacity

There are many different conceptions of plant capacity. Here, it is considered to be the output that ought to arise from efficient operation of the plant throughout the normal working week. For certain processes—*e.g.*, beer or coal gas—this is twenty-four hours per day for seven days. In other cases it compares with the normal working week for labour as agreed between the representatives of employers and workers—say, 44 hours per week.

Emphasis is placed on the production that *ought* to arise in a normal week, and this introduces problems of plant and labour efficiency—the latter necessitating simultaneous consideration of the labour budgets.

Items of plant may be highly specialised and capable of performing an operation or operations in connection with a particular product only. On the other hand, it may be of a general nature—*e.g.*, borers, planers, etc., capable of performing a given operation on a variety of products. In both cases, working at an economic speed and load, it will be capable of a certain output

in a given time. The output represents products or operations connected with products and may be expressed in terms of:—

(a) Units or articles.

(b) Production time.

Where hand operations are involved, the normal output in the space available may also be expressed similarly.

Additional time is also needed in taking the work in progress from one operation to the next, or to store, either by hand or by mechanical means, and this also may be expressed in terms of time.

Each product, then, may be represented in terms of total production time analysed by operations and the capacity of the works—comprising process, machine and labour operations—stated in production time or converted into the equivalent number of products. Where more than one article is produced, it is convenient to use the time expression of output, rather than the physical.

Figure 2 shows a type of problem that frequently confronts the budget controller. One thousand production hours are needed to produce a batch of 100 articles in four weeks. There are three operations and the total plant capacity is assessed at 3,275 hours. At first, it appears that three batches (actually 3·275) of 100 articles can be produced. On looking into the capacities of each operation, however, it is found that three batches may be completed at the first operation, but only two at the second, whilst five can be produced at the third.

Assuming a potential demand for the year of 44 batches—equivalent to 44,000 production hours—it is revealed in Figure 3 that the first and second operations can only produce 42 and 35 complete batches, respectively, whilst the third operation could produce 65. In other words, only 35 batches may be produced towards satisfaction of a demand for 44, and there would be a stock of seven batches held up between operations One and Two.

Resolving this state of disequilibrium devolves upon the planning department. The courses of action taken, however, will be of vital concern to the budget controller. They may be considered under the following headings:—

(1) Overtime working.

(2) Improved planning and management.

(3) Increased labour efficiency.

(4) Sub-contracting.

(5) Plant additions and modernisations.

(1) *Overtime Working*

Introduction of overtime, or a second shift, allows for a greater volume of output, and may be used in connection with operations where bottlenecks occur. An increase in overhead costs results, however, from the overtime bonus payable. But this may not give rise to an increase in the cost of the product, because it may be offset by the spread of the fixed expenses of the business over a greater volume of output.

(2) *Improved Planning and Management*

Careful planning of the flow of work with, perhaps, judicious re-siting of plant, may give rise to a permanent increase in capacity at no continued extra cost, and is a possibility worth thorough investigation.

(3) *Increased Labour Efficiency*

Introduction of piece-work, where formerly day-rates were paid, frequently results in increased output. Motion study in connection with machinists and hand operators, may also have the same result. Both of these methods, besides increasing the earnings of workers, decrease total costs by spreading fixed overheads over a greater volume of output. Where piece-work is already in operation, introduction of a differential incentive may increase labour efficiency and output still further. The effect of the increased volume on the fixed expense portion of unit costs may tend to be reduced, however, by the additional incentive payment.

(4) *Sub-Contracting*

Sub-contracting may be a satisfactory method of increasing the output of certain operations for a short time. If the sub-contractor's price is dearer than the cost of production, the arrangement should, obviously, not be permanent. And if the sub-contractor's price is cheaper, the possibility of buying all this operation out, and utilising the plant or space so made available for furthering the output of other operations or products, should be considered.

(5) *Plant Additions and Modernisations*

This factor is considered in the section of Chapter 15 dealing with the Capital Budget.

IV

The Sales Estimate—Illustration

The Sales Estimate—Illustration

HAVING dealt at length with the considerations affecting potential demand, the capital budget and the stock budget, we can now take a simple example to show the approach necessary for analysing past sales and formulating a sales estimate. Where demand is flexible and is susceptible to price alterations, it may be necessary to prepare several sales estimates and to select the most satisfactory. For the sake of simplicity, however, one estimate only is illustrated and this is quite imaginary.

Illustration

Data

A certain product used in every home in a particular town is produced on specialised plant by a number of manufacturers. The market, so far, has been local only, and none of the producers markets any other articles. Although they each submit details of their respective plant capacities and unit sales to the local Chamber of Commerce, no trade association exists and there is very little liason between them. The industry was virtually closed down from 1940 until 1947.

Problem

In 1948 attempts were being made to revive the industry and producer "A" engaged a consultant to advise him on the possibilities of extending the market and the potential demand for the product. He was told that as the circumstances prevailing up to 1939 and from 1948 onwards were not homogeneous, comparisons based upon existing records would not necessarily be reliable and that door-to-door interrogation would be better. This course was agreed to, but, in the meantime, the consultant analysed the past sales and gave an estimate of the sales potential for 1948/51 *on the assumption that the two periods were homogeneous* and the information that follows is taken from his report.

Figure 4

The consultant found that all "A's" records prior to 1928 had been destroyed. He was, therefore, only able to determine the sales and plant

capacity for twelve years. A visit to the Chamber of Commerce gave him total sales and plant capacity for the whole industry throughout the same period. He also ascertained "A's " plant capacity, and confirmed by tests the accuracy of the latest capacity figures used by him.

It was apparent that "A" had enlarged his plant in 1934, but that no other producer had taken a similar step. The whole of this information was set out as shown in Figure 4, and the total sales by "A" and the whole industry for twelve consecutive years determined.

Figure 5

The next step was to divide the total sales for the whole industry (171,900 units) by 12 to arrive at the average annual sales (14,325 units). By calling this annual average 100 and expressing the actual sales for each year as a ratio of this, a series of ratios was obtained as shown in the third column of Figure 5. It was noticed from these that the three highest ratios occurred in 1931, 1935, and 1939—at four-yearly intervals. Similarly, the lowest ratios arose in 1929, 1933 and 1937, again at four-yearly intervals.

Figure 6

Assuming from Figure 5 the operation of a four-yearly trade cycle, the plant capacities and sales of "A" and the whole industry were set out on a large chart allowing plenty of columns for analysis purposes. Totals were ascertained for each complete cycle, followed by the average per annum for each. Armed with this chart, the consultant discussed the history of the business, the industry in general, and circumstances in the town with "A" and several of his workers, noting the information given on his chart.

From the municipal office he ascertained that in 1928 there were 50,000 dwellings in the town and as the life of the unit averaged four years, potential demand was assessed at 12,500 (col. 13). Although the number of houses was known for each subsequent year, in view of the trend towards use of two units per household (which was partly offset by lingering poverty) the potential demand from 1931 onwards could only be estimated approximately.

General Conclusion 1928 *to* 1939

Of the total sales for the whole period of the review, "A" obtained 8·3%.

Sales Estimate for 1948

As there had been no production since 1939 and the average life of the unit was four years, all units were considered to be worn out by 1948, and an entirely fresh estimate of potential demand was necessary.

Market research was undertaken, and enquiries as to the number of households and the local authority's building programme made at the council offices. The Chamber of Commerce furnished information as to plant capacity —which had increased in many cases owing to war production. "A" in fact, now had a capacity for 2,400 units per year. Government departments revealed the man-power and raw materials positions and also a potential foreign market, while interrogators showed that approximately 80% of householders would now require two units. An additional outlet was considered probable in certain local factories where welfare and canteen policies were advanced.

Potential Demand		*Units.*
Actual number of households	60,000	
Building Programme 1948/51	10,000	
	70,000	
Local domestic potential demand:—		
70,000 × ·8 × 2		112,000
70,000 × ·2 × 1		14,000
		126,000
Potential commercial demand:—		
Works canteens, 200 × 5		1,000
Export		100,000
Total potential demand (4 years)		227,000
Potential demand for 1948 for whole industry		56,750

N.B.—No consideration was given to the trade cycle. Experience alone would show whether it still existed after such a lengthy break.

Modifications to Potential Demand

1. *Plant Capacity* (based on 1939 efficiency). Plant capacity for whole industry, 1948 = 24,000 units; "A's" capacity = 2,400 units; Ratio of "A's" capacity to total = 10%.

It is apparent that:—

(a) If all producers worked a double shift, they would still be unable to cope with the full potential demand.

(b) As "A's" capacity has increased to 10% of the total, and as his average output was previously 8·3% of the total, he may need greater sales effort in future, to obtain his maximum output of 2,400 units.

(c) Unless there are modifying factors, the position is so attractive that existing producers may increase their plant capacities and new producers enter the market.

2. *Availability of Materials.* Materials are in short supply. A certain quantity of substitutes is known to be available, which will augment the official quota, but have an inflationary effect on cost. About 85% of 1939 production is estimated to be possible.

"A's" 1939 sales	= 1,800 units
85%	= 1,530 units

3. *Availability of Labour.* Only 80% of pre-war labour strength is likely to be available, and it is considered that average efficiency has dropped by 20% since 1939.

"A's" 1939 sales	= 1,800 units
80% of 80% = 64%	= 1,152 units

The following methods of increasing labour efficiency are practical:—

	Units.
Basic output at present efficiency .. .. =	1,152
Overtime working .. .. =	182
	1,334
10% extra to be achieved by differential incentive payment .. .. =	133
	1,467
5% additional by mechanisation of handling .. =	73
Estimated Labour Output for 1948 .. .. =	1,540

Selection of Sales Estimates

The position as far as "A" is concerned is:—

Plant capacity .. .. =	2,400	Units p.a.
Materials capacity .. .. .. =	1,530	„ „
Labour capacity .. .. .. =	1,540	„ „

The limiting factor is, therefore, materials, and "A" will base his sales estimate upon the maximum availability of this element—*viz.*, 1,530 units. As a result, he will be working at only 63·75% of his normal plant capacity.

The possibility of new producers entering the industry, or of present producers increasing their plant capacities, is remote, owing to stringent material quotas and licence restrictions.

V

The Sales Budget

The Sales Budget

IN many light industries the potential demand for each product may often be predetermined and published in the form of a sales estimate in physical units such as tons, dozens, gallons, yards, etc. To these units of output, selling prices may be applied to arrive at a detailed statement of sales turnover known as the Sales Budget.

In heavy industries, or where finish is non-standard and to customers' choice, and in jobbing work, or the rendering of services, however, formulation of accurate forecasts in detail of potential demand may not be practical. As a result, there will not be a sales estimate in physical quantities, but the sales budget itself will be formulated in value with the aid of whatever market research and past data is helpful. Individual selling prices will not be considered at the budgeting stage.

Ultimately, all selling is effected on a price per unit basis, the prices being either:—

1. Based on cost.
2. Predetermined by law or agreement between producers.
3. Determined in open market by operation of the laws of supply and demand.

1. *Prices Based on Cost*

Where selling price is based upon cost, it is necessary to prepare budgets to arrive at the cost of production and then, by means of costing technique, to arrive at product costs before the sales budget can be completed.

2. *Prices Pre-Determined by Law or Agreement*

Where maximum selling prices are predetermined, they tend also to become the minimum prices. The sales estimate, in units, in such cases, will have been determined at the controlled price level, and the sales budget can be prepared forthwith. Again, under these price conditions, even where a detailed sales estimate is impractical, compilation of the sales budget may be completed before ascertaining budgeted costs of production and sales.

3. *Prices Determined in Open Market*

Where demand is flexible and the number of saleable units varies with the price, several sales estimates may be needed to show the volume at each price and several tentative sales budgets prepared based upon tentative budgets of the costs of production, financing and selling before the most satisfactory one can be determined and adopted. The question of relative profitability must also be considered, where more than one product is marketed.

Lay-out of Sales Budget

In all cases, where appropriate, sales budgets may be analysed by products, territories, etc., as advocated on page 24, Chapter 3, when dealing with the preparation of the sales estimate ; but in addition to quantities, values should now be shown.

The sales budget so analysed is built up for the whole budget period from similar detailed budgets for each control period and will, in consequence, allow for seasonality, and afford a satisfactory standard with which actual sales may be compared.

In the same way as the long-term policy of the business with regard to development may be budgeted—and broken down to a moving quinquennial capital budget outside the main system—so, too, when conditions are suitable, an Ideal Sales Budget may be used to show, in broad outline only, the likely trend of sales for a number of years ahead. It tends to give a better perspective to sales policy, and at the same time may furnish basic information useful in compiling the annual sales budget.

Evaluation of Sales Budget

The prime consideration is to establish an analytical sales budget which, if achieved, will reflect the most profitable and stable position of the business as a whole. Maximum sales turnover may not give this. Other considerations arise, such as:—

(1) The effect on profits of reductions in selling price to obtain greater volume of sales where demand is flexible.

(2) The relative profitability of the different products for sale due to:—

  (a) Differences in costs of production.

  (b) Differences in profit margins for the same or similar products through various channels—*e.g.*, wholesale, retail, chain-store, etc.

(c) Disproportionately heavy selling expenses necessary to achieve high sales of certain products.

(3) Heavy financing charges where liquid capital is restricted, thereby reducing net profits and also leading to:—

(4) Adverse ratios of outstanding creditors to material stocks, and adverse ratios of outstanding debtors to sales.

Selling Expenses

It will be observed that disproportionately heavy selling expenses may be involved in achieving high sales. Naturally, the selling and distributing expenses budgets will, in practice, be considered at this stage. These indirect expenses, however, have so much in common with factory and administration overheads that it will be clearer and more convenient to consider them all together in later chapters.

Sundry Debtors Budget

Sundry outstanding debtors on sales ledger, too, will be better left for detailed consideration, along with outstanding creditors on bought ledger and the financial budget, in a later chapter.

Control Bases

Within each function, control is maintained by comparing actual expenditure under each account heading, with the standard expenditure allowed, the difference between them—known as cost variations—being the subject of investigation and ACTION by responsible officials.

Co-ordination, however, is maintained by balancing the standard or budgeted value of the function as a whole against the budgeted value of another function which may be considered as a criterion. The resulting ratio is then used as a basis for comparison of actual ratios as they arise. Care must be exercised, however, in the selection of such basic ratios, or the actual ratios achieved may be misleading. For instance, it would be unwise to express warehouse costs as a percentage of stock value, because higher stocks might give rise to a lower ratio for warehousing. Higher stocks themselves may be undesirable, and the ratio would not indicate whether the warehouse costs had increased. To be satisfactory as a basis, the actual value of a function must

be stable and as near as possible to the budgeted value. Fixed assets and sales turnover are good bases because:—

(1) Fixed asset values are unlikely to alter—except as planned in the capital budget.

(2) An *increase* in the ratio of sales value to fixed assets is itself a desirable tendency.

(3) A *decrease* in the ratio of *any* function to the value of sales would indicate an improvement regardless of the actual movement in value of either function.

(4) An *increase* in the ratio of *any* function to the value of sales would indicate a deterioration from the plan, regardless of the actual movement in value of either function.

Where the product of a process, in whole or in part, is used in another process, " sales " or transfers from the one to the other should be valued at their budgeted cost, or a technical apportionment thereof adopted as a standard, and the complications avoided which arise out of inter-departmental profits where market prices are used.

If, later, the actual cost of production in the transferor department tends to differ from that budgeted, the difference or variance may be expressed as a percentage above or below the standard set and applied to the standard allowance in the transferee department. Similarly, if required for price estimating purposes, a factor may be applied to bring the standard allowance in the transferee department up to market price.

Important standard ratios which may be determined from the budgets so far considered are:—

(1) Sales value compared with the value of fixed assets. The desirable trend in practice is towards an increase in the ratio.

(2) Sales value compared with the fixed asset value per square foot of factory, the desirable actual trend again being towards an *increase* in the ratio.

(3) Stock and work-in-progress valuations compared with sales value. The desirable trend in practice is towards a *decrease* in the ratio.

(4) Stock value and warehouse costs compared with sales value, the desirable trend being towards a *decrease* in the ratio.

(5) Selling expenses compared with sales value, the desirable actual trend again being in the *downward* direction.

VI

Introduction to Labour, Material and Expense Budgets

Introduction to Labour, Material and Expense Budgets

IN the previous chapters, consideration has been given to the preparation of a sales estimate and a sales budget. It is upon the successful operation of such predetermined plans that the object of carrying on an industrial enterprise depends, *viz.*, obtaining a satisfactory net profit in conjunction with a stable balance sheet position.

Putting the sales plan into operation is primarily dependent upon having the actual goods to sell. In the case of the manufacturer, this involves producing them. Where factoring is involved, they have to be purchased, and where a service is rendered, such as transport, it has to be made available.

If it is necessary to maintain stocks, the amount of goods purchased or produced in the short period may not coincide with the amount sold, although in the long run they will agree. So that sales, plus any increase in stock between the beginning and end of the budget period, or sales less any decrease in stock over the same period, are equivalent to production.

From the detailed sales estimate analysed by products and modified where necessary for changes in stock levels, the amount of production in physical unit may be ascertained. Where a by-product or residual arises in the course of production, and after further processing may become usable, the budgeted loads of the departments in which such further processing is undertaken will require adjustment to allow for the additional output. By-products actually made saleable in this way would, of course, be considered when setting the sales budget.

The next step in establishing a system of budgetary control is to determine, in advance, what the total cost of production should be by setting up standards of expenditure under suitable account headings in the various production, service and overhead expense departments as a measure against which actual costs may be compared.

Analysis of Expenditure

As Mr. H. J. Wheldon says in " Cost Accounting and Costing Methods", " It is necessary to analyse and classify manufacturing costs if management is

to be provided with the data required for cost control". The first essential to budgetary control, as with costing, is thus to create a suitable schedule of cost account headings, carefully coded and defined.

Expenditure is then divided into groups according to the activities of a manufacturing concern as under:—

(1) *Production Departments*—in which the products or articles are made.

(2) *Service Departments*—such as power, transport or plant maintenance as aids to the production departments.

(3) *Works Expenses*—applicable generally to the production and service departments.

(4) *Administration Expenses*—necessary to the business as a whole, without particular reference to production or service departments.

(5) *Selling Expenses*—applicable only to the sale of products.

(6) *Distribution Expenses*—applicable only to the despatch of products to customers.

For costing purposes, the total expenditure incurred in production ((1), (2) and (3)), administration, selling and distribution, are divided as shown in the table on page 5, Chapter 1.

To ensure the maximum degree of control over all overheads, modifications may be made to these divisions under budgetary control, separate budgets being prepared for:—

(1) *Factory Overhead*—including those direct expenses which are not completely controllable in the departments where they arise, but excluding all fixed expense.

(2) *Selling and Distribution Overhead*—excluding all such fixed costs.

(3) *Fixed Costs.* These are the costs of administration and certain other direct costs specifically excluded from the factory and selling and distribution overheads, with, sometimes, portions of direct expenses all of which tend to vary in amount according to the policy of the management rather than in relation to the volume output or trade.

This in no way interferes with normal costing methods or procedure, and actually facilitates application of the marginal costing technique. Overheads, or indirect costs, are classified under suitable account headings in the budgets for overhead departments, each account—or sometimes groups of accounts—being within the control of a responsible official. For costing purposes, factory overheads are apportioned to production departments or cost centres by the most suitable means, so that costing rates may be ascertained. This is essentially a feature of costing, however, and not of budgetary control.

Prime costs arise mostly at cost centres within the production and service departments, there being one cost centre or more in each department as required. Budgetary control is exercised in greater detail and with more certainty than costing, and all those cost centres under the control of one person are grouped together to form a department. Thus, a machine shop may be treated as one department under the control of a foreman, superintendent or manager, and contain cost centres for planers, borers, millers, gear cutters, etc.

Every item of expenditure, however small, must be allocated to an account. There is no escape. The total expenditure under each account heading is in turn charged to a department—either production, service or expense. Finally, all accounts or groups of accounts in all departments come under the complete control of a responsible official, who in turn may be answerable to a higher official. There is no scope for "passing the buck". Someone, readily identifiable, is answerable for every penny expended.

With production and service departments it may be convenient to have three budgets for each. There may be one for Direct Labour, showing the standard quantity and value thereof, applicable to each cost centre. There may also be one for Direct Materials and a further one for Direct Expense. With Overhead departments, one budget only is needed in each case, however.

Direct Expense for costing purposes is defined by The Institute of Cost and Works Accountants as "All items of cost, other than material and wages, not forming part of the normal production overhead, that are incurred on specific products, production units or services". Under budgetary control, however, it is desirable to modify this so that direct expenses are those which are:—

(1) Incurred within the department.
(2) Completely controllable by the head of the department.

If an expense, such as electricity, is incurred in a department, but because of inadequate switching or metering it is not completely controllable by the head of the department, it should not be included in his direct expense budget, but charged to Electricity account in the Works Overhead budget, where it becomes the responsibility of a specific official, such as the fuel officer, or even the factory or works manager himself.

The control of operations under budgetary control may be so close and the integration with costing and accounting—springing from common, fundamental documents—so intimate that regular presentation of a full set of cost accounts and financial accounts at frequent intervals may be unnecessary. If proper control is obtained, it follows that the bases for estimating—which many still consider to be the prime function of costing—will remain constant.

Costing at regular intervals may, therefore, be needed only in so far as it augments the control given by budgetary control.

In the next few chapters, consideration is given in detail to the formulation of budgets in regard to the three main elements of cost, namely, labour, materials and expense. Labour, in particular, is such a large item of cost that it is considered more significant to deal with the subject as a whole in this way at the start, rather than to consider portions of direct labour and indirect labour separately in conjunction with all other costs arising in production, service and overhead departments and, perhaps in process, lose sight of the main problem of obtaining the best ratio of indirect to direct workers.

VII

The Man-Power Estimate

The Man-Power Estimate

Labour Definitions

For costing purposes labour or wages is divided into two main categories, defined as:—

(1) *Direct Labour*—being " labour expended in altering the composition, condition, conformation or construction of the product ". It is an element of the direct cost of production and features in separate Direct Labour Budgets for production and service departments, where required. Typical examples are:—Moulders, Fitters, Electricians, Watchmakers, Embroiderers, etc.

(2) *Indirect Labour*—being " labour expended that does not alter the composition, condition, conformation or construction of the product ". It may be:—

(a) Partly direct cost of production chargeable to various accounts in the Direct Expense Budgets of production and service departments. Examples: Cupola men, gas plant attendants, departmental sweepers, clerks and supervisors.

(b) Mainly indirect cost chargeable to various accounts in the Expense Budgets relative to Overhead Departments (Factory, Administration, Selling and Distribution). Examples: General labourers, storekeepers, heads of departments, inspectors, clerical workers, draughtsmen, administrators, salesmen.

Increases in direct labour strength in production departments, provided labour efficiency remains constant—or improves—is desirable. It means more output without increasing the cost per unit of production. Increase of indirect labour strength in either category, independent of increase in direct labour strength, however, is generally undesirable. It implies additional expense and, ultimately, higher product costs.

The introduction of personnel for planning, production control, time and motion study, budgetary control, etc., while increasing the total indirect labour costs, however, should be aimed at obtaining such a volume of additional output that costs per unit of departmental output are reduced. Careful co-ordination of all functions of the business, as already advocated, should aid in achieving this object in practice.

Special conditions regarding Service Departments

Where the cost involved is relatively small, an auxiliary service to production may be budgeted entirely under one account heading in the factory overhead budget. In such a case, the fitter, carpenter, or electrician, as the case may be, is an indirect worker. Where, however, the service is considered as a department with cost apportioned to direct labour, direct material and direct expense budgets, he is a direct worker included in the direct labour budget. When, for costing purposes only, the total direct cost of such service departments is transferred to factory overhead, it all becomes indirect expense. On the other hand, where direct expense budgets are maintained in connection with production departments, and the cost of services is apportioned to them on the basis of usage, it becomes direct expense. This is due to the fact that the service department in one business may usually be a direct production department—or a whole business—in another industry.

Direct Labour Analysed

As a rule, direct labour or wages is looked upon as the whole earnings of those employed in production departments. This is the conventional costing attitude. Overhead is usually recovered in product costs as a percentage on such wages. Estimates for price-fixing purposes based upon this simple method are often, however, highly inaccurate. In order to obtain maximum control over labour and its cost, a more accurate measure is needed, and for budgetary control purposes, therefore, a modification of the accepted costing definition becomes necessary. An analysis of such wages is needed and this may be effected by considering:—

(1) *The actual wages paid or payable*—to determine whether they are of a composite nature and, if so, to ascertain the proportion of each part present in the whole and the rules governing their computation.

(2) *The actual duties of the workers*—to determine which of those engaged in a department do actually " alter the composition, condition and conformation of the product " and which do " fetching and carrying " and other routine services.

(1) *The Actual Wages Paid*

There are two main methods of remunerating workers:—

(a) Time or Day Work, irrespective of results or output.

(b) Payment by Results—*e.g.*, Piece-work and various Bonus Schemes.

Division of gross wages by the number of units produced, reveals the average price per unit paid to workers. Under the time or day-rate method, this will

be found to fluctuate considerably owing to changes in labour efficiency, due to the lack of inducement to work steadily. Total earnings must, of necessity, be considered as applicable to the quantity of output. Introduction of piece-work tends to stabilise efficiency and output at a level satisfactory to the worker which is usually higher than the average previously obtained. That is, he will try and produce sufficient, or work just long enough, to ensure receiving approximately the same amount of wages each week. Piece-work earnings are a measure of output in both value and quantity. To induce still higher output, upon introducing a system of budgetary control, it may be decided to offer a further bonus as an inducement to overcome the worker's desire for stability (or to remove it to a higher level) and this has the effect of increasing plant capacity, a fact to be considered in setting sales and plant budgets.

Some industries—notably engineering—adopt a two-part rate when piece-work or any other method of payment by results is used. The Base Rate refers to the *output* ; the National Bonus to the *time* the employee spent at work.

In all cases where work is undertaken beyond the normal working hours, overtime or night-shift bonus becomes payable according to prescribed rules, in addition to payment for the output and time involved.

In addition to the possibility of a change in wage rate, the wages cost per unit of production where a two-part rate is in use may vary because of:—

(1) Changing labour efficiency—*i.e.*, varying quantity of output in the normal working week over which the National Bonus is apportioned.
(2) The incidence of overtime or night-shift bonus.

If overhead expense is absorbed by a percentage application to total direct wages, wide divergences in job costs for the same article may result through overhead being absorbed by overtime bonus. This is quite unsatisfactory. The introduction of overtime or night-shift work at the request of a customer should not increase the price of the job beyond the actual amount of the bonus payable, and where it is habitual, or for purposes of boosting production generally, the costs of the actual work produced after normal hours should not be singled out for increase, but the total overtime bonus apportioned to all production by inclusion in the direct expense rate or by alteration of the overhead absorption percentage.

More accurate costs may be obtained by separating National Bonus and overtime and night-shift bonus from the output element of direct wages and charging them to separate accounts in a wages section of the direct expense budget, in the department in which they arise.

Direct Labour or Wages for Budgetary Control purposes are the incentive, or base rate, earnings relating to output only of those classified as Direct Labour.

(2) *The Actual Duties of the Workers*

The number of direct workers required in a cost centre or production department depends upon the volume of output budgeted, the method of production and the anticipated efficiency of the labour. What is considered to be direct work undertaken by direct workers in one firm, may be " indirect production labour " in another, however. For instance, where a highly skilled worker obtains his own patterns and materials from stores and is responsible for keeping his working area clean, such duties may not conveniently be divorced from his production duties and therefore become direct labour. But where, owing to different production methods, such " fetching and carrying " and sweeping are carried out by employees engaged exclusively for such duties, although arising in the department and completely within the control of its head, they become indirect labour.

It may be argued that if the best plant lay-out is adopted and most suitable methods of production used, such a situation cannot arise. Owing to the varying sizes of industrial units within the same industry and the limitations of existing plant or buildings *at present*, etc., even by selecting the most suitable methods, such conditions do all too frequently arise, and are a difficulty in adopting uniform costing methods for a whole industry.

In a production department involving employment of direct labour it may, consequently, be necessary to apportion their remuneration between the direct labour and the direct expense budgets in the following way:—

(1) *Direct Labour Budget.* One item arising in each cost centre comprising the Incentive Earnings applicable to output alone in regard to direct workers.

(2) *Direct Expense Budget.*

A. The following items analysed to individual accounts and sub-totalled:—

(a) " Indirect Production Labour "—several separate items if required.

(b) National Bonus—one item or account relating to both direct labour and indirect production labour.

(c) Overtime and Night-shift Bonus—one item or account relating to both direct labour and indirect production labour.

B. Departmental Supervision—one item.

C. Departmental Clerical Labour—one item.

In a production department where the cycle time of a process, machine or plant, sets the pace of output as distinct from the efforts of man, the wages of the operators or attendants are indirect in nature and, strictly speaking, should be analysed and charged under suitable account headings in the direct expense budget, as indicated above. As a matter of practice, however, it may be convenient to record them in a separate document analogous to a direct labour budget, along with the physical details of budgeted output, charging only the relative national bonus (if applicable) and overtime and night-shift bonus to the direct expense budget.

By adopting such an analysis of production department labour, Uniform Costing is facilitated. Armed with a definition of the duties covered by direct labour—as agreed by all manufacturers subscribing to such a proposed system—the individual producer may add to his own conception of direct labour cost items recorded by him under various account headings in the direct expense budgets to arrive at an adjusted departmental wage cost comparable with that of other producers. At the same time, he maintains his own labour analyses and controls in the manner *best suited to his own particular needs.*

The Man-power Estimate

The man-power estimate is a quantitative statement of the number of employees required relative to the budgeted output, and it is usually analysed by departments, occupations, sexes and ages (where juniors are involved) (Figure 7). " Man-power Budgets " have been popularised by the Government but as, in this book, a budget is considered to be a standard of value, the term " Man-power Estimate " is preferred for such a standard in quantity. Man-power requirements may be assessed in the following ways:—

(1) By analysis of past and present records, making due allowance for known inefficiencies.

(2) From estimates by highly experienced workers or supervisors, or by arbitrary decision from the management.

(3) By arbitration on the basis of (2). This is a plea for sweet reasonableness on the part of both the Budget Controller and the Responsible Head of the department concerned, when better methods are not available.

(4) By production of a sample or prototype under recorded conditions rated down to the time for the average worker.

(5) From mathematical and technical formulæ and calculations, particularly in regard to machine operations or processes where they, as

distinct from the operators, set the pace. These may be based upon actual observations, tests, etc., or on the study of specifications and blue-prints.

(6) By Time and Motion Study.

(7) By synthetic formulæ developed from time and motion study.

The results may be obtained in terms of the number of workers required, or of the number of working hours involved. Where more than one article is produced, the latter is usually most convenient.

Direct Labour Requirements

(a) *Where a detailed Sales Estimate or Production Programme is possible*

The amount of direct labour required will be dependent on the budgeted output of the products in each cost centre, translated from physical units into labour hours, as determined by one or more of the methods mentioned. It may be convenient, in this connection, to record each cost centre horizontally at the top of a sheet of columned paper and to list all the products vertically down the right-hand side. Each product may then be considered in turn and the production required entered in the appropriate operation or cost centre columns. Not every product will pass through all operations. Naturally it will be impossible to add up the output in each column, but each figure may be translated into labour hours, and these, when added, give the total labour hour requirements in each centre.

(b) *Where a detailed Sales Estimate or Production Programme is not possible*

In certain heavy industries, or where jobbing work is undertaken, or where finish is non-standard and to customers' choice, it was found that a detailed sales estimate was impracticable. As a result, difficulty may be experienced in determining direct labour requirements. This may be overcome by:—

1. Relating the sales turnover of a previous period to the corresponding number of direct labour hours experienced in each cost centre, and applying the ratios determined to the sales turnover budgeted for the current period after making allowances for ascertainable fluctuations in the current average selling price and for known inefficiencies in the previous labour figures.

2. Adopting the above method in order to build up a complete set of budgets, and then adopting flexible budgets whereby the standard labour hours

relative to the actual production achieved are substituted for the normal number established by the previous method. This technique will be explained fully in a later chapter.

Machine or Process Hour Requirements

In those operations where the pace of production is set by machines or processes and the number of operators is no guide to output, much of the method applicable to direct labour may apply in determining the machine or process hours applicable to the budgeted production load. The speed of the machine or the cycle times of the processes may be determined in many cases from technical formulæ compared with actual observations or time studies and these, in total, are necessary as a measure of standard output, as a basis for allocation of certain expenditure in costing, and to indicate the total spread-over of working hours, which may affect the number of workers required if in excess of the normal length of working week. As to the number of workers required, this may depend upon the type of machine or process, and method of working it, trade custom, or policy, or upon time and motion study.

In connection with machine operations, two studies are usually required:—

(1) Running time per unit of production.

(2) Setting-up time.

In some cases the number of machine set-ups and the time involved may be determined with precision in advance. In other cases a desirable ratio of set-up to running time must be established after consideration of the particular types of job to be machined and other circumstances. Setting-up may also be treated as a separate operation or cost centre.

Auxiliary Service Departments

Output from a service department may depend upon the capacity of the plant, or it may be hand labour which may fluctuate as required. If there is an excess of service plant capacity, it may be necessary to decide whether to:—

(1) Reduce the plant capacity to the level needed for production purposes.

(2) Produce the service to plant capacity and waste the excess output. While this may tend to reduce the unit cost of the service produced, it will also tend to increase the cost per unit of saleable production.

(3) Produce the service to plant capacity and sell the excess output, thereby running the plant as economically as possible—with a tendency towards reducing the main product costs—and increasing overall profits by reason of the additional sales thus budgeted.

Having decided the best way in which to operate the service plant, considerations affecting its man-power estimate are similar to those for production departments.

Indirect Labour Requirements

Indirect production labour—included in the direct expense budget of a production department—may tend to vary with the total production of the department rather than with the output of particular cost centres in it. It is sometimes difficult to measure, particularly where it is unskilled, its duties unpredictable or irregular in recurrence. As a result, it may be necessary to allot a certain number of such workers to a department, on a more or less arbitrary basis, leaving it to the foreman to see that they are fully occupied all the time. The number of other types of indirect workers required, including clerical and administrative, can often be closely measured, however. It is probably true to say that flow production needs fewer indirect workers than batch or job production when the amount of documentation associated with the latter is considered. *While the number of direct workers always tends to vary with the volume of productive output, the number of indirect workers tends to vary more with the organisation adopted and the systems employed.* These can be, and frequently are, elaborated to undesirable lengths, thereby greatly inflating product costs. The simplification of organisation, clerical work, forms and other unprofitable work is of prime consideration in establishing budgetary control and merits closer consideration in order that the most satisfactory man-power estimate giving the lowest ratio of indirect to direct workers may be established.

Ratio of Direct to Indirect Labour

Lewis C. Ord, in his book " Secrets of Industry," suggests that in America, on an average, 25 indirect workers are employed to every 100 direct workers, whilst in England, the ratio is probably at least 100 indirect to 100 direct workers.

Naturally, the ratio varies considerably between one industry and another, and no dogmatic relationships can be established with certainty. In assessing man-power requirements for a particular producer, however, the problem should be considered, and energetic measures taken to obtain a percentage as near as possible to the American figure. Bearing in mind the high wage rates and salaries now paid and that together they are frequently in excess of 50% of total cost, reduction of from 25% to 50% in total costs may often be achieved

by successfully tackling the problem. Some of the reasons for the heavy inflation of indirect workers in this country may be:—

(1) Aggrandisement of departmental heads.
(2) Payment of bonus in some cases to departmental heads based upon the numbers " under " them.
(3) Excessive enthusiasm of specialists for their own specialities.
(4) Lack of *horizontal* organisation and co-ordination of functions.
(5) The production methods adopted.
(6) Bad factory lay-out.
(7) Uncoordinated documentary systems, giving rise to almost simultaneous preparation of similar information, on unsuitable forms, in a number of departments.
(8) Over-elaboration of documentary systems.
(9) Collection, preparation and dissemination of information after the need for it has ceased.
(10) Low efficiency, unsuitability and immobility of employees.
(11) Poor or inadequate supervision.
(12) Excessive buying involving additional clerical work in many departments, and extra labour for unloading, handling and storing.
(13) Forcing a product into the market by dint of excessive sales effort when there are already a number of alternatives available.

Survey of Systems

A study of the tasks involved in each indirect expense account is a preliminary to deciding upon indirect man-power needs. Points to consider include the following, but the list is not exhaustive:—

(1) The number of workers engaged, their ages, sex, capabilities, etc., and the total number of working hours involved per period.

(2) Details of each task giving:—

  (a) Frequency of recurrence.
  (b) Average time taken.
  (c) A sample of each form received with time of arrival and name of sending department or account.
  (d) A sample of each form leaving the section, showing typical information given, with time of departure and destinations.
  (e) The object of performing each task. Often the need will be found to have ceased years previously.

(3) Tabulations for each day in the period of the effective and non-effective hours worked. Many jobs are of weekly or monthly periodicity and require a certain labour strength at peak times, a strength which is maintained throughout the whole period and employed on non-effective work at slack times.

(4) Examination and comparison of all forms received and despatched by each section. Often, information which need only be prepared once and routed or duplicated for use by all, is produced and used concurrently in several places.

(5) Elimination of redundant forms and collection of information that " might be needed," but, in point of fact, never is.

(6) Re-designing forms, amalgamating those which are only partly used.

(7) Consideration of whether sufficient work is required to warrant introduction of machinery, and to what extent this is desirable. Surplus capacity, in this respect, invites employment of extra labour to keep it fully used " to make it pay " !

(8) Job evaluation of each task by the most suitable method to determine the necessary education, training or experience needed, the degree of responsibility involved, and the comfort, safety, prestige, etc., of the general working conditions. At a later stage this information may be used in establishing standard wage or salary schedules.

(9) Examination of the history cards or personnel records of each employee and, after a personal interview, valuing each in the same way that the various jobs were valued.

(10) Re-allocation of personnel to the most suitable tasks in each case.

(11) Calculation of the number of hours typing, machine operating, etc., for the whole business, which when divided by the number of hours in the normal working week, determines how many workers are required for each occupation. This to be followed by employment in pools and preparation of programmes so that work may be routed to them—or they to the work—as the work-load varies.

(12) Encouragement of mobility among certain other workers with suitable potentialities and creation of itineraries for them, so that they pass into other departments at peak periods and are withdrawn when the rush is over to assist elsewhere. By this means, both the mobile workers and the various departments or sections in which they work will always be fully occupied, but maintaining the minimum complement overall.

(13) Re-tabulation of the number of hours needed in each section or department. Non-effective time should, as a result, be minimised and indirect labour strength considerably reduced.

Organisation is usually considered to work up-and-down in each function, on a ranking basis. The above conception, however, involves also horizontal co-ordination and the utmost co-operation and goodwill—not only in each function, but between all of them. While certain workers object to change, the more progressive element welcomes it, and the employment of mobile workers and specialist pools produces workers with a fair understanding of many facets of the business. It also obviates the necessity for taking on executives from outside the business—when vacancies arise—thereby encouraging juniors and building a valuable but somewhat intangible asset in the accumulated historical knowledge which long progressive employment fosters.

The man-power estimate must be both a prelude to, and an end of, satisfactory labour budgeting. Taking a parallel, the most satisfactory Sales Estimate was found to be not the one giving the maximum turnover, but that which gave the maximum final profitability after allowing for changes in price and disproportionate selling expenses.

So, too, with labour. A preliminary estimate is built up to give the lowest ratio of indirect to direct workers, which will in due course be modified by the labour budgets, in view of differences in sex and wage rates, to give the most satisfactory final cost position.

Standardisation of Operations

Standardisation of all products, labour operations and methods, is essential if the most satisfactory position with regard to output, man-power and cost is to be planned. In jobbing work, or where finish is to customers' requirements and production of *standard products* is out of the question, it is even more important to *standardise production methods* and, of course, the type of product is no hindrance in either case to the standardisation of indirect methods and the introduction of economical systems.

VIII

Labour Budgets

Labour Budgets

IT is now necessary to consider the formulation of labour budgets in the various departments, based upon the preliminary man-power estimate. Direct labour is always recorded separately in special direct labour budgets relative to each cost centre, with a summary for each department as a whole. Indirect labour, however, appears under a variety of account headings in the direct expense budgets of production and service departments, and also under similar circumstances in the budgets of overhead departments. The subjects of direct expense and overhead expense budgets will be dealt with fully in later chapters. At this stage, it should be remembered that paragraphs dealing with indirect labour, therefore, refer only to portions of such direct expense and overhead budgets.

Direct Labour Budgets

In preparing a direct labour budget relative to a predetermined volume of output from a cost centre, it is necessary to determine:—

(1) The correct amount of direct labour required.
(2) The types or classes of workers needed.
(3) The appropriate wage rates to be paid.
(4) The most suitable method of remunerating the workers.

1. *Correct Amount of Direct Labour*

The various ways of determining the amount of direct labour needed relative to the budgeted output were mentioned on pages 55 and 56 in the previous chapter, and need not be referred to here. Where costly plant is involved in connection with jobbing work, it is usual to plan for the maximum production possible and the direct workers concerned may be serviced by a high proportion of " fetchers and carriers." Where, however, alternative methods of production have to be available to meet potential demand, such a course may be impracticable, owing to the need for maintaining a balanced labour force. Although output for a given period may be considered, statistically, as one large " lump," it usually arises in practice by way of a multitude of smallish orders and the possibility of an unpredictable swing from, say,

machine work to hand work, may mean working the machines full out to the exclusion of hand production. This may involve a large proportion of unskilled "fetching and carrying." If the trade pendulum swings suddenly towards hand work, however, the jobbing manufacturer finds himself with a large number of unskilled workers on his hands and expensive plant lying idle. Often the price of the hand job is relatively greater than the price of the mass-produced one. To maintain the desired flexibility of production, and at the same time ensure the cheapest costs over a long period, and a stable labour force, may dictate modifications to the production methods and budgeted output which have no immediate or direct relation to potential consumer demand (which in this case cannot be predicted in detail) or plant capacity. The desirability of such modifications will be manifest, however, only at the final co-ordination of all budgets—a process that may lead to several major revisions to plans and budgets before the maximum profitability becomes apparent. Which of two orders to accept when there is only capacity to undertake one, is a problem which is settled with most satisfaction where fixed and variable overheads are kept separate as advocated.

2. *Types or Classes of Labour*

Where the operation involved is highly specialised, there may be no doubt as to the type of worker required—*e.g.*, electrician, moulder, embroiderer, etc. In other cases, however, it may be advisable to undertake a detailed job analysis to see exactly what skills are involved and to employ workers with just sufficient of the right type, education, strength and temperament.

It is essential to establish a ratio for the employment of men, women and youths, as without some such guide the average labour cost per hour may increase through engaging the labour which is easiest to obtain. Other considerations are the relative cheapness of boys and girls. Where light, semi-skilled operations are involved, it may be desirable to employ the latter, as their stay in industry is frequently limited, resulting in a fairly constant turnover, but a low, stable wages budget. With regard to women, the long term as well as the short term labour position—not only for the particular producer, but of the industry and the nation as a whole—must be considered in establishing the maximum number to be employed.

It comes within the scope of budgetary control to examine the age grouping of actual workers and to suggest means whereby the ravages of war and a falling birth rate may be made good by the training of boys and adults, where necessary, so that inherent skill may continue to flow from the older to the younger generation.

Where production loads are subject to frequent violent fluctuations, the mobility of labour is important, and it may be preferable to employ a proportion of fully skilled, adaptable workers at high rates in certain occupations for which semi-skilled juniors at cheaper rates, but less mobile in accomplishments, might otherwise be considered desirable.

Having finally decided upon the types of labour, and the required ratios of men to women and youths, the information should be clearly shown in the detail accompanying the direct labour budget for the guidance of the head of the department.

In view of the varying maximum working hours established in regard to women and juniors, the original man-power estimate—based upon the normal hours for men—may now have to be modified.

3. *Appropriate Wage Rates*

Minimum wage rates have been established for many occupations under National Wage Councils, or by negotiation between Trade Unions and Employers' Federations. In some cases, however, they still remain a matter of personal negotiation between the worker and his employer. The wage rates used in labour budgets may be the minimum rate as agreed, or high rates if desired, or, failing agreement, those which are customary in the locality. The tendency with wages agreed on a large scale has been to ignore differences in individual ability and to establish common rates for whole classes. This is a convenience. Where payment is a matter of personal agreement between the employer and employee, however, it is still possible to recognise differences in ability. Nevertheless, it is desirable to standardise these for budgetary control purposes and to use one only for each occupation, as a basis.

By applying the appropriate wage rates to the hours of the different grades of men, women and juniors that may be included in the budget for the cost centre, the total wage cost is ascertained. This, when divided by the total of all their hours, irrespective of class, sex or age, gives the standard hourly rate for the cost centre, as shown in the following example:—

			s.	d.				£	s.	d.
10 men	for 44 hours at		2	6	=	440 hours for		55	0	0
5 women	„ 40	„	1	6	=	200	„	15	0	0
3 girls	„ 40	„	1	4½	=	120	„	8	5	0
2 boys	„ 40	„	1	0	=	80	„	4	0	0
20			1	11½		840		£82	5	0

The importance of adhering strictly to the ratios established is shown in the following example, where the same number of workers, and the same hourly rates are used as previously, but where there are no boys or girls:—

		s.	d.			£	s.	d.
10 men	for 44 hours at	2	6	= 440 hours for		55	0	0
10 women	„ 40 „ „	1	6	= 400 „	„	30	0	0
20		2	0½	840		£85	0	0

In this case, although the same work has been produced (840 hours), the total labour cost has increased from £82 5*s.* 0*d.* to £85 0*s.* 0*d.*, and the hourly rate from 1*s.* 11½*d.* to 2*s.* 0½*d.*

Without working to budgeted ratios, the above situation easily arises.

4. *Most Suitable Method of Remuneration*

The main methods of remunerating workers were mentioned in Chapter 7, page 52.

Cost Accountants will be familiar with the principles underlying the many and varied bonus schemes in current use, and it will be necessary to decide upon the most suitable one, modifying it if required to meet the particular circumstances. It should be easy to understand, simple to operate, and acceptable to the workers. Time piece-work has many advantages. It is recorded in hours—a unit which is immediately usable in operating statements and therefore makes for economy in clerical effort, equates dissimilar products in a common unit, facilitates efficiency statistics, and simplifies price estimating (particularly when increases in rates of pay are agreed). While for direct workers bonus schemes are related to their own efforts or output, such a basis is unsuitable for many types of indirect worker, as it leads to non-productive effort and inflated costs.

There are signs, however, that financial inducements as at present offered, are becoming of less importance as an incentive to additional output. There is a body of opinion which asserts that non-financial incentives will become increasingly important as the worker's desire for joint consultation and share in management—and his ability to do so effectively—develops. If this is the case, consideration must be given to methods of training in this direction and to the promotion of confidence, friendly relations and personal knowledge and understanding between executives and workers in addition to the more obvious types of welfare work.

When this stage is reached, it may be worth while to consider not necessarily profit sharing, but a financial incentive based upon *net sales* rather than on individual or group *effort*. After all, this is the basis upon which the prosperity of the business, and the stability of employment depend.

Minimum Incentive Wages

Where it is decided to introduce piece-work or a bonus system of wage payment in conjunction with budgetary control, it will be found that most agreements between Employers and Trade Unions stipulate that job times should be set at such a level that an average worker should be capable of earning a minimum bonus of a prescribed percentage above the base rate. This also applies to similar methods of payment under National Wages Councils. In the leather trade this percentage is 25, and in engineering it is 27½.

Thus, where a normal job time of, say, 10 hours, has been established in connection with an occupation rated at, say, 2*s.* 6*d.* per hour in an industry where the 25% minimum bonus operates, the job time would be 12½ hours, equivalent to a piece-work price of £1 11*s.* 3*d.* This may be determined either by increasing the normal time by 25% and applying the normal rate, thus:—

$$10 \times 1{\cdot}25 \times 2s.\ 6d. = 12{\cdot}5 \times 2s.\ 6d. = £1\ 11s.\ 3d.$$

or by increasing the normal rate of 2*s.* 6*d.* per hour by 25% and applying the normal hours, thus:—

$$2s.\ 6d. \times 1{\cdot}25 \times 10 = 3s.\ 1\tfrac{1}{2}d. \times 10 = £1\ 11s.\ 3d.$$

In these cases the labour hours relative to planned output would be increased by the necessary percentage and recorded in the direct labour budgets as Standard Hours. The wage budget applicable to output—whether from direct labour or from indirect production labour recorded in the direct expense budget—should be restricted to the incentive earnings at the base rate only, allowances for national bonus and overtime premium, where applicable, being set in separate accounts in the direct expense budgets.

Indirect Labour Budgets

As already mentioned, for costing purposes indirect labour is that which does not alter the composition, condition or conformation of the product. Indirect labour, for budgetary control, is divisible between the direct expense budgets of production and service departments and the expense budgets of overhead departments.

Indirect Labour in Direct Expense Budgets

The portion chargeable to the direct expense budgets is applicable to workers completely within the control of the foreman or other named head of the department and is further divisible into two major categories:—

(1) (a) Incentive earnings of those workers carrying out duties which, in other works within the same industry, might be carried out by direct labour, *e.g.*, crane drivers (overhead gantry), sweepers, tool-setters, labourers, etc. ; or, alternatively:—
(b) Process or plant attendants, etc., where there is no direct labour budget, and the process or plant cycle time tends to govern the volume of output rather than the efforts of man.
(c) National bonus applicable to direct workers and/or (a) or (b).
(d) Overtime and night-shift bonus for those as in (c).
(e) Lost time applicable to direct workers.

These items sub-totalled, together with direct wages, make up what may loosely be called "total productive wages", a highly variable figure between the various producers in a particular industry, which nevertheless by careful selection in accordance with an agreed formula, may become comparable with and form the basis of, a Uniform Costing System, individual producers retaining the wage analyses and controls most suited to their particular requirements, but, at the same time, producing comparable statistics on a uniform basis.

(2) (a) Supervision, including national and overtime and night-shift bonuses where applicable.
(b) Shop clerks, with similar inclusions where applicable.

Difficulty may be experienced in deciding how many of each type of worker will be required in relation to the budgeted output. This has already been dealt with in considering the man-power estimate, however. Study of the production methods, the clerical systems and current and past practice, may give most assistance, but may need augmentation by judgment. Special comment is needed, however, on the following points:—

Lost Time. There should be no budget allowance for lost time. Doubtless, in practice, a certain cost will arise—hence the desirability of providing an account for it. The cost envisaged is the wage paid to the direct worker only, during periods of idleness due to machine breakdown, faulty synchronisation, etc.

Supervision. This would not include the wages of working-chargehands,

who are, essentially, producers, although it may cover the chargehand award if required. Nor does it include the remuneration to the head of the department himself, as he cannot be said to " control " his own salary—it is set by management as a matter of policy—and, further, it is usually a fixed sum regardless of output and more suitable for inclusion in the fixed expense budget (with direct allocation back for costing purposes). The account, therefore, covers for supervisors within the control of the head of the department, with the proviso that if any of them may be regarded as " key " persons likely to be retained on the pay-roll throughout a shut-down, for any reason except liquidation, they, too, would be included in the account for factory supervision in the fixed expense budget.

Clerical. This item covers the cost of clerks within the full control of the foremen and does not include record clerks and chasers, where production control is the responsibility of a specialist official, in which case the charge would be to a specific account in the factory overhead budget. This principle applies, also, to technical officials working in a production department who, although controllable by the head of that department for discipline, are answerable to a higher authority in a service department or the factory overhead department.

Trucking. If this is within the complete control of the head of the department, it will be necessary to decide whether it falls within the definition of indirect production labour or not. Where it is a function of an internal transport service department, the control and charge would lie with the head of the department. The fact that it is customary to charge inter-departmental trucking to the receiver is a matter of costing, not of budgetary control.

Inspection. It is undesirable that a department should carry out its own inspection beyond the use of gauges by the actual operatives, in which case it becomes part of the labour operation. If an inspector is definitely within the control of the head of a production department, it is suggested that he is really carrying out supervisory duties and should accordingly be charged to that account.

Maintenance. Maintenance personnel as a rule come under the control of the Chief Engineer, and are direct labour in his service department. A charge may be included in the direct expense budget of a production department to cover the budgeted cost of maintenance, however, based upon the estimated labour hours at the maintenance departmental hourly costing rate ; but this is essentially a direct expense. In particular cases, however, a maintenance man may be employed in a production department under the control of its head,

and a decision may be necessary whether his efforts are indirect production labour or otherwise.

The principles governing the correct amount of indirect labour, choice of types or classes and sexes, etc., are the same as for direct labour, as considered earlier in the chapter. With regard to choosing the most suitable method of payment, in many cases group bonus systems based upon total departmental output may be found most satisfactory, and economical to run.

Indirect Labour in Overhead Budgets

Indirect labour chargeable to overhead departments is all the labour necessary to carry on a business, but not directly applicable to production. With factory overheads, the labour involved is indirectly associated with production, but administrative labour and that attached to the selling and distribution departments have no connection with it at all. Overhead labour is charged to suitable accounts in entirety, no analysis being made into base rate, national bonus, or overtime premium. A purely arbitrary division is frequently made between:—

(a) *Salaries*—the remuneration of heads of departments, clerical and technical workers, salesmen, travellers, administrators, etc. The range is from the lowliest junior clerk to the managing director.

(b) *Wages*—the remuneration of those not included in the salaries category.

Whereas wages are invariably compiled and paid by the wages clerk or department, salaries are frequently the responsibility of the secretarial or accounting function.

For costing purposes, overheads are usually divided into:—

1. Factory.
2. Administration.
3. Selling.
4. Distribution.

Under budgetary control, however, greater control may be obtained by the following grouping:—

1. Factory (or Variable).
2. Fixed.
3. Selling and Distribution.

In small organisations, overhead may be telescoped into two departments only without loss of control—*viz.*, Variable and Fixed.

The individual nature of each item of expenditure falls into one of three classes. It may be a fixed expense, a variable expense, or a semi-variable (or semi-fixed) expense.

Fixed Expenses. These generally remain unchanged in amount, despite fluctuations in production or sales volume—*e.g.*, salaries of heads of departments, administrators, depreciation, insurances, rent, etc.

Variable Expenses. These fluctuate in amount almost directly in proportion to the volume of production or sales. Most of them will be found in the budgets of production departments rather than in the overhead budgets, but auxiliary services—*e.g.*, transport, maintenance, etc., if chargeable to overhead, are good examples.

Semi-variable (or Semi-fixed) Expenses. These are expenses which tend to fluctuate with production. There is usually a fixed element in the item, with a variable amount superimposed. For instance, the duties of the wages department tend to fluctuate with the number of workers employed—whether they produce or not. If there is little or no production, wages clerks may be discharged, but the head of the department, together with key workers necessary to facilitate a quick re-start would be retained and, therefore, give rise to a fixed element in the cost.

An idea of the types of indirect labour that may be found in each overhead department is given in Figure 8.

The principles governing the correct amount and type of indirect labour required in each account, rates of pay and methods of remuneration, are as already considered in connection with direct labour and indirect labour in production departments, and it will be sufficient here to mention a few points of particular bearing in the case of overhead only.

Rates of Pay. As Union influence is weak in clerical, technical and administrative grades, minimum rates applicable to large sections of these workers have not been agreed, wages being frequently a matter of personal negotiation. In view of the high ratios of indirect to direct workers experienced in this country, and the great sums of money therefore involved, it is desirable to establish standard schedules of salaries for the various ages and grades concerned.

Methods of Remuneration. Clerical and technical workers and low administrative grades, usually receive a flat weekly wage without bonus. Certain types of manual labour, however, present local units of "indirect output" which may sometimes be used as a basis for incentives. For example, truck unloaders may receive a bonus per ton unloaded, if the goods ordered

and received are in accordance with the purchase budget or future production load. Local units may, however, give rise to unproductive effort with corresponding increases in costs unless carefully handled, and a flat rate bonus on net sales, shared amongst members of indirect manual labour groups, may be found most satisfactory in the long run. Heads of departments, and those of higher rank, may receive some sort of bonus varying with net sales or net profits. Sometimes, under budgetary control, attempts are made to relate bonus to budget performance with a view to encouraging cost consciousness. This may take the form of an encouragement related to reduction in the cost of adverse variance from the standard set. Where activity or output fluctuates appreciably from the budget, however—as it does in those cases where a detailed sales estimate could not be formulated—this may be unfair. For instance, take the following example:—

	First Case.	*Second Case.*
Standard cost of output . .	£100	£200
Actual cost of output	£120	£230
Adverse variation	£20	£30
Percentage variation to standard	20%	15%

In the first case the adverse variation is £20, and this *increases* to £30 in the second case, where the output has been doubled. The head of the department has incurred greater cost variation and is apparently not entitled to bonus. Expressed as a percentage of the standard cost of output, however, he has effected a reduction of variation from 20% to 15%, a performance worthy of bonus. It is convenient to dissociate bonus to persons in this level from their salaries and to charge it all to the profit and loss budget. The policy element, as distinct from output element, is often great, and should not be allowed to influence salary comparisons.

IX

Man-Power Estimate and Departmental Labour Budget

Man-Power Estimate and Departmental Labour Budget

Illustration

AN illustration follows to show how the man-power estimate and labour budget for a department is prepared. It is in a simple form and the rates, times and information generally, are fictitious.

Data

A certain producer manufactures four products, W, X, Y and Z. The particular department under review contains two Cost Centres, A and B. The actual operation times, on average, plant capacities and production requirements—as determined from the sales estimate modified by the stock budgets, are:—

Operation or Cost Centre	Product	Unit Op. Time (Minutes)	Plant Capacity (Hours)	Budgeted Production (Units)
A	W	20	900	800
	X	36		600
	Y	40		400
	Z	32		200
B	W	23	600	800
	X	20		600
	Y	—		—
	Z	40		200

Both men and women are employed in cost centre A, the most satisfactory ratio being 75% men to 25% women. Only women are directly employed in centre B, however. It is considered that one hour of indirect labour arises for every hour of direct labour in centre A, the ratio being doubled in centre B.

Direct workers will be employed on piece-work with times set so that an average worker should earn a minimum of 25% above his base rate, whereas

indirect labour will be paid at day-rate. Normal working hours and wage rates are:—

	DIRECT LABOUR				INDIRECT LABOUR	
	MALES		FEMALES		MALES	
	Per week	Per hour	Per week	Per hour	Per week	Per hour
Normal Hour ..	44	1	40	1	44	1
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Base Rate	77 0	1 9	50 0	1 3	44 0	1 0
National Bonus ..	33 0	9	20 0	6	33 0	9
TOTAL	110 0	2 6	70 0	1 9	77 0	1 9

Problems

1. To produce a man-power estimate for one week.
2. To produce a direct labour budget for the week.
3. To determine budget allowances for indirect labour, national bonus and overtime bonus for inclusion in the departmental direct expense budget.
4. To establish piece-work prices for each product, based upon the times, rates and conditions given.

Procedure

Step 1. Determination of the ratio of production hours required to plant capacity to ascertain whether overtime working will be necessary or if there is spare capacity. (Figure 9.)

Step 2. Determination of direct labour requirements. (Figure 10.)

Step 3. Determination of indirect production department labour requirements:—

	Hours.
Cost Centre A, 100% on Direct Labour Hours ..	1,000
Cost Centre B, 200% on Direct Labour Hours ..	1,280
Total Indirect Labour Hours	2,280
Comprising:—	
51 Labourers at 44 Hours	2,244
12 Labourers at 3 Hours Overtime .. .. (3 per night for 4 nights)	36
	2,280

Step 4. Determination of *Standard Hours* of output to allow average worker to earn 25% above base rate (Figure 11).

Step 5. Determination of gross earnings for all workers (Figure 12).

Answers

Answer 1. Departmental Man-power Estimate:—

Department	Cost Centre	Occupation	Number of Workers			
			Men	Women	Boys	Girls
	A		15	6	—	—
	B		—	15	—	—
	Dept'l.	Labourers	51	—	—	—
			66	21	—	—

Answers 2, 3 *and* 4. These are given in Figures 13 and 14.

X

Materials Budgets

Materials Budgets

Definitions of Materials

LIKE labour or wages, materials are also divisible into two main categories, defined as:—

(1) *Direct Materials*—materials that enter into, and form part of, the finished product.
(2) *Indirect Materials*—materials which do not enter into, or form part of, the finished product.

Direct materials—the second of the three main elements of cost—are the subject of a direct material budget in each department in which they are used. Where a personal service is rendered in a department—*e.g.*, assembly; or no new materials enter the product, or it is more convenient to treat small items such as nails, glue, cotton, etc., as indirect owing to the difficulty of controlling or measuring the quantities applicable to particular jobs, a direct material budget will not be required.

Indirect materials are part of expense, the third main element of cost, and may be either direct expense or indirect expense. If they are used in a production or service department, and are controllable by the head of that department, they are included in the departmental direct expense budget. But if they do not justify such treatment, they fall into the indirect expense category, and are charged to suitable accounts in the overhead expense budgets.

The transference of processed material from one department for operation in another does not qualify it for inclusion in the direct material or direct expense budget of the receiving department.

Direct Materials Budgets

Whereas direct labour is often primarily concerned with the departmental operation or process, and productivity may be measured in terms of the common unit of labour or machine hours rather than in saleable units of production, direct materials are essentially related to the products. In some cases, therefore, although it may be possible to budget direct labour requirements with accuracy, budgeting direct materials may tend to be arbitrary. This is particularly so where the finish of an otherwise standard product is to

customer's choice. The time involved and wages payable may be the same for all finishes, but the material costs may differ appreciably.

In such cases and in jobbing work, where an all-round sales turnover or production cost is necessarily the basis of budgeting, a reasonable assortment of the products or finishes should be decided upon, and will probably be made, in the light of previous experience modified for any known changes in the trend of fashion, etc.

Standard Materials Specifications

A standard material specification is required for each product and variation of each product featuring in the total budgeted output, giving full details under separate material code numbers or references of every direct material required, and making allowances for inevitable scrap or residuals. When completed, these will be (a) added together to give the gross total amount of each material needed; (b) valued; and then (c) allocated to the direct material budgets of the departments in which they are used.

Often, in practice, there is no record on paper of this important information, the foreman or worker obtaining an " adequate " supply of materials and proceeding with the job. This method is frequently used even for pricing new jobs or products.

In other cases a paper record is made, the total expenditure under each heading of material being divided by the total units produced to give the average cost per article. This method is very popular in practice, because it calls for no greater effort from anyone to reach the standard set (better results having actually been achieved). And because it must always be slightly better than the *worst* performance included in the figures upon which it is based, an average standard tends to give a slightly improved performance in the current period. It frequently condones much inefficiency, however, and the fact that the worst performance—below average—might be due to circumstances outside the control of the worker or the head of the department, is ignored.

The maximum degree of standardisation must be exercised if budgetary control is to become really effective as a means to reaching a desired profit target. This has already been touched upon in regard to standardisation of production methods and labour requirements. Standardisation of the actual products and materials must now be considered.

Product Standardisation

To insist upon producing all units of a particular product to a common specification, reinforced by suitable inspection, goes a long way to maintaining

the quality of the article. It also allows for a greater interchangeability, and reduces fitting operations and costs to a minimum. Accurate assessment of direct materials requirements is also facilitated, while elimination of unpopular, slow selling lines, sizes, types or finishes (which must be considered at the same time as the sales forecast) tends to longer production runs at lower costs and the economies attendant upon bulk buying.

Material Standardisation

By standardising the qualities, specifications and forms of materials to be used, a further step may be taken in stabilising the quality of the finished article, the two together also facilitating accurate determination of physical raw material requirements. Scrapped work, due to faulty materials, is minimised, and the unmeasurable but significant loss often occasioned by giving the customer a better article than he orders or pays for, is eliminated. Close definition, too, helps the buyer to obtain the exact materials or satisfactory substitutes.

Several methods are available for determining material standards, such as:—

(1) Development runs or production of a prototype with a detailed record of all operation times, quantities of materials and their physical qualities (tensile strengths, degrees of purity, etc.).
(2) Scientific assessment of quantities and qualities from plans, blue prints, etc., and information as to the uses to which the products will be put.
(3) Synthetic formulæ derived from (1) and (2).
(4) Experience.
(5) Analysis of past and present records, making due allowances for known inefficiencies and changes in prices.

Bill of Materials

The last two methods, though frequently used, cannot be seriously considered as " standards". Undoubtedly the first three methods give a reliable basis for material estimates, which are frequently prepared in the form of a Bill of Materials for each product by technical officials or the planning department. The information given is of vital importance in assessing plant capacity (necessary in setting the budgets for sales and production), planning production loads, fixing operation times, piece-work prices, stores issuing, buying materials, budgetary control and costing. Care should, therefore, be taken in designing their layout to ensure that information is at once available

to all those requiring it from the one document in the form immediately suitable to each, thereby saving time and labour which is often wasted in merely copying out basic data in a different form.

The bill of materials may be prepared relative to one unit, to a batch of a suitable size for production planning, or to a round number of units. Its layout will depend entirely upon the industry, type of product and the particular requirements of the individual producer, so that a general form cannot be stated. From the data actually furnished, however, the following will be needed by the budget controller in order to establish his standard material specification:

(1) Description and physical quantity of each material.
(2) Quality or properties and form of each material.
(3) Amount and (sometimes) value of each by-product or residual.
(4) The above, classified according to operations, processes and departments with the standard operation or process times in each case.

1. *Physical Quantity.* This will be determined after making standard allowances for evaporation, cutting losses, etc., and the normal, inevitable scrap experience. For instance, the normal loss in melt shown on the Metal Specification in Figure 15 has been established from experience at 7%. Again, in the garment trade, irregular shapes are cut from rolls of fabric of a constant width, whilst in the leather trade, similar shapes are cut from hides of irregular size and shape. In both cases, there is an inevitable amount of wastage which, over a long period, may be weighed and expressed as a percentage of the total fabric or hide content of the finished goods. Actual requirements, as determined from patterns, would be increased by this percentage, and it is the duty of the cutter to lay out the patterns so as to minimise the actual scrap likely to arise.

Scrap allowances for faulty workmanship are not included in the standard material specification. They are a question not of how much *material* goes into a batch of articles, but of how many articles must be put into production to obtain the final net good quantity required.

2. *Quality, Properties and Form.* Some materials are available in several different forms, and it may be necessary to specify the particular one required. Thus, in the Metal Specification shown in Figure 15, ·6% of Manganese is needed in every six hundred tons of steel. This might be satisfied by using 3·6 tons of Manganese, but the specification calls for the use of 4·614 tons of 78% Ferro Manganese ($3{\cdot}6 \times \frac{100}{78} = 4{\cdot}614$). Similarly, ·55% of Silicon is specified, and might be satisfied by using 3·3 tons of Silicon, whereas, in fact, 7·332 tons of 45% Ferro Silicon are used ($3{\cdot}3 \times \frac{100}{45} = 7{\cdot}332$).

3. *By-products and Residuals.* Valuation of by-products in some industries may be a matter of computation by technical experts rather than by the cost accountant. Where they arise, and are measured in a different unit from the main unit of output, not only should the amount of residual be shown as a credit on the bill of materials expressed in terms of its own unit, but its relative measurement in terms of the main unit of production or basic raw material should also be given. H. J. Wheldon in " Cost Accounting and Costing Methods," states that the recoveries of by-products over a long period from the carbonisation of one ton of coal are:—

70% coke.
9·5 gallons tar.
8·0 lbs. ammonia.
3·0 gallons benzole.
11,850·0 cubic feet gas.

By means of the known gravities of the liquids and the density of the gas, these may be resolved into their equivalent weights and reconciled with the original input of coal:—

	lbs.
9·5 gallons tar	111
3·0 gallons benzole	28
11,850·0 cubic feet gas	443
70% coke	1,572
8 lbs. ammonia	8
	2,162
Loss in weight (steam)	78
	2,240

A credit should be budgeted for by-products in the departments in which they arise, and if they need further processing to make them usable or saleable, the costs involved may be budgeted in the appropriate production departments and controlled in the same way as other production.

4. *Prices Adopted.* These are usually the actual costs of the materials, or the average costs at which they are issued from stores. If a price increase is known to be imminent, it may be practical to budget for a certain amount of production at the old price and the balance at the new. If a price increase occurs during a budget period, it may also be practical to adjust the budget according to the amount of production outstanding, when all material at the

original price has been used. On the other hand, it may be more convenient to maintain the original prices, allowing the difference to be assessed on the variation statement applicable to the actual performance of the production department. A further alternative, much to be desired in a business of any size and particularly where prices are constantly changing, is to adopt a standard price for each material in the budget and to book out issues from stores at the same rates, control over prices being dealt with in the purchase budget. Where the standard prices adopted upon the inception of budgetary control differ from the actual or average prices at that date, the difference may be recorded on the purchase budget, which will analyse all materials bought at standard and actual cost.

Presentation of Direct Material Budgets

While the direct material budget for a department is derived from a detailed schedule of the quantities and values of all materials, less credits for losses, wastage, etc., which enter into the products at that operation—schedules which are in practice the basis of detailed operating control—only the total net material cost applicable to a department analysed by products need be shown on the final budget summary for the control period.

Indirect Material Budgets

As already stated, indirect materials are those which do not enter into the finished product, together with those small items of direct material—*e.g.*, glue, nails—which it is more convenient to treat as indirect. They may be divided into three main classes:—

(1) Process or operation materials, consumption of which varies directly with the production load, *e.g.*, polish, grinding wheels, machine tools, welding electrodes, moulding sand, etc.

(2) Direct materials which are small in value and difficult to handle quantitatively relative to particular production orders, *e.g.*, nails, glue, cotton, etc. They are in such everyday demand that they may be consumed for non-production purposes as well, and are not, therefore an expense that varies directly with the volume of production.

(3) Consumables, stores or supplies of a general nature, which may be used in production or overhead departments, *e.g.*, lubricants, waste, belt fasteners, shovels, brooms, buckets, disinfectants and a host of other items. The consumption of these goods does not vary directly with the amount of production.

In the first category, the materials may be valuable and also used in large quantities, and therefore warrant allocation to separate accounts in the direct expense budget of the department in which they are used. The standard amount necessary to the budgeted output may be assessed scientifically along the same lines as for direct materials, although in practice resort is frequently made to averaging. The small direct materials which it is convenient to deal with under this heading do not merit such close attention, and may usually be included with the consumables mentioned in the third class.

Whereas the quantity of direct materials, process and operation materials, in store or on order at any time may depend largely upon the future production load, and is of prime concern to the planning department, who often initiate their purchase, the storage and purchase of consumables, etc., may be budgeted in advance by the budget controller and, working within prescribed limits, re-ordering would be initiated by the storekeeper. As the amounts needed do not vary with the volume of production, scientific assessment is often unsuitable.

Detailed analysis of stores requisitions over a long period may reveal fluctuating quantities used in each department. Where quantities and values are high and delivery times significant, items should be analysed separately on a quantitative basis, but where quantity and price are small, and items readily obtainable from suppliers' stocks, they may be dealt with in groups by value. If the total of each quantity or group value is then analysed on a time basis per control period, and the extremely light and heavy consumptions eliminated, the modal or most frequently recurring rate of consumption may be found and used as a basis for agreeing budget allowances with the heads of departments, the quantitative items being valued in due course. Details making up the allowance should not be published in the budget, however, and no attempt should be made to control the consumption of individual items, as this is too restrictive on the head of the department. The schedules are of great importance, however, in establishing the maximum and minimum quantities that the storekeeper should be allowed to maintain.

XI

Expense Budgets—(a) Direct Expense

Expense Budgets—(a) Direct Expense

Definition of Direct Expenses

As mentioned in Chapter 6, the definition of direct expense used for costing undergoes modification before becoming acceptable to budgetary control. The costing definition is:—

> "All items of cost, other than material (direct) and wages (direct) not forming part of the normal production overhead, that are incurred on specific products, production units or services."

For purposes of budgetary control a proviso must be added to ensure that such expenditure is also completely controllable by the head of the department in which it arises. As an example, electricity was quoted and amplification is, perhaps, desirable at this stage. Unless the usage of electricity is completely controllable in a department by individual switches, the expense cannot be completely controllable in that department. Frequently, specific items of plant may be subject to such direct control, but general equipment or lighting in a building divided into several departments may be controlled by one master switch and the cost of electricity is not, therefore, completely controllable in any one department. On the other hand, even if an individual switch is installed, there may not be an individual meter, so that the allocation of cost must be " according to the most satisfactory method available ". This may be the best treatment from a costing point of view, but it is unsatisfactory for budgetary control because it is uncertain and may give rise to " passing the buck ". It is essential, under budgetary control, to have someone completely responsible for all expenditure. One of the functions of costing would be to determine whether the installation of additional meters and switches would, in the long run, be profitable. It then becomes a problem of budgetary control whether provision of the necessary cash to effect such installations, if desirable, is practicable in the current budget period, or whether it will be added to the moving quinquennial record of desirable capital projects for future consideration.

Expenses of this nature are probably best dealt with in a special account of the factory overhead budget controlled, in total, by the factory manager himself, or a duly authorised subordinate.

Direct expenses arise only in production and auxiliary service departments.

In very small undertakings, however, it may be convenient to include them in the factory overhead budget.

Typical Direct Expenses

It is impossible to lay down hard and fast rules as to what are direct expenses. It depends upon the particular circumstances. The following may, however, be treated as fairly typical examples:—

(a) *Indirect Labour.* This has already been considered in detail in connection with labour budgets in Chapter 8, page 70.
(b) *Indirect Materials.* This subject, too, has already been considered in detail in Chapter 10, page 88, when dealing with the materials budgets.
(c) *Power, Electricity, Fuel, etc.* These may be purchased from outside suppliers or be allocations from auxiliary service departments, and a separate account may be maintained for each.
(d) *Maintenance, Internal Transport, etc.* These services may be undertaken by the department's own employees, or be allocations from auxiliary service departments or sub-contractors' charges.
(e) *Supervision.*
(g) *Scrap.*
(h) *Overtime Premium.*

Budget allowances for these items may in many cases be assessed by study of the output of individual cost centres as it is with direct labour. Others, however, may be of a more general nature applicable to the activities of the department as a whole. There are no hard and fast rules for setting expenses allowances. Each must be considered on their own merits in the light of the prevailing circumstances. The following remarks may, however, serve as a guide to the approach to the subject.

Power, Electricity and Fuel

Assuming these are fully controllable within the department, three main methods are available:—

(1) Running tests.
(2) Scientific calculations based upon the capacity of the plant concerned and the time for which it will be used, bearing in mind the necessity for deciding on the average working efficiency that may be obtained.
(3) An average of previous costs per unit of production applied to the budgeted load for the current period.

Averaging does not mean applying the mathematical average cost—found by dividing the total cost of electricity consumed by the total production for the same period—to the budgeted output, as this would be biased by extremely light and heavy performances. It is a question of ascertaining the modal or most frequent number of units consumed relative to production, and then applying the price per unit. In this way, extremes do not affect the standard obtained.

Such a method would also be used in connection with running tests. The mode is found by inspection, after setting out the units consumed vertically according to quantity and recording alongside the frequency with which each occurs. If more than one mode is at first apparent, it is necessary to add the frequencies together in pairs, starting at the top with the first two, and then again in pairs, starting with the second and third items down. If this fails to reveal one predominant mode, a further series of groupings and additions in threes should be effected working downwards, again starting with the top three items, then again with the second, third and fourth, and finally with the third, fourth and fifth.

Example

Electricity consumed per unit of production—based on meter readings over 50 consecutive weeks—vary from 10 to 20 units. The following table shows the number of weeks in which each average rate of consumption was experienced:—

No. of Units.	*No. of Weeks.*	*Product of Weeks and Units.*
10	4	40
11	6	66
12	6	72
13	2	26
14	1	14
15	8	120
16	5	80
17	4	68
18	3	54
19	8	152
20	3	60
	50	752

Mathematical Average: $\frac{752}{50} = 15$ units.

It is required to find the mode or most representative rate of consumption per unit of production as a basis for establishing a budget allowance. The procedure is shown in Figure 16. The highest number in each of the columns B to L is ringed and a tick made against the appropriate consumption rates in the lower part of the diagram. The total number of ticks against each average consumption is then ascertained, and it will be noted that, after grouping in threes, the modes were 15 units and 19 units, respectively. By a further series of groupings in fours (columns H to L), one predominant mode is revealed on the total line against 17 units, and this would be used as the basis in agreeing the budget allowance.

Maintenance, Internal Transport, etc.

Maintenance cost applicable to the plant in a department may be incurred through employing maintenance workers directly under the control of the departmental head (differentiate between such service men and indirect production labour) by calling upon the maintenance department for assistance as and when necessary, or by engaging outside contractors.

The cost of regular preventive maintenance, including the replacement of certain parts subject to regular wear may, in many cases, be carefully calculated in terms of labour hours, stores and spare parts. Where maintenance labour is actually employed by the department, the appropriate wage rate may be applied to the hours involved. But where labour is supplied by a maintenance service department, a service department standard rate per labour hour determined from the maintenance budgets will be used to recover not only wages, but the direct expense and overhead as well. If a programme of preventive maintenance is adhered to, breakdowns should be minimised. Nevertheless, an allowance to cover the contingency should be made and established at a level to include the cost of the spare parts which, in practice, is highly variable and cannot be anticipated.

The heavy cost of a major plant overhaul—as distinct from maintenance—should be budgeted in the period in which it occurs to ensure proper cost control, and an apportionment made between the current cost of manufacture and a suspense ac':— the budgeted balance sheet (as will be explained later) on the basis ts. ted duration of the benefit to be derived from it. In the following lculations based dition to budgeting for actual maintenance requirements, an ne for which it wnce must be granted to cover the appropriate transfer from su g on the average \

Not only ge of previous costs st of maintenance in a department be comparable wi load for the current pece set, but where the service is rendered

by a maintenance department, there should be an additional control at the source, that is, in the maintenance department itself.

With internal transport, unless the runs between departments are fairly long and the journeys can be programmed, the labour involved in budgeting the cost in user departments and recording the actual journeys and loads that take place, may not be warranted. Congestion through transport delays becomes apparent long before operating results can be published, and action to eliminate them is needed on the spot, at once. If transport is sufficiently important, it may be treated as a service department, otherwise it may be recorded in a separate factory overhead account.

Supervision

Departmental supervision comes under the control of the person alluded to as the " responsible head of the department ". This official may be called a superintendent, foreman, supervisor, chief clerk, or any other suitable title.

Where he needs assistants, their wages may be chargeable to a special account in the direct expense budget for Supervision. The salary of the responsible head of the department himself is not chargeable in this account or budget, however, for it cannot be said that it is within his own control. It is usually settled as a matter of policy by the management, and is more suitable for inclusion in the fixed overhead expense budget. The head of the department is more likely to show his budgets to his subordinates and enlist their interests in them if his own salary is not revealed in the process. Working chargehands are essentially direct workers, but the bonus they receive in a supervisory capacity may, if considered worth while, be chargeable to the account for supervision.

The amount of supervision required will depend not only upon the number of workers, their age and sex, and the degree of skill involved in the work, but also upon the size and shape of the department and the amount of inspection duties involved. It is axiomatic that the higher the skill, the less is the need for supervision. As a principle, inspection should never come under the control of the head of the production department. But the duties of supervision do imply a certain degree of inspection, which varies according to the type of work involved. It may be possible to decide how many supervisors are required in relation to each cost centre in the department. On the other hand, supervision may be of a general nature applicable to the work of the whole department. Analysis of the duties actually undertaken by supervisors may reveal that they do much unnecessary clerical work and produce unofficial statistics. These should be eliminated so that more time can be given to the supervision of output.

If necessary, a properly trained clerk may be allocated from the pool of factory clerks for part-time service. This problem should be tackled in conjunction with determination of the desirable ratio of indirect to direct workers advocated in Chapter 7. Generally speaking, employment of working chargehands may be cheaper and more productive than the setting on of full-time supervisors.

Scrap

In many cases, allowances for the loss due to faulty workmanship, or scrap, cannot be accurately or successfully set up by departments and, on the whole, it is most satisfactory to leave them out of the Direct Expense Budget, making allowance for it at a later stage on the Summary Operating Statement. Some of the reasons for this course are:—

(1) Although the total standard cost established in the budget may be correct in total relative to the net good production, incorrect allowances will be shown against direct labour, direct material and direct expense accounts, because portions of them have to be deducted to build up the scrap allowance.

(2) As a result of (1), the actual expenditure incurred for standard performances will exceed the budget allowances against every item except scrap.

(3) If the actual percentage of scrap experienced is greater than that budgeted, the total cost of production recorded will be in excess of the true cost and the actual cost of scrap (at standard), although showing the relative alteration in volume of scrap, will not give it a correct valuation.

(4) Adjustment is necessary to reconcile the budgeted "actual" costs with the true costs as shown by the financial accounts.

(5) To budget scrap costs by departments requires either an allowance applicable to the loss in value arising in that department only—whereas scrap loss is cumulative—or else needs, in addition, an allowance to cover the cost of all previous and any subsequent operations.

(6) If the scrap allowance is applicable to the loss in value arising in the one department, it will be necessary to apportion the standard cost of the actual scrap to all departments through which it has passed instead of charging it in total against the one in which it arose.

(7) Cumulative allowances, on the other hand, are only practical where the products are highly standardised and can be budgeted in complete

detail. They are impractical where jobbing work is undertaken, where the production detail budgeted is arbitrary, where finish is to customers' choice or where products do not necessarily go through all operations or departments.

(8) There is frequently a time lag between the occurrence of scrap and its actual detection, which may extend over the end of one control period into the next. This is particularly so in regard to customers' rejects. Actual scrap figures may not, therefore, relate to the standard allowances set.

(9) Scrap is a contingency which, if controllable, would be eliminated. Therefore, it is unfair to saddle a department with a charge that is not fully controllable within that department.

(10) It is not always possible to determine the department responsible for incurring the scrap, so that if a cost is charged against a department apportionment of blame may be somewhat arbitrary and lead to dissatisfaction.

(11) Departmental scrap allowances involve a large volume of clerical work to set up and to operate, based on arbitrary figures, and do not usually return sufficient gain in control to justify the efforts expended.

(12) Statistical analyses of scrap by products, etc., showing the departments in which they arise, the full standard value involved, and the reasons, are of more help to management.

(13) Control over scrap must be exercised on the spot by technical officials long before control statements and statistics can be prepared.

Overtime Premium

Night-shift premium should be included under the same heading, as it is usually impracticable to control the two separately. The man-power estimate will show what hours should be budgeted under this account and it is necessary to decide the likely times at which it will be worked. Maintenance frequently has to be carried out at week-ends when plant is idle, and involves payment of full-time rate as a bonus. It may be more advantageous to boost production, however, by extending the normal working day, in which case the bonus may be only one-third of normal time rate. In deciding the appropriate rates payable, reference must be made to the rules, where agreed, between Trade Unions and Employers' Federations. The worker, if left to decide himself, usually prefers to work on Sunday for double pay, hence the desirability of planning normal overtime in advance.

Departmental Budget Summary

When allowances applicable to the budgeted load on each cost centre, or for the department as a whole, have been determined, they may be summarised on the Departmental Budget Summary (Figure 17). Direct Materials have been shown in this example. Where applicable to the operation or process, this is quite practicable, but where the materials are applicable to various products, they should not be recorded.

Space is provided on the Departmental Budget Summary for allocations of Factory Overhead and fixed expense, so that the total cost of the business may be shown against the production departments. This is necessary for costing and not for budgetary control, but as the latter aims at economy of effort and the co-ordination of all functions of the business, it is logical to make provision here rather than to create an additional set of documents for the purpose.

To support the departmental budget summary it is usual to compile an analysis by cost centres, the lay-out being on similar lines. From this, costing rates for each centre may be determined by dividing the total budgeted cost for each by the budgeted units of output. Direct wages and direct materials should always be shown separately but direct expense and factory overhead may be added to give one rate for variable expense in each centre. It may be advantageous to show fixed expense as a separate element in the costing rate to facilitate price fixing.

XII

Expense Budgets—(b) Overhead

Expense Budgets—(b) Overhead

Definition of Overhead

The second main division of the expense element is known as Overhead, and may be defined as " The cost of indirect material, indirect labour and indirect expense, together with those items of direct expense which are not completely controllable in the departments where they arise." As mentioned in Chapter 6, page 46, when introducing labour, material and expense budgets, overhead is divided for costing purposes into factory, administration, selling and distribution, but under budgetary control a more suitable division is:—Factory Overhead, Selling and Distribution, Overhead and Fixed Costs. Each individual item of cost falls, in turn, into one of the three broad types of variable, fixed and semi-fixed costs, as defined in Chapter 8, page 73.

Proper coding and definition of overheads is vitally important to cost control in view of the fact that overhead often exceeds the total expenditure on productive wages and materials. By reason of its *indirect* nature, arbitrary action may be taken to ensure that standards of expense set are not exceeded without in any way affecting the quantity or quality of production. The greater the number of accounts used, the closer becomes the definition and control, but over-elaboration should be avoided, as it merely increases clerical work without an adequate return, and may make it difficult to decide which is the most suitable account heading to which a particular item should be allocated.

Factory Overhead Budget

This budget includes all indirect expenditure—except fixed—incurred by the factory from the receipt of the raw material until the finished product is placed in the warehouse ready for despatch, together with those direct expenses which are not fully controllable in the production departments in which they arise. Typical examples are:—

Office cleaning.
Wages of student apprentices.
Wages of storekeepers.
Wages of timekeepers and watchmen.

Factory clerical wages.
Cost of wages department.
Heating.
Canteen.
First aid.
Maintenance of buildings.
Workmen's compensation premiums.
National insurance.
Holiday pay.
Electricity.
Water.
Auxiliary Services—where not treated as separate departments.

Responsible Officials

The factory director, manager or chief executive will be the official responsible for all cost included in the factory overhead budget but, in view of the varied activities covered, it is usual for him to pass primary responsibility for certain accounts direct to specialists of lesser rank under his control.

Standards of Expense

In the majority of cases, factory overheads do not lend themselves to such accurate, scientific assessment as direct expenses. Very often, too, they are of an " intangible " nature to be valued in sterling without a preliminary estimate of quantity. Production control, planning, wages department, etc., chiefly involve wages cost (the stationery used is best charged to a stationery account), and are largely dependent upon the system in force, a matter which was considered in Chapter 7 when dealing with the ratio of indirect to direct workers. Averaging of past experience is frequently said to give satisfactory results, and it must be admitted that, in view of the arbitrary methods that may be adopted to ensure overhead allowances are not exceeded, a budget allowance based upon previous average experience is bound to lead to a slightly better performance, because it must be a little better than the worst example recorded. Such a standard is, however, often seriously biased by extreme performances, and is to be avoided in favour of the mode as explained in the previous chapter.

Typical Allowances

National Insurance. Assessment of the employer's contribution may be determined with accuracy from the man-power estimate—analysed by sex and ages under twenty-one—in conjunction with the prevailing rates of contribution.

Although not conforming to strict accuracy, the practice of treating National Insurance as part of wages has, in some cases, developed owing to its simplicity of application. Where it can be avoided, this method is not advocated.

Workmen's Compensation Insurance Premiums. These may be calculated from the total budgeted wages costs of all departments in conjunction with the rates quoted by the Insurance Company for the various risks.

Holiday Pay. This, too, may be assessed from total budgeted wages in conjunction with the holiday pay rules adopted by the industry or producer concerned.

Overtime Bonus. Night-shift bonus should be included under the same heading, as it is usually impracticable to control the two separately. The man-power estimate will show what hours should be budgeted under this account and it is necessary to decide the likely times at which it will be worked. Maintenance frequently has to be carried out at week-ends when plant is idle, and involves payment of full time rate as a bonus. It may be more advantageous to boost production, however, by extending the normal working day, in which case the bonus may be only one-third of normal time rate. In deciding the appropriate rates payable, reference must be made to the rules, where agreed, between Trade Unions and Employers' Federations. The worker, if left to decide himself, usually prefers to work on Sunday for double pay, hence the desirability of planning normal overtime in advance.

Presentation of Factory Overhead Budget

An overhead department budget summary is required to display the totals of all accounts, and this may be on the lines of the departmental budget summary—Figure 17—used in connection with the production departments. As with the labour accounts in direct expense budgets, it is a convenience to sub-total all the wage and salary accounts featuring in the factory overhead budget. Where, however, an auxiliary service is budgeted under one account heading as overhead, it may include labour, materials and direct expense, and is thus unsuitable for inclusion in a sub-section devoted entirely to labour. It is a question as to which presentation is likely to lead to the greatest control over expenditure. In view of the detailed analysis which is such a feature of budgetary control, problems of this nature may often arise and should be treated as a sign that the system is being stretched to its limits, and any further division of expenditure may denote over-elaboration and increasing costs.

For costing purposes, a supporting analysis of each item to departments and cost centres is necessary, giving the total amount allocated to each.

Selling and Distribution Overhead Budget

It is usual in costing to keep selling expenses separate from distribution expenses, owing to the fundamentally different basis of allocation to products. Under budgetary control, however, it is more convenient to treat them as one subject, and if a specific range of account numbers is adopted for each, this may be effected without interfering with costing requirements. Selling and distribution are usually controlled by a sales director or sales manager, although there may be a separate official responsible for each. This is no different from the position with regard to factory overhead, however, where several technical officials may be responsible to the factory manager for particular accounts and a greater diversity of methods of allocation are used for costing. As a matter of convenience and clarity in exposition, however, the two subjects will now be given separate consideration.

Selling Overhead

Selling expenses are incurred in soliciting and securing orders. There is usually a fixed element consisting of the rent of the sales office and showrooms which, together with the salary of the sales director or manager and the more permanent section of his office staff, is dealt with in the fixed overhead budget.

Typical selling expenses remaining are:—

Royalties.
Travellers' Salaries and Commission.
Travelling Expenses.
Market Research.
Trade Subscriptions.
Advertising.
Bad Debts.
Tendering and Estimating.

Certain selling expenses may be particular to a specific product or sales outlet, but many are incurred in the general campaign. It is interesting to note that whereas factory overhead, on the whole, tends to fluctuate naturally with the volume of output, selling expenses may increase abnormally out of proportion to the volume of sales, owing to external influences such as the elasticity of demand, degree of necessity or luxury in the product, variations in price, and the amount of competition or number of substitutes. When dealing with the sales estimate in an earlier chapter, it was stated that several estimates would be necessary at different levels—particularly where demand was elastic—and that this would involve preparation of several selling expense budgets. Only

when all budgets in the system were finally correlated would it be possible to decide which was the most profitable level at which to budget. It is chiefly due to the vagaries of selling expense that higher sales may become less profitable, and so finally lead to the adoption of a less than maximum output.

The amount of selling expense required in any business may be affected by two important influences:—

(1) Nature of the product or production method.
(2) Varying types of selling and distribution policy.

1. *Nature of the Product or Production Method.* Four main types of product or production method spring to mind, involving different selling problems and costs:—

(1) Standardised products with stock sales, such as motor cars, soap, chocolate, hosiery, nuts and bolts.
(2) Non-standardised products, where orders are required before the goods can be produced—*e.g.*, ships, locomotives, boilers, bridges, architectural wood, stone and metal-work, and items to customers' specifications.
(3) Businesses providing services or skills as distinct from production—*e.g.*, professional men, consultants, etc.
(4) Agricultural production. Agriculturists must consider the pros and cons of intensive and extensive cultivation and the effects upon price of choice of crop and the yield thereof.

2. *Selling and Distribution Policies.* Here, again, the subject is capable of further analysis:—

(1) Sales promotion obtained by press, poster and other forms of national advertising which may be supported by some salesmanship.
(2) Similar advertising campaigns, but reinforced by intensive and extensive salesmanship.
(3) Personal contacts requiring but a small amount of advertising (most professional men are particular to this type).
(4) Pursuing specific enquiries by speciality manufacturers and suppliers of skilled services.
(5) Trade exchanges which fix prices for materials, in which case selling effort may not need to be highly developed.

Standards of Expense

It is sometimes suggested that allowances for selling expenses cannot be set in advance and that the average of past experience is the best guide. In a

highly competitive market, dealing with an elastic demand, however, past experience may have little bearing on the offsetting of decreases in production costs at increasing sales volumes by the disproportionate increase in selling costs to secure the maximum profitability. If the nature of the product is recognised from the start and the most suitable selling policies adopted—which may not be those in current use—a good beginning has been made which may be followed up by detailed consideration under account headings. It is true that such an accurate method of assessment as time and motion study is not practicable for these expenses, but because policy enters so much into the problem, practical limits soon become apparent in many instances and in others mathematical calculations from known data give good results.

Typical Allowances

Travellers' Salaries and Commission. The type of customer and the type of product may indicate the sort of representative needed, and give guidance to the maximum and minimum salaries which should be paid. Trade Associations may furnish general information of this nature, but even where it is widely disseminated and approved, the laws of supply and demand often vitiate its usefulness. Nevertheless, it is worth while to establish a standard schedule of desirable salaries, even if it is necessary to budget in excess. Commission rates tend to greater stability. Reference should be made to service agreements on these points.

Travelling Expenses. Each salesman's area should be given separate consideration, and answers found to such questions as the number of calls to be made per day; whether house to house, business houses, or factories; distance between calls; method of transport to be adopted; amount of entertaining necessary and authorised; type of hotel to be used; appropriate scale of personal expense allowances, etc., etc. It is again apparent that the product, customer and type of salesman required all give pointers to the maximum allowable expenditure under certain heads, such as entertaining and subsistence, while the amount and cost of transport involved is capable of assessment.

Royalties. Royalties will be covered by agreements to which reference should be made, and an allowance built up on the basis stated. It is necessary to differentiate between a royalty on sales and a royalty payable for the right to use a productive process, which should be assessed and charged to a specific account in the factory overhead budget.

Market Research. The research necessary to establish the sales estimate for the current budget period may have been incurred before the commencement of the period, and the cost of maintaining the service throughout the

period under review may be relative to the following period. Nevertheless, it is necessary to budget the expense to be incurred in the *current* period. If the work is carried out by an agency, it will probably be on the basis of an estimated price or contract, and all relevant documents should be examined in order to build up the allowance.

Where, however, the work is undertaken by the sales department, the cost of the labour involved—likewise the number of persons—will be determined when fixing the man-power estimate in order to arrive at the most satisfactory ratio of indirect to direct workers. The most satisfactory research methods will also have been decided, and the costs of the questionnaires, economic services, Government statistics, etc., may be compiled from the details of this pre-conceived plan.

Trade Subscriptions. When the trade bodies to which the business will belong have been decided—a matter of policy—the charge to this account may be determined from the annual subscriptions payable, if of a fixed sum, or by applying the necessary percentages to the budgeted turnover after consulting the appropriate membership agreements.

Advertising. Where advertising assumes considerable proportions—as is frequently so in marketing highly competitive products—it may be worth while to prepare a separate advertising budget along the lines of an auxiliary service department, and to incorporate only the total in the advertising account in the selling expense budget. A similar effect may be obtained by allocating a range of account numbers in the latter budget specifically for advertising expenses. The heavy cost of a major campaign which will benefit the sales for several years should be budgeted in the period in which the cost is to be incurred. An apportionment between the current cost of sales and a suspense account in the budgeted balance sheet, based upon the estimated effective duration of the scheme, can then be made at a later stage in budgeting. In the following budget period, it will then be necessary to bring in a proportion of the suspended charge, besides budgeting the actual advertising expenditure to be incurred.

Bad Debts. Where losses are high, before basing a percentage allowance on previous experience, it should be decided whether a system of credit sanction *in advance* may not be more advantageous than a system of debt collection. The staff involved should not be increased, but fees will be payable to the bank and various information services. For a premium, a portion of the risk may be covered by insurance, subject to certain stringent conditions, and the likely cost of such a change in policy may be closely assessed with a little care. Credit control necessitates a careful liaison between the despatch department and the credit control section, however, to ensure that goods being prepared for despatch

in anticipation of a reduction in the balance outstanding on the customer's account, are not inadvertently sent off before the remittance is received.

Tendering and Estimating. As a rule, the chief expense under this heading is wages, and the number of workers involved should be determined on a satisfactory basis when establishing the man-power estimate. It should be remembered, however, that this expense tends to vary with the potential volume of future sales rather than with current sales, so that consideration of the long-term trend is necessary. In jobbing work, the amount of estimating and tendering is frequently far in excess of the ultimate orders received, and an examination of previous records is desirable to determine the trend in regard to particular products and the method of dealing with enquiries. Where trade is slack and there is plenty of available plant capacity, it may be advisable to quote on almost all enquiries. Many producers also do so when they are busy, but under a system of budgetary control as outlined here, the relative profitability of many products could be ascertained in advance and the volume of tendering cut down to the most remunerative types of product only.

Distribution Overhead

Distribution overhead comprises expenditure incurred on the product and its containers from the time it is placed in the warehouse ready for despatch until it reaches its final destination, including all outward transport, inward transport of returned empties, etc., cost of maintaining outlying sales depots, and the receipt, handling and reconditioning of returned empty packages. There is often a fixed nucleus of expense, comprising warehouse rent and a certain amount of labour which may be more conveniently dealt with through the fixed overhead budget. Typical distribution expenses remaining are:—

Variable warehouse labour.
Warehouse expenses—consumables, etc.
Packages and containers.
Depot expenses.
Carriage.
Finished stock waste and loss.

These may be considered further under two broad headings:—

(1) Cost of packing and delivery, etc., which can be determined with accuracy and related to the number of units despatched as distinct from their value.
(2) Salaries and wages of packers, shipping employees, etc., which are indirectly attributable to all despatches.

Whereas the latter type of expense will have been considered in determining the most satisfactory man-power estimate and now merely involves evaluation at agreed wage rates, the former requires a close study of each individual product. An average rate of despatch cost for all products is quite unsatisfactory, particularly where the nature of the products is dissimilar. Unlike selling expenses, despatch costs are really " tangible " and capable of accurate assessment. Packaging varies considerably from one product to another, but the most suitable types may be determined after a study of the product, its destination and means of transport, so that it arrives in a satisfactory condition. In view of the analysis of the sales estimate by territories, and the special rates for various classes of freight quoted by railways, etc., carriage charges may also be built up by products. Extreme care should be taken in using previous freight accounts as a basis for future rates, owing to changes in the rates and to the fact that despatches and returns are frequently mixed on the same account, and in a large organisation the effort involved in sorting out the details may be formidable. Where a transport organisation is already in existence for internal purposes, it may be advantageous to develop a delivery service as well, in which case the charge for carriage might be an allocation of the total transport cost, or at a suitable time or load rate according to usage.

Presentation of Selling and Distribution Overhead Budget

A budget summary is necessary to display the total of all accounts, and this will be similar in layout to that adopted for the factory overhead budget which, in turn, was based upon the summary used for production departments, as shown in Figure 17. Where wages are recorded in separate accounts, free from other types of expense, it is, again, a convenience for control purposes to sub-total them. Further summaries will also be needed for control and cost allocation purposes necessitating analysis of each account to such headings as:—

(1) Territories.

(2) Products or commodities.

(3) Channels of distribution, *e.g.*, wholesale, retail, or ultimate consumer.

(4) Method of sale, *e.g.*, salesman, mail order, etc.

(5) Classes of customers.

(6) Sizes of orders.

(7) Organisation and operating divisions, *e.g.*, branches, departments, stores, etc.

(8) Salesmen.

(9) Method of delivery, *e.g.*, over-the-counter, store-to-door, delivery on request, etc.

(10) Size or number of physical units, *e.g.*, cases, car loads, gross, etc.

(11) Terms of sale, *e.g.*, cash, credit, instalments, etc.

XIII

Expense Budgets—(c) Fixed Costs

Expense Budgets—(c) Fixed Costs

Definition

Fixed costs are indirect costs and portions of direct costs which only vary in amount according to the policy of the management and not in relation to changes in volume of trade, output, or other functions.

Time is probably the only standard that may be fixed without fear of fluctuation. Official weights and lengths vary slightly with humidity, temperature, etc., and scientific formulae and calculations are usually only valid under closely defined conditions. In budgetary control, certain expenses tend to fix themselves according to prevailing circumstances—indirectly engineered by management. With other expenses, management may take the initiative directly and force a degree of fixity on them temporarily for the duration of the budget period. These are often refixed in the subsequent period, in view of changing conditions or policy. Alterations in salaries are a typical example, and depreciation may change owing to a proposed alteration in the budgeted plant capacity, etc.

Types of Fixed Costs

Study of fixed expenditure may be of inestimable benefit to a business and it will be found that there are three major types:—

(1) Stand-by charges that cannot be avoided. These persist regardless of whether or not production continues—*e.g.*, insurance, depreciation, caretaking, maintenance and other expenses under contracts which can be determined only by notice or under penalty, such as rent, maximum demand, etc.

(2) Stand-by charges which persist as a matter of prudence or policy. These could be avoided if there was a cessation of activity, but their retention would facilitate a resumption of activity—*e.g.*, salaries of the heads of production and service departments and other key personnel.

(3) Administration and policy expenses. These bear no relation to the quantity or quality of output, but follow as a result of the policy

adopted—whether preconceived or not—and are capable of increase or decrease arbitrarily at the will of management, *e.g.*:—

Salaries arising in the costing and accounting department.

Salaries arising in the secretarial, buying and personnel departments.

Charity subscriptions.

Professional fees.

Stationery.

Secretarial expenses.

Consumables—toilet requisites.

Telephones and postage.

Office equipment.

In production, expense standards are set relative to the required quantity and quality of the products. If the budgeted output is exceeded, it is inevitable that more materials and labour will be needed, so that total cost increases. The cost per separate unit of production nevertheless remains approximately constant. Arbitrary cutting of these expenses would adversely affect quantity and quality of the output. The same conditions apply with regard to selling and distribution overhead, but the incidence is primarily on quantity alone.

As there is no direct contact between the types of expense termed " fixed " and the product, however, increases in such expenses may give rise not only to increased total cost but also to increased unit product costs. Insidious increases are very prone to arise—even where the expenses are budgeted—owing to spontaneous elaborations of systems, stationery, office equipment, personnel, etc., which, taking a short-term view, appear to be desirable. Fortunately, control may be exercised arbitrarily, or even ruthlessly, to ensure that actual fixed expenditure does not exceed the budgeted allowances, without, however, adversely affecting either the quantity or quality of the products. The necessity of predetermining the clerical systems and labour involved, in order to obtain the most satisfactory ratio of indirect to direct workers, has already been explained and reiterated, and if carried out properly will have a profound effect on the amount of overhead and fixed expenditure alike. By adoption of a separate fixed expense budget, attention may be focused readily on them and, in addition, preparation of the following vital information is simplified and expedited:—

(a) Ascertainment of the marginal costing rates which allow for determination of the relative profitability of various products, jobs, etc.

(b) Preparation of break-even charts to demonstrate the stability of the business and, when output is decreasing, to locate the volume at which profits cease and losses begin under various product assortments.

(c) Rapid assessment of the likely losses due to a temporary shut-down.

Establishment of Budget Allowances

Many fixed expense allowances will be governed by expenditure included in other budgets so that, once again, the necessity of preparing all budgets at the same time is apparent. Plant insurance and depreciation are dependent upon the plant inventory and the capital budget for the current year. The conventional view of depreciation is that it is a replacement of the *original* cost of the assets over their estimated lives in order that they may be replaced when worn out. In view of the phenomenal rise in costs throughout the last twelve years, however, this is now quite inadequate as a basis for depreciation or plant insurances and an estimated replacement value is required for each asset. In addition, an adjustment is desirable to the depreciation reserve as at the commencement of the budget period which will take into consideration such factors as the prices paid, the life already expired in each case, the ratio of prices in the purchase year to the present year and the residual values obtained where assets have already been disposed of. The problem is so complicated that it is felt advisable to leave detailed consideration until the end of the book. Certain insurance premiums will be influenced by the valuation of the proposed stocks of raw materials, work-in-progress and finished goods, and these cannot be calculated until all the budgets have undergone a preliminary co-ordination and costing rates have been calculated.

Typical Allowances

1. *Salaries.* This will include separate accounts for:—

   Supervision, Factory—Departmental head and key assistants.
   Supervision, Administration—Departmental head and key assistants.
   Supervision, Selling and Distribution—Departmental head and key assistants.
   Executive—Working directors, factory manager, sales manager, secretary, etc.
   Costing and Accounts—All salaries unless allocated to Supervision.
   Secretarial—All salaries unless allocated to Supervision.
   Buying—All salaries unless allocated to Supervision.
   Personnel—All salaries unless allocated to Supervision.

General Clerical—Telephone and postal clerks, etc.
Specialised Clerical—A separate account for each pool of specialists, *e.g.*, typists, machine operators, etc.
Watchmen.

In order to demonstrate clearly that the total number of employees included in all departmental budgets reconciles with the manpower estimate, and to allow for rapid assessment of total budgeted wages, adoption of separate accounts for wages and other types of expense is desirable where otherwise a mixed item would result—*e.g.*, wages of telephonists and G.P.O. charges for telephone calls should be allocated to separate accounts.

2. *Stationery.* This charge is governed by the systems adopted and is frequently inflated, in addition, by the heavy rate of obsolescence due to the blandishments of printers who explain that the bulk of their cost lies in setting-up and that the cost of the extra hundred or so forms not really wanted is *almost* negligible. The consumption rate for forms and books may be calculated, and the quantity to order fixed at so many months' supply, varying with the delivery times and degree of permanence attributable to the particular document —often quite short. Because stationery costs are usually written straight off on purchase, emphasis must be laid on the importance of estimating carefully stock requirements and usage.

3. *Professional Fees.* After the initial audit, annual audit fees are usually agreed in advance. A contingent allowance may be necessary to cover minor legal fees, and the policy of the business will indicate to what extent the employment of other consultants is likely to be in excess of the normal experience.

4. *Telephone and Postage.* Because of their immediate availability, these services are frequently used to excess. Unauthorised usage may be curbed by recording details of all outgoing mail and telephone calls. It is also important to differentiate between rentals which are a stand-by charge, and the average cost of calls, which is an administrative or policy expense.

5. *Office Equipment.* Sometimes these are capital expenses involving an annual depreciation charge. At other times a rent is chargeable to revenue. In both cases, however, a periodic charge may become payable under a maintenance service agreement. All such items are capable of accurate budgeting. It is a stock-in-trade of office equipment salesmen to state that their apparatus will save time and cost if fully used. Too often, however, any saving in time is either conceded to the staff, who relax their efforts, or the spare time is filled up with additional, unofficial or unplanned work, so that costs increase. With the larger type of installation, the emphasis is on its

versatility, and the reduction in its operating cost when fully utilised. To make the particular machine " pay " therefore, a spate of additional information is prepared and disseminated to a management which does not really want it, and, in fact, may not know what to do with it, so that total costs are inflated. Mechanisation in the office and introduction of new office equipment, to be successful and economical, must be planned in conjunction with the manpower estimate and the pooling of specialised labour.

6. *Charity Subscriptions.* These may affect the welfare of the workers or be for the general establishment of local goodwill. It is important to examine past donations and prepare a list of " approved " cases stating the amounts to be given. Armed with this authority, clerks and others responsible for interviewing the persuasive and plausible representatives of such bodies are assisted in taking a strong line, thereby saving themselves much embarrassment and loss of time. While most business men will want to contribute, within reason, to certain worthwhile causes in addition to those charities which affect the welfare of their own workers and the local goodwill of the business, there is a vast body of collectors who prey on business houses and are only too keen to take advantage of a junior employee, wheedle a contribution out of him, and ever afterwards flaunt last year's receipt as a precedent for a continuation *ad infinitum*.

Presentation of Fixed Expense Budgets

As with other expense budgets, the final presentation is along fairly similar lines, with one difference. In addition to the total expense shewn against each account number, the amount of the stand-by charge included should be shown in a separate column, as indicated in Figure 18.

XIV

Capital, Stock and Purchase Budgets

Capital, Stock and Purchase Budgets

The Capital Budget

As mentioned in Chapter 2, the Capital Budget is concerned with plant renewals, alterations and additions and so that no idea as to a possible development project need be overlooked, a memorandum record is desirable from which a moving quinquennial record of schemes, marshalled into priorities, may be compiled. Each year a number of the most urgent or desirable ones—dependent upon the capital that can be made available—would be selected, priced and considered for adoption in the annual capital budget forming part of the integrated system of budgetary control. At the same time, the moving quinquennial record would be extended one year and brought up-to-date again by selections from the nebulous memorandum.

Choice of items for inclusion in the annual capital budget may depend upon:—

(1) *The degree of urgency or necessity of the case.* Such items may arise suddenly, without being envisaged in the quinquennial record, by regulation under an Act of Parliament—*e.g.*, Factory Act—or under a local bye-law. They may be in the interests of safety or welfare, as distinct from production, and besides involving capital outlay, may also increase the cost of production.

(2) *The comparative advantages of different schemes.* These may be divided into two main classes:—

(a) Those which involve capital outlay, but do not increase production costs or fixed expenses—*e.g.*, re-siting or renovating plant to remove bottlenecks or to improve the flow of production.

(b) Those which involve capital outlay and, in addition, increase fixed overheads—*e.g.*, normal plant development. (This may not, of course, increase product costs if the additional output is sufficient.)

Before embarking on a policy of plant expansion, the following factors should be considered:—

(1) The degree of permanency—as distinct from cyclical influences—attributable to increased sales. If the product is seasonal, too, it is essential to draw up a stock budget before considering plant development.

(2) The effect of increased sales upon selling prices. Where demand is elastic, reductions in selling prices may bring about increased volume of sales.

(3) The effect on cost of increased production. Provided the additional plant is adequately used, there may be no increase to direct cost of production, but the amount of fixed overheads will undergo a permanent increase.

(4) The effect on advertising and selling expenses. To bring changes in price to the notice of consumers, or to bring in an increased volume of sales, may lead to a disproportionate increase in such expenses, tending to offset the volume profits arising in connection with fixed charges when plant is working above normal output.

(5) The effect on financing charges. Although interest on capital is not a part of cost, it has repercussions in the profit and loss budget and the cash position, both of which are intimately concerned with budgetary control. Interest payable on borrowed money must, therefore, be included in any statement as to the profitability of undertaking a capital development project.

Once more it is apparent that the functions of a business are so closely integrated that all budgets depend upon one another, and must receive almost simultaneous consideration.

Programming

Having budgeted certain plant additions and made suitable arrangements with regard to finance, a problem confronts the planners as to when and how to put the projects into operation. Frequently, plant additions cause serious interruption to production, not only in the immediate vicinity but generally through curtailment of power facilities.

The work must be carried out with as little delay to production as possible. Much of this type of installation is effected at week-ends, when a minimum of productive work is in progress. Where an extension is too big to be dealt with in this way, it should be tackled in the slack season—if there is one.

Where interference to production appears inevitable, it should be budgeted and the cost dealt with in the most suitable manner in view of the circumstances.

Where a pronounced trade cycle exists, plant installation may be effected in the period of depression. This applies particularly to the less essential projects. By this means the minimum interference with production is occasioned, and where, normally, workers become temporarily redundant, if they are adaptable, they may be re-absorbed on capital expansion schemes, thus keeping the labour force together and reducing the cost of labour turnover.

Sales Less than Plant Capacity

Where the ideal or long-term trend of sales is downwards, disposal of plant and reduction of capital and fixed expenses may be considered. Cyclic and seasonal reasons may, however, give rise to temporary excess capacity which should be utilised, if possible, by:—

1. Introduction of new products.
2. Undertaking work for other producers as a sub-contractor.

The latter type of work may be planned in advance, and included in the sales budget, but where excess capacity arises in connection with particular operations rather than generally, it may be better to re-plan and reorganise to eliminate the bottlenecks.

Direct Labour v. *Contractors*

The capital budget will list fully all items definitely incorporated in the budget plan for the year. If the work is to be undertaken by contractors, it will be supported by detailed specifications. But where some or all of it will be carried out by the producer's own engineering department, at this stage only the estimated hours may be available together with the cost of bought-out parts until the budget for the engineering service department has been compiled and the hourly costing rate determined.

The total cost of the capital budget will be shown as an addition to plant value in the projected balance sheet and, as the work is actually carried out, the necessary entries will be made in the detailed plant record.

Stock Budget

In certain industries—*e.g.*, consumer goods—stocks of finished articles may be maintained from which prompt deliveries can be made. Production in such cases does not equal sales, but is modified by the difference between the actual stock on hand at the beginning of a period and the desired stock at the close.

Where the product is seasonal in character, sales and production may coincide when considered annually after allowance has been made for waste and obsolescence. Considerable stocks may arise, however, during the year if all the sales are effected, say, in the summer only.

The possibility of building up stocks and the amount of them should be considered not only in conjunction with budgeting the production function but also in fixing the sales estimate and budgeting plant capacity. Having taken steps—as far as possible—to eliminate bottlenecks and to obtain the most efficient plant and factory layout so that maximum output may be obtained from the existing plant, it is necessary to determine whether such plant is adequate fully to meet sales requirements. Where seasonality of product is evident, this may involve building up suitable stocks from month to month. It is then essential to consider the sales for each short control period in conjunction with plant capacity for the same length of time and any stock brought forward from the previous year or to be carried forward into the succeeding one.

Figure 19 shows how this may be achieved in a case where total annual sales are estimated at 1,000 units and the quarterly plant capacity is 250 units. One hundred and fifty units are already in stock at the beginning of the budget period and, owing to seasonality, sales are expected to be as under:—

1st Quarter	100 Units
2nd Quarter	350 Units
3rd Quarter	450 Units
4th Quarter	100 Units

The example shows that, by working to plant capacity each quarter, sufficient stocks may be built up to meet the high seasonal demand in the second and third quarters. The figure also illustrates the necessity of continually planning stocks ahead, and it will be noted that, as a result, a carry forward to the succeeding year is indicated.

Although in the example quoted, the plant is constantly worked to capacity, in practice it is customary to budget production up to, say, 85% of capacity only, in order to avoid delays and loss through congestion. It also allows for re-processing scrapped or faulty work, the allowance for which may be budgeted in value only.

Work-in-Progress should also be budgeted at the same time as finished stocks. This involves determination of the desirable stock position at each operation or process and for each sub-assembly. The value of work-in-progress is likely to reach alarming proportions—particularly where batch production is involved—unless a proper control is instituted, for it is the easy course to build up stocks rather than to re-plan factory layout.

Stock Costs

Whilst an efficient layout tends to cheapen product costs and reduce investment in stocks and work-in-progress, it may be necessary, where insufficient liquid resources are available, to forgo these benefits for the time being, if the costs of the reorganisation are greater than the reduction in costs of stocking and stock values. For it is the object of budgetary control to present the most satisfactory position for the business as a whole rather than only the most profit.

Stock, or warehouse, costs are a distribution expense as distinct from factory overhead and, as a consequence, they do not enter into the stock value of the goods. They may be budgeted at the same time as the stocks are budgeted.

The principles underlying the budgeting of stocks are:—

(1) To maintain a constant labour force—thereby obviating the costs of a high labour turnover.

(2) To obtain maximum plant utilisation—thereby spreading the fixed expenses over the maximum volume of output and reducing costs to a minimum.

(3) To carry the minimum stocks compatible with achievement of the sales estimate—thereby reducing to a minimum the amount of capital locked up in stock, and also keeping warehousing costs as low as possible.

At this stage the stock budget may be left in units. When the budgets for production departments have been completed, stocks will be valued and the total of the stock budget recorded in the balance sheet.

The Purchase Budget

To achieve the budget plan for the business as a whole it is necessary, at some time or other, to purchase every item recorded in the various budgets. The liability for certain items and " intangibles " which are readily available and used immediately is the sum, in each case, of the separate liabilities recorded in the various production budgets and the capital budget.

With materials, however, the amounts needed to meet the budget programme for a particular period and the amounts actually ordered in the same period seldom coincide. Purchases must be adjusted to meet the fluctuations necessary in stock levels in order to meet future production loads. As buying

is external to the business, it is effected under certain conditions inherent in the function itself, such as delivery time, stability or volatility of the material, trade customs as to buying quantities, etc. Besides purchasing materials for present usage and for storage against fluctuating future production loads, it is, therefore, necessary to purchase in accordance with prevailing buying conditions.

Many industrialists are content to have plenty of everything on hand so that there are no delays through non-delivery. They do not consider the losses involved through congestion, spillage, pilferage, breaking bulk, instability, etc., nor those incurred through locking up excess cash in this way. Liquid resources are a most important commodity, and very difficult to control. Hence the need for regulating purchasing and all other functions which involve its use or retention.

With so many officials and workers clamouring for materials and intangibles to carry out their tasks, it is essential, to avoid confusion and for the sake of efficiency and economy, that only one person is authorised to place purchase orders—the Buyer. Requests for intangibles, miscellaneous commodities and services for immediate delivery and consumption, may be addressed to the buyer by the heads of the departments requiring them. Requests for materials, however, will be received from the storekeeper or planning department after examination of the stores records. Stores control is thus an important prelude to the purchase of materials, and the three main methods and the circumstances under which materials may be used should be considered. They are:—

1. Control from production programmes—built up to show material requirements and values for mass production or continuous processing.
2. Control from stock records.
3. Control for non-standard conditions where there is no reliable anticipation of customers' requirements.

1. *Control from Production Programmes*

This type of control is suitable for direct materials where production for the period is planned in detail in advance. It may also be used for production to standardised specifications where there is a heavy order book, so that although production may not have been budgeted in detail in advance, its detail becomes apparent well ahead of the production date, and purchasing may be initiated based on actual requirements. The capital budget is a good example.

The main production programme is analysed into material requirements—both bought-out and manufactured on the premises—by reference to the bills of materials or specifications, due allowance being made for wastage. Quantities

are shown and, by reference to the production cycle, the dates upon which the various materials will be needed. Certain materials may, therefore, not require immediate delivery. Further allowance is also made for the free stock on hand. That is, materials which have not been earmarked for use in connection with specific jobs or orders. The average scrap likely to arise will also influence the amounts required, so that the quantity ultimately purchased on the strength of a specific order may bear no resemblance to its standard material content. It is also usual to add a percentage to guard against contingencies, such as excessive scrap experience, or a fall down in deliveries—say enough to meet one week's production at the average rate of output. Under this system, the function of the storekeeper is passive. He acts as custodian of the materials, accepts further supplies when delivered (against proper purchase orders—a copy of which is sent to him for information) and issues them against requisitions or the factory production orders. It is the planning or production control function—under whatever name it operates—that advises the buyer how much is needed by means of a copy of the specification showing details of quantities, qualities and dates required. The buyer then examines the stores record to see what free balance is already available, consults the sales department with regard to future prospects which may necessitate its increase or decrease, and adds a quantity to cover for contingencies, if desirable, to arrive at the amount to order. At this stage, buying and financial considerations take control of the transaction, the buyer ascertaining market conditions, economic purchasing quantities, and capital involved and, if the latter is large, advising the accountant so that liquid resources may be made available by the due date. Use of the standard specification as to material quality of the product is a great help to the buyer, and tends to reduce costs to a minimum by ensuring that the material purchased is neither too good and costly for the job, nor inferior and liable to cause excessive scrap.

2. *Control from Stock Records*

This method is suitable for use:—

(1) In connection with direct materials where it is impossible in advance to determine with accuracy details of the production load for the whole budget period, but where products are fairly standardised—*e.g.*, production of machine tools.

(2) In connection with indirect materials or consumables. Changes in the production load do not occasion similar variations in the consumption of stores, and this method may usually be adopted regardless of the method used for direct materials.

It involves consideration of the standard ordering quantities, ordering levels, minimum and maximum stocks for each material or item.

Standard Ordering Quantity. This is the quantity normally ordered after considering the average rate of consumption and the economic ordering quantity.

Ordering Level. This is the point at which to re-order so that fresh stock should be received before the amount on hand is reduced to nil. It takes into consideration the average rate of consumption, delivery time, and the need for a reserve against contingencies.

Minimum Stock. It is the contingency level already referred to, below which stocks should not be allowed to fall.

Maximum Stock. This is the largest amount that may be carried. It is a multiple of the standard ordering quantity plus the minimum stock, and is fixed after consideration of the average rate of consumption, the delivery time, and the maximum permissible investment.

Whilst a producer must be prepared to finance the purchase of direct materials according to the approaching production load, locking away large sums of money for the time being if necessary, investment in indirect materials should always be kept to a minimum, and if, on adding up the maximum values of all such items to be stocked, the sum involved appears excessive, the rate of turnover for each item may be considered. This is found by dividing the total value of materials consumed for the year by the value of the item on hand and, where it is low, reducing the minimum stock authorised.

For certain types of production, maximum stocks of direct materials may also be based on operation time cycles in conjunction with plant capacity and delivery times, using the bills of materials relative to production batches. They should, however, be reviewed occasionally in case of changing conditions.

Standard ordering quantities, ordering levels, minimum and maximum stocks are recorded on each bin card, and under this method the storekeeper actively assists in the purchase routine by requisitioning the buyer for the appropriate ordering quantity whenever the amount on hand is reduced to the ordering level.

3. *Control for Non-standardised Conditions*

Where outstanding sales orders are few, products unstandardised and reliable information as to future orders not generally available, indirect materials and small stocks of direct materials common to all production—*e.g.*, bar steel, angle iron, etc.—may be maintained on the stock record basis. It is unwise,

however, to adopt such a method for direct materials not in common use, owing to the risk of deterioration, pilferage, obsolescence, etc., experienced with slow-moving materials, and the serious financial difficulties accompanying large inventory values.

It may be necessary in such cases for the sales department to base delivery promises to customers on the production cycle time plus material delivery time. Where there is a full order book, however, and factory capacity is "sold" far ahead, much can be done, even with jobbing work, under the production planning method.

The Purchase Budget

Preparation of a Summary of Cost Origins for each department may be found a useful prelude to preparation of the final Purchase Budget Summary. This is an analysis of every budgeted item of cost to show the prime sources from which each is derived—*e.g.*, cash book, purchase journal, stores requisitions, etc. The summary of cost origins is also important in building up the cash budget, and an example is given in the next chapter (Figure 21). For use in particular departments, however, account names and references should be substituted for the departmental names shown.

To simplify control, it is advocated that all purchases should be passed through the bought ledger, so that the "cash" column is used only for petty cash transactions.

The origins of cost in each department having been determined, the Purchase Budget Summary itself may be compiled from them, giving as much detail as is necessary, including the following:—

(1) **Total value of purchases to be made:—**

(a) *Direct Materials*—showing major items or categories separately —as determined from the specifications or bills of materials based upon current budgeted production.

(b) *Indirect Materials*—showing major categories and based directly upon the amounts recorded in the budgets for production, and service departments and the capital budget.

(c) *Intangibles*, such as insurances, rent, rates, stationery, gas, water, electricity, etc., as recorded in the budgets for production, service and overhead departments.

(d) *Plant* as given in the capital budget, if not already included in the output of production or service departments or describable as indirect materials.

(e) *Movements on Direct Material Stocks.* (*Indirect* material stocks remain constant for all practical purposes.)

(f) *Movements on Payments in Advance.* This is concerned with intangibles such as insurance premiums where the value receivable may not be exhausted at the close of the budget period.

(2) Goods Receivable in Current Period:—

(a) Allocations to stores (movement of balances).

(b) Allocations direct to departmental budgets. (As far as possible, however, they should be eliminated by passing entries—if not the goods themselves—through the stores as this affords closer control and facilitates preparation of the cash budget.)

(c) Allocations direct to capital budget.

(3) Contingent Liability for goods ordered but not receivable until after the close of the budget period.

This is a sum which should be recorded as a memorandum on the face of the balance sheet—and which may have very serious effects on the cash budget in later periods, unless kept under review. It is essential, therefore, to see that properly valued purchase orders are placed for every commitment, including rates, rent, insurance, and other annual expenses, which are frequently treated as direct cash payments instead of being passed through the bought ledger.

The layout of the Purchase Budget Summary will depend entirely upon the particular circumstances, and Figure 20 should be looked upon as an indication of the general idea rather than as an actual pattern.

XV

Creditors, Debtors and Cash Budgets

Creditors, Debtors and Cash Budgets

Creditors Budget

THE total amount due to creditors will, ultimately, be the total value of goods and services, etc., to be purchased as shown on the Purchase Budget—Figure 20. A portion only of this full sum, however, arises within the limits of the budget period, the liability to pay, in certain cases, being contingent upon receipt of the goods after the close of the period. In view of the widespread use of credit facilities, the cost of the goods actually receivable in the budget period (less any discount granted to induce prompt payment) will usually be greater than the amount payable in the same period for such goods, but this net sum may then be increased to allow for payment of balances owing to creditors at the commencement of the period, as shown in total on the balance sheet.

It is necessary to calculate the cash actually payable and discount allowable to creditors during a particular period, so that the outstanding liability at the end may be stated on the balance sheet and a criterion obtained against which to compare future results. This information is also needed to complete the cash budget.

The simplest way is to find from previous experience the ratio of outstanding balances to the total value of purchases, and to apply this figure to the total value of goods receivable in the current period. It should be remembered, however, that the liquid position of previous years may have had considerable bearing on the acceptance of cash discounts for prompt payment. Where seasonality is pronounced, too, purchases may not be spread evenly over the whole year, so that the amount of discount involved may have been appreciable. Here it is desirable to examine the purchases month by month, computing the full discount wherever allowed. These sums may then be totalled for the year. Whether or not a balance will be due to a creditor at the close of the period is largely a question of the dates upon which the last goods will be received, the period of credit allowed, and the inducement offered for prompt payment. If the maximum period of credit is taken, balances outstanding will be higher than if payments are prompt and maximum discounts claimed. The position may not be resolved until the cash budget itself is tentatively formulated, for if the liquid position is " tight " it may be more advantageous to forgo a cash discount of $2\frac{1}{2}\%$ in preference to borrowing from the bank at 4% to pay wages.

The calculations involved may be set out in the following manner, the final figures being transferred to the Summary of Cost Origins, Figure 21:—

	£	£
Credit balance outstanding at start of period ..		29
Total to be purchased		3,730—100%
		3,759
Contingent liability carried forward	220	
Cash discount	75	
Cash payable	3,062	
		3,357
Balances outstanding at close of period ..		£402—11%

A complication in accounting often arises at the close of a period, owing to goods being received for which invoices are not available. This involves providing for the sums involved by means of a special account for Accrued Liabilities, the transactions being excluded from the creditors' accounts until receipt of the invoices. It is unnecessary, however, to meet this complication in the budgets, and the liability may be included in the balances due to creditors. The ratio of balances outstanding at the close of the period shown as 11% in the above illustration may be used as a criterion by which the ratios of outstanding balances at the close of future periods may be judged.

Debtors Budget

The procedure for establishing the likely revenue from sales and debtors balances follows closely that adopted for creditors. The relative gain or loss through acceptance of a cash discount when the cash position is " tight " has also been mentioned. The tendency on the part of old and valued customers to be slow in payment may thus be explained. A cash discount—the amount varying with different classes of customer—*e.g.*, wholesale and retail—may assist in getting in the cash, but discount on the full value of sales should not be anticipated. The ratio of discount to gross amount due in each class may be determined from previous experience and applied to the budgeted sales in each category. But while it may not be prudent to disturb old customers, much can be done in the way of credit control, before accepting new ones, to ensure payment according to the agreed terms.

The value of balances outstanding at the end of a period will depend

primarily on the value of sales arising within the span of time for which payment will not become due until after the close of the period. Where sales are subject to seasonal fluctuations, it is important to assess this after consideration of the turnover budgeted for the final control period. Under similar conditions it is also advisable to build up, period by period, the amount of cash discount likely to be deducted by debtors when making payment to arrive at the total expense for the year. The calculations involved may be set out in the following manner:—

	£	£
Debtors balances outstanding at start of period		350
Sales Budget		10,000
		10,350—100%
Discounts allowable	240	
Cash Receivable	9,710	
		9,950
Balances outstanding at close of period ..		£400—4%

The ratio of balances outstanding at the close of the period shown as 4% may be a valuable criterion by which the ratios of outstanding balances at the close of future periods may be judged.

Cash Budget

It has been said that every business transaction has its financial repercussions. Reference to Figure 1 shows that all the budgets comprised in the scheme are related either directly or indirectly to the cash budget. Having dealt with all the other budgets, it therefore remains to collect information from them, and to prepare a cash budget so that control may be exercised over this vital function, and so that the double entries from an accounting point of view may be completed. This is simply a matter of adding all budgeted revenue to the opening cash balance and deducting all payments necessary to meet budgeted obligations. Needless to say, the cash position thus presented may at first be quite hopeless, and necessitate either the introduction of fresh capital or reduction in expenditure in some of the other budgets. This aspect will be dealt with later in the chapter on Co-ordination, the present task being merely to show the mechanics of the cash budget.

Where the planned production load varies from month to month, or where the sales are of a highly seasonal nature, although the cash position in total

for the year may appear satisfactory, serious difficulties may arise from month to month. It is therefore necessary to analyse the cash budget to such short periods, if fullest information and control is to be maintained.

Figure 22 illustrates an annual cash budget based upon four quarterly control periods with highly seasonal sales. The figures shown—which are imaginary—are those used in connection with the illustrations of the Purchase Budget, Figure 20 and the Summary of Cost Origins, Figure 21. Several sources of revenue and expenditure have been left blank, partly for the sake of simplicity, but primarily because loans, sales of investments, or purchases of fresh investments, and profit appropriations, cannot be decided until the profit position and the liquidity of the business have been considered. Notice that although a balance in hand of £2,598 is planned for the end of the year, there is a deficit of £500 at the close of the first quarter.

The cash budget is compiled from the following original sources:—

(1) *Opening Balance*—from the balance sheet as at the commencement of the period.

(2) *Receipts:*—
   (a) Sundry Debtors—net cash receivable as shown in debtors budget.
   (b) Sale of Plant—ex capital budget.
   (c) Loans—balance sheet at close of the period.
   (d) Sale of Investments—balance sheet at close of the period.
   (e) Miscellaneous—*e.g.*, registration fees—profit and loss budget.

(3) *Payments:*—
   (a) Purchases
   (b) Wages
   (c) Petty Cash
   } ex summary of cost origins (Figure 21).
   (d) Profit Appropriations—profit and loss appropriation budget.
   (e) Purchase of Investments—balance sheet at close of the period.
   (f) Miscellaneous—profit and loss budget.

(4) *Closing Balance*—determined from the cash budget, and used on the balance sheet at the close of the period.

XVI

Budget Summaries

Budget Summaries

DEPARTMENTAL budget summaries—complete with overhead allocations to facilitate preparation of costing rates—have already been dealt with. Other summaries are necessary, however, to complete the system. With the exception of items taken from the balance sheet as at the commencement of the period, and miscellaneous income and expenditure specifically excluded from cost, which is assessed and included in the profit and loss budget, the remaining information required may be obtained from budgets already prepared. The headings of the financial accounts may be followed, *viz.*:—Manufacturing, Trading, Profit and Loss, Profit Appropriation and Balance Sheet.

1. *Manufacturing Summary*

The manufacturing summary or summary operating statement is simply a schedule of the total amounts budgeted in each production and service department, together with the factory overhead. As auxiliary service costs at standard rates have been spread to users—to obtain control over both usage and production—this may overstate the actual budgeted expenditure. Similarly, portions of factory overhead may be included in production departments to give control over usage, and also be shown separately to give control over production thus giving rise to a further duplicated charge, the sum of all of which may be deducted as a separate item to reconcile with the actual expenditure budgeted in total. This is preferable to omitting service departments from the summary, as full control information would not then be available. Omission, too, would not take into account the fact that certain auxiliary department expenditure may be applicable to the capital or profit and loss budget as well as to production, so that manufacturing cost would not be correctly stated and the balance sheet would, in consequence, not balance.

Scrap

The quantity of production budgeted has been related direct to the budgeted quantity of sales after making adjustments for any desired charges in the stock

balances. No consideration has, so far, been given to scrap, which will inevitably arise to reduce the net good production below the required level. Budgeted cost of saleable production is, therefore, understated, and an addition must be made somewhere to cover the additional expense which will be involved.

It is strongly advocated that the allowance for scrap—no matter how or where it arises—should be added to the total cost shown on the manufacturing summary, and not to individual production department budget summaries. Scrap is a most tricky subject to contend with, and since the circumstances under which it arises differ in most industries it is possible to deal with the matter here only in the simplest manner, if a method adaptable to everybody's requirements is to be described. Scrap allowances are frequently based upon:—

(1) *Operation or process experience.* This method may be satisfactory where the scrap is related to the operation or process rather than to the products made in it, particularly where scrap is detected by inspection in the department in which it arises and where the average quantitative experience may be determined and is fairly stable. It is important, however, that the production load should be planned for the whole budget period, and that alternative operations should not be anticipated, otherwise the cost involved in all departments before that in which the scrap arises cannot be assessed.

(2) *Product Experience.* Here the scrap, if expressed in terms of the departmental unit of output, may fluctuate violently but be measured quantitatively in terms of the actual products. It is essential to standardise both the products and the production methods.

(3) *Arbitrary allowance based on value only.* This method may be necessary where:—

(a) Production methods and products are not standardised.
(b) The production load is not fully planned for the whole period.
(c) Use of alternative standardised production methods is permitted.
(d) Jobbing work is undertaken.
(e) Actual scrap is either insignificant or computation of a more accurate method is too involved, so that the effort and cost is unwarranted.

Under method (3), an allowance may soon be established in the light of past experience, or by arbitrary decision, but method (2) necessitates reference to the costing system, so that average scrap factors may be applied to the individual product costs. Not only has the cost arising in the department in which the scrap occurs to be valued under method (1), but also the cumulative cost arising in all previous and any subsequent departments—hence the importance of a full production programme planned in advance and the absence of possible alternative methods.

It is a principle of budgetary control that departmental budget allowances must represent expenditure completely controllable by the head of the department. With regard to scrap, this would imply inclusion of the cost arising in previous and subsequent departments as well as that in which the scrap actually occurred. The impossibility of determining this where products and production methods are non-standard, where alternative production methods are permitted, or where the production is not budgeted in full for the whole period, implies that any allowance for scrap in a departmental budget would be of an arbitrary amount with which actual scrap experience would not be strictly comparable. If the products and production methods were standardised, however, and the production programme budgeted in full for the whole period without risk of alternative methods, a departmental scrap allowance might be laboriously built up, but it is questionable whether the advantage to be gained would be worth so much effort. This explains the advocacy of an allowance for scrap added to the total budgeted cost on the manufacturing summary, a method which, it will be shown later, in no way prevents the showing of scrap in the operating results of the departments, revealing it as a variation from the standard expense allowed. Such an allowance would be built up in the most suitable manner—reference being made to previous operation, process or departmental experience. It would also be recorded at the foot of the summary of cost origins—Figure 21—and apportioned between purchases, wages and cash in the same proportions as the previous totals shown.

Distribution of Production

Division of the cost of manufacture between cost of sales, stock and capital is a matter of costing. Any method may be used, but the fact that standards have been set for all expenditure indicates that standard costing may be installed with ease and speed, and it is not surprising to find this method in frequent use in conjunction with budgetary control. The distribution may be recorded in vertical account form beneath the manufacturing summary, as shown in the following illustration:—

Manufacturing Summary

Debit Department			Budgeted Cost £
A. Production Department			1,000
B. Production Department			1,200
C. Production Department			500
D. Production Department			1,400
E. Maintenance Service Dept.			900
F. Factory Overhead Dept.			4,000
Budgeted Cost of all Departments			9,000
Add: Scrap Allowance, say			1,000
			10,000
Deduct: Duplicated Charges:—			
Maintenance Service at standard cost included in Depts. A to D	£900		
Portion of output from B Dept. included in Overhead at standard cost	400		
			1,300
Actual Budgeted Expenditure			£8,700
Credit			
Cost of Sales			6,000
Movement on Stock Balance			1,700
Capital			1,000
			£8,700

2. *Trading Summary*

The trading summary shows the manufacturing cost of sales as transferred from the manufacturing summary plus the selling and distribution expense budget—which, together, give the total cost of sales—plus or minus gross profit or loss, thereby building up to the total value of sales budgeted. This statement may be analysed by main product groups, sales channels, selling areas, etc., as required.

Trading Summary

	Budget	Product Group A	B	C
	£	£	£	£
Manufacturing cost of sales	5,000	2,000	1,200	1,800
Selling and Dist. Overhead	1,000	430	210	360
	6,000	2,430	1,410	2,160
Gross Profit	1,000	670	190	140
Net Sales Budget	£7,000	£3,100	£1,600	£2,300

3. *Profit and Loss Summary*

The credits to this summary are the gross trading profit transferred from the trading summary, together with miscellaneous items of revenue excluded from cost, such as registration fees, bank interest, investment income, etc., estimated in the light of past experience, market trends and the future policy of the business. Debits would be the gross trading loss—if such were budgeted —together with the fixed overheads as budgeted, bank charges, etc. It may, of course, be necessary to complete a tentative cash budget before bank interest and charges can be determined. The profit and loss summary will be balanced by insertion of the final net profit or loss, as the case may be.

Profit and Loss Summary

Debits

	Budget
	£
Financial Charges	100
Fixed Overhead Budget	250
Net Profit	950
	£1,300

Credits

Gross Profit from Trading	1,000
Miscellaneous Revenue:	
Transfer Fees	50
Investments	250
	£1,300

4. *Appropriation Summary*

In many businesses, budgeting stops short at the profit and loss summary when a " satisfactory " profit is shown. As much consideration should go into the use of profits, however, as into their creation, in order to preserve the stability of the business and so achieve its long-term policy. Ascertainment of the likely amount of income tax to be paid may be the most difficult task and after suitable dividends have been budgeted and transfers made to general reserve and specific reserves such as in respect of increase in replacement cost of fixed assets—as considered in Chapter 27—the most profitable disposition of a surplus should be considered. This may lie in investment in readily marketable securities—if the liquid position is unsound—or, on the other hand, in further development of the capital budget. This summary cannot be finally settled, however, until all the budgets have been co-ordinated and the most satisfactory position realised.

5. *Balance Sheet Budget*

Prior Sinclair emphasises that the balance sheet is the beginning and the end of budgeting. It starts with the balance sheet at the commencement of the period, which is finally adjusted by all the outstanding balances at the close, together with profit appropriations. Adjustments will, therefore, be necessary to the commencing balance sheet for the following outstanding budgets:—

Capital or Plant.
Materials and Stores.
Finished Stock (and Work-in-Progress).
Sundry Debtors.
Sundry Creditors.
Cash.
Profit and Loss (balance and appropriations).

Any planned changes in the share capital would also need adjustment. This balance sheet closely resembles that used in financial accounting, a vertical type being advocated, allowing space for statistical ratios, some of which will be considered in the next chapter.

XVII

Co-ordination of Budgets

Co-ordination of Budgets

BECAUSE of the volume of work involved, preparation of a complete set of budgets is sometimes regarded as an end in itself. Surrounded by trees, the budget controller momentarily fails to see the wood, and the real goal of maximum profitability and stability is forgotten.

Profitability is not just a matter of profit and loss: it cannot be determined apart from the balance sheet. Stability, too, involves consideration of the balance sheet. The two are thus affinities. But all the other functions of business are also related to one another, to the profit and loss account and to the balance sheet, and if the maximum benefit is to be derived from such a polygamous state, they must be harmonised and utilised in the best proportions. This process is known as co-ordination, and is primarily a question of establishing the most advantageous ratios between the budgets for various functions to act as criteria. By altering the amount of a budget, its ratio to other budgets will increase or decrease. Sometimes an increase is desirable and a decrease is a bad sign. Between other items the reverse position may obtain, a decrease in ratio being a good sign and an increase a bad one.

Where demand is flexible, it was stated that several sales estimates might be offered by the sales department, the quantities increasing as the price decreased (an exception may, perhaps, be provided by extreme fashion goods, where an increase in the price of an exclusive garment may lead to an increasing demand). In connection with each, stock requirements would be fixed so that production loads can be established and departmental costs of production determined in total by application of the departmental costing rates. The rates to use are the actual costs budgeted in each department through which the products pass, excluding factory overhead. The latter should be considered separately and re-budgeted, if necessary, particularly where the changes involve product assortment rather than total production. Allocation to departments leads to a convenient way of recovering overhead, not of determining its proper amount. Selling and distribution overhead, too, may need to be re-budgeted at the new levels.

Maximum Profitability

Having set up alternative schemes, the one showing the greatest amount of profitability combined with stability should be adopted. At this stage, it may

be desirable to consider profitability and stability separately. The former is accordingly approached by way of a simple illustration. A small producer (capital £1,000), making one product only, is visualised with sufficient plant capacity to produce 1,300 articles or units. He finds he could sell 1,000 at 5*s.* each, or 1,300 at 4*s.* 6*d.* By increasing his plant capacity at a cost of £200, he could then sell 1,700 at 4*s.* 2*d.* or 2,000 at 3*s.* 9*d.* His fixed expenses are £100, but these would increase by £10 if he increased his plant. Selling expenses are estimated at £13 for 1,000; £22 for 1,300; £28 for 1,700; £50 for 2,000. Cost of production would remain approximately constant at 2*s.* per article. Which level of output shows the maximum degree of profitability?

The data may be summarised as follows:—

Output in units	1,000	1,300	1,700	2,000
Capital	£1,000	£1,000	£1,200	£1,200
Sale price, each	5*s.* 0*d.*	4*s.* 6*d.*	4*s.* 2*d.*	3*s.* 9*d.*
	£	£	£	£
Sale price, total	250	293	354	375
Cost of production	100	130	170	200
	150	163	184	175
S. and D. Expense	13	22	28	50
Fixed Expense	100	100	110	110
	113	122	138	160
Profit	£37	£41	£46	£15
% Profit to Sales	15%	13¾%	13%	4%
% Profit to Capital	3·7%	4·1%	3·8%	1·3%

From the above it is apparent that:—

(a) Maximum profit to sales is 15% for 1,000 units.
(b) Maximum profit to capital is 4·1% for 1,300 units.
(c) Maximum amount of profit is £46 for 1,700 units.

Thus, by risking an additional £200 capital in the business, the proprietor may increase his profits by £5. His dividend, however, decreases from 4·1% to 3·8%. The increased profit represents a return of 2½% on the extra capital employed, so that if this money had been invested at a higher yield, it would not be worth while to sell out, increase the plant and market 1,700 units at 4*s.* 2*d.* each. If he restricts sales to 1,000 articles, he obtains the highest ratio of sales to turnover—*viz.* 15%. But owing to the spread of fixed expenses over

less than the maximum possible output, the cost price per article is increased, thereby reducing the potential profit relative to the actual volume of 1,000 units. Thus, neither the output giving the highest amount of profit, nor the highest rate of profit to sales is satisfactory.

With an output of 1,300 units, fixed expenses are spread over the maximum quantity and the cheapest cost of production results. The disproportionate increase in the selling and distribution expenses, however, reduces the profit to £41 or $13\frac{3}{4}\%$ of turnover. Nevertheless, the maximum ratio of profit to capital investment at 4·1% is obtained, and the proprietor would be well advised to produce to this level rather than to increase his plant capacity. From the foregoing it may be seen that maximum profit and maximum profitability are not the same thing and that maximum profitability or the highest return on the capital investment is the most desirable.

It frequently happens that several products are produced and sold, and that demand is flexible for each, in which case the comparative profits per article are not the criteria as to profitability. Take an example. Two products, A and B, are marketed, A at 28*s.* 0*d.* and B at 23*s.* 9*d.* A involves 12 production hours and B 10, both at 2*s.* 0*d.* per hour. Which is the more profitable?

	A		B	
	s.	*d.*	*s.*	*d.*
Selling price	28	0	23	9
Cost of production (12 × 2*s.* 0*d.*)	24	0	(10 × 2*s.* 0*d.*) 20	0
Profit per article	4	0	3	9
Profit per hour	4*d.*		$4\frac{1}{2}$*d.*	

B is the more profitable of the two, as it gives rise to a profit of $4\frac{1}{2}$*d.* per hour against A's 4*d.* It will be most profitable to produce and sell the maximum quantity possible of B at 23*s.* 9*d.* each and when the limit of the market has been reached and the selling price has to be reduced, to compare the hourly return at the new rate with that of A and budget for production of a further quantity of the one giving the highest hourly return and so on, until plant capacity is reached.

It will be seen from the foregoing that completion of a tentative set of budgets is only the beginning of budgetary control. By considering the relative profitability of the various articles manufactured, the most satisfactory sales budget may be selected and production department budgets adjusted to the new levels where necessary, by means of the flexible budgetary technique to be explained in Chapter 18. The selling and distribution expense budget

will have to be brought into line with the new volumes, and this will involve reconsideration of the actual standards of expense involved.

At this stage it is well to consider whether the costs recorded in departmental budgets can be reduced in order to increase the profit margin. Throughout this book the importance of standardisation has been emphasised. If standard products, materials and standard production methods are adopted, based upon scientific assessments wherever possible, the cost of production budgeted should be the lowest compatible with maintaining the required quality of the products. Even where jobbing work is undertaken, much can be done with standardisation to ensure minimum costs. The importance of an overall manpower estimate cannot be stressed too much in this connection. Establishment of a satisfactory ratio of indirect to direct labour does more than anything else to guard against over-systemisation and inflation of overheads. Intelligent use of statistical method in setting overhead allowances rather than the adoption of simple mathematical averages based upon past experience will also have played a part in creating budgets which are workable and at the same time standards of performance.

Stability

A brief balance sheet in the usual form is given in Figure 23, showing liabilities on the left-hand side and assets on the right. The stability of the business is not readily apparent, however, from this, and presentation in a statistical form—as in Figure 24—is desirable at this stage. Two important points to establish are:—

(1) Criteria or " measuring sticks " against which to compare certain items, and

(2) Whether sufficient liquid resources are available to carry on the business as planned.

Criteria or " Measuring Sticks "

In a new concern the capital, less the price paid for goodwill, preliminary expenses not written off and any other intangible assets, is a suitable standard. Subsequently this will need adjustment for amounts written off the goodwill, preliminary expenses, etc., and for reserves created and the undistributed balance of profit and loss account. A debit balance on the latter would, of course, be deducted. The net result is the *effective capital* employed, sometimes known as the " net worth " and it is represented by the sum of the assets less

the sum of the remaining liabilities. These, in turn, may be shown in two analysed groups:—

(1) *Liquid Resources*, comprising:—

(a) *Current Assets, e.g.*, stocks of materials, work-in-progress, sundry debtors and cash;

less:—

(b) *Current Liabilities, e.g.*, sundry creditors, short-term loans, etc.

(2) *Fixed Assets*, less debentures and other long-term liabilities.

Liquid Resources

Adequacy of the liquid resources must be very carefully considered, as without it production cannot be financed and the business must eventually be curtailed or cease. While the balance sheet shows the position at a particular date, cash receipts and payments are of day-to-day occurrence and, particularly where trade is seasonal or demand of a fluctuating nature, it may be necessary to ascertain the liquid position in advance as at the close of each monthly control period, or even at shorter intervals.

When cash is " tight," some manufacturers cut down material stock and delay paying their creditors. Under budgetary control, however, direct material stock value would be calculated in regard to budgeted production and allow for no reduction without jeopardising the programme. Neither should maximum stocks of indirect materials under the maximum/minimum method be capable of arbitrary reduction without risk of running short of supplies. And besides losing discounts for prompt payment, delay in settling with suppliers may reveal too much of the producer's internal economy. The capital budget may be reconsidered, however, and desirable but non-essential development schemes curtailed or cancelled. Failing this, the introduction of additional capital or the issue of debentures may be necessary to stabilise the position. On the other hand, it may appear from the statistical balance sheet that too much cash is lying idle in the business, and consideration should be directed to the most profitable way of employing it. This may result in additions to the capital budget or investment in securities. With plant it would be necessary to establish that there was a *permanent* excess demand for the firm's products at a profitable price, before additions were budgeted. This would possibly involve a further sales estimate and re-assessment of the maximum profitability.

Ratios

When the balance sheet has been finally agreed and shows the most satisfactory position, a few fundamental ratios or percentages may be calculated for use as standards, similar ratios being obtained from the actual balance sheet

positions arising, in due course, at the close of each period, and their trends determined. With Figure 24 the most important ratios have been established as:—

1. $\frac{\text{Fixed Assets}}{\text{Effective Capital}} = \frac{8{,}000}{10{,}000} = 80\%.$
2. $\frac{\text{Excess of Current Assets over Current Liabilities}}{\text{Effective Capital}} = \frac{2{,}000}{10{,}000} = 20\%$
3. $\frac{\text{Net Sales}}{\text{Effective Capital.}}$
4. $\frac{\text{Net Profit}}{\text{Effective Capital}} = \frac{920}{10{,}000} = 9\%.$
5. $\frac{\text{Current Assets}}{\text{Current Liabilities}} = \frac{2{,}300}{300} = 767\%.$
6. $\frac{\text{Cash}}{\text{Current Liabilities}} = \frac{500}{300} = 167\%.$

Break-even Point

To carry on any type of business involves an element of expenditure in connection with plant and administration which is fixed regardless of the volume of business obtained. The budgets have been set to show the most profitable level of output obtainable. In practice, however carefully the budgets have been set, sales never coincide with the target. They are either above or below it owing, chiefly, to external causes. Selling prices may remain constant as budgeted, however. If sales are actually above the budgeted figure, fixed expenditure will become a smaller proportion of each pound of sales value, and the ratio of profits to sales will increase. On the other hand, if sales fall short of the budgeted amount, fixed expenditure will be spread over a smaller amount of output and will, therefore, represent a greater proportion of each pound of sales. The ratio of profit to sales in this case will diminish. At a certain level below that budgeted, there will be neither profit nor loss and, if sales decrease below this crucial point, losses will begin and steadily increase. The crucial spot—known as the "*Break-even Point*"—may be determined, either graphically or mathematically, as soon as the budgets are completed. If it is relatively close to the budgeted output, so that only a slight divergence from the plan will occasion loss, the business is unstable. If, however, it is far removed from the output set, it gives an indication of stability in addition to those ascertained from the balance sheet. and may show that the business is

in a position to weather trade depressions. If so, the percentage of fixed assets to effective capital may probably be low and the liquid position sound.

To find the position of the break-even point graphically, the budgeted sales turnover is considered to be 100% and marked off thus, to a suitable scale along the horizontal axis. A suitable scale is then chosen so that sales value and cost may be recorded vertically. A line is then drawn parallel to the horizontal axis to represent the total fixed expenditure budgeted. Segregation of such expense in a separate fixed overhead budget facilitates this. The total cost at 100% is then joined to the fixed expense line at the vertical axis, while total sales at 100% are joined to zero—the point of intersection of both axes. The total sales and total cost lines will be found to cross at the break-even point, and if a perpendicular is dropped to the horizontal axis, it may be read as a percentage of the total budgeted output.

Mathematically, the break-even point may be located by formula:—

$$\text{Break-even point} = \frac{c}{a + c - d}$$

Where:—a is total Sales Value.
b is Variable Cost.
c is Fixed Cost.
d is Total Cost.

As the total cost, however, is made up of b plus c, the formula may also be written:—

$$\text{Break-even point} = \frac{c}{a - b}$$

Example

Total Sales — a	=	£120,000
Variable Cost — b	=	60,000
Fixed Cost — c	=	40,000
Total Cost — d	=	£100,000

$$\text{Break-even point} = \frac{c}{a - b} = \frac{40{,}000}{120{,}000 - 60{,}000} \text{ or } \frac{40}{60}$$

This is two-thirds or $66\frac{2}{3}\%$ of budgeted output—*viz.*, £80,000 Sales. Figure 25 shows this example worked out graphically.

XVIII

Flexible Budgets

Flexible Budgets

HAVING established a set of budgets to show the most profitable and stable position that can arise, and having decided to operate the business in accordance with this in the hope of achieving such desirable results, it is essential from time to time to compare the actual results achieved—both in physical and financial terms—with the budgets, and to note in what respects progress is satisfactory or unsatisfactory. Such comparisons are made at the close of each budget control period in financial terms, but physical control must be exercised daily, from hour to hour, at every point where output is created or expense incurred. It is important to ensure that the financial figures are based upon the same physical figures of output, sales, etc., as are used for day-to-day control, so that no ambiguity arises, and the sterling values are the financial results of the physical actions taken.

Comparisons frequently start with a glance at the budgeted and actual profits. Where these are quite different, attention is then directed to sales, and if these are actually less than budgeted, a loss of profit is to be expected, whereas if more than the budgeted sales are actually achieved, it would be reasonable to look for more than the budgeted profits. Irrespective of the actual volume of sales, however, much profit may be lost through lack of control in the production departments, that is, through wastage, inefficiency, paying prices in excess of those budgeted and so on. A comparison of the amount under the three main expense headings with the actual expenses similarly analysed in each department is necessary. Often, direct expense and overheads are analysed in budgetary control to a great number of accounts—far more than are usual in financial accounting. This is important in the early days of the system before the departmental heads have got into the way of running their functions in accordance with the methods and limits laid down in their budgets. Later on, the allocation of expenditure to fewer headings may be satisfactory in each department, provided control is adequate.

In the case of operating and overhead departments, examination of the difference between actual costs and budgeted costs, when carefully analysed according to a plan of *Variance Analysis*, will reveal the reasons for divergencies from the budgeted results. This method is not, however, of great help in regard to the results shown in the balance sheet, and here most use is made

of comparisons of the actual ratios of various items with the standard ratios set up. This method can also give additional information in connection with operating costs.

It was stated in an earlier chapter that in certain industries it is impossible to anticipate sales or production *in detail* so that budgets are based upon estimates, while in others, either with or without the aid of market research, fairly reliable estimates of sales may be budgeted in detail. In all cases, however, these budgets are forecasts, and not predetermined facts, and seldom, if ever, does the actual volume of production or sales achieved coincide exactly with the amount budgeted. Actual expenses are therefore, not strictly comparable with budget allowances, as they refer to different quantities. The technique of *Flexible Budgetary Control*, however, overcomes this difficulty, and by its aid all items appearing in the forecast budgets are increased or decreased in amount to arrive at a new set of budgets coinciding exactly with the actual volume of sales or production achieved.

Flexible budgetary control involves consideration of the extent to which variations in the amount of output increase or decrease the amount of each expense. It will be appreciated that certain costs such as direct wages and direct materials vary in the same way as the amount of output varies. Given a standard material specification, twice the amount of materials at twice the budgeted cost will be needed to produce twice as much output as budgeted. On the other hand, certain items of expense such as depreciation, insurances, executive salaries, etc., may remain unaltered in amount regardless of changes in the volume of output. Between these two classes is a heterogenous group of expenses which are neither directly variable with the volume of output nor entirely fixed. They are best described as Semi-Fixed or Semi-Variable. They fluctuate to some extent—but not directly—with output, or with some other unit, or for some other reason. Canteen and First Aid costs, for instance, tend to vary with the number of workers employed which, in turn, may vary but not necessarily directly with the amount of output. Heating and Lighting costs, on the other hand, sometimes vary with the weather or the time of year, while Overtime Bonus varies according to arbitrary rules agreed between employers and representatives of employees. Thus items of expense fall within one of the following three categories:—

(1) Directly Variable.

(2) Fixed.

(3) Semi-Fixed (or Semi-Variable).

The degree of variability in an item of expense may be:—

(1) *Regular*

(a) Directly variable with output and expressible by means of a straight line graph as in Figure 26A, *e.g.*, Direct Labour or Direct Materials.

(b) Directly variable with some other unit, *e.g.*, Workmen's Compensation Insurance Premiums vary directly with the amount of wages paid in certain categories, and the degree of variability to output is, therefore, irregular.

(c) A directly variable element imposed on a fixed base, of which Furnace Heating is a good example—a fixed cost being incurred in raising to the required temperature. The wages, planning and production control departments also have this tendency and the cost involved at varying amounts of output may be expressed graphically as in Figure 26B or as a mathematical formula in relation to volume of output.

(2) *Irregular*

These items usually vary with a unit, having only indirect bearing—if at all—on the volume of output, and are capable only of representation as a diagram or in the form of a table. Compared with volume of output, the tendency may be towards a more than direct variability, a less than direct variability, or a combination of both at different levels. These are demonstrated in Figure 26C and D.

Determination of Flexible Allowances

It has been shown in previous chapters how expense allowances are set in relation to the budgeted volume of output in each department. It is now necessary to consider what each allowance should be over a range of output above or below that budgeted. Where regular variability is involved, the item is adjusted up or down according to the increase or decrease in output and, if the expense is wholly directly variable, this is simply:—

$$\frac{\text{Budgeted Allowance}}{\text{Budgeted Output}} \times \text{Actual Output.}$$

Example

Budgeted output is 4,000 hours and Budgeted Allowance £80. What is the directly variable allowance applicable to 5,000 hours?

Answer

$$\text{5,000 hours is 125\% of budgeted output} = \frac{5{,}000}{4{,}000} \times 100.$$

$$\text{Allowance at 125 \% budgeted output is } \frac{£80}{£100} \times 125 = £100.$$

Where the item of expense includes a fixed element, the formula is:—

$$\text{Fixed Element} + \frac{\text{Variable Element}}{\text{Budgeted Output}} \times \text{Actual output.}$$

Example

Using the previous example, but assuming the allowance of £80 to contain a fixed element of £20.

Answer

Actual Output (5,000 hours) is 125 % of Budgeted Output.

$$\text{Allowance at 125 \% Budgeted Output} = £20 + \frac{£60}{100} \times 125.$$

$$= £20 + £75 = £95.$$

Expenses which are directly variable with a unit other than volume of production and, hence, only indirectly variable with output, are best related to output and expressed by means of the above formula (if suitable) or a pre-prepared graph.

With expenses containing an irregular element of variability, it is necessary to determine the units with which they vary, or the conditions under which they vary and then, for a number of selected volumes of output, to work out the allowances in accordance with the amount of the unit involved, or according to the rules laid down. Overtime Bonus comes in the latter category, and because, under most agreements a bonus of 20% is payable for night shift working, 33⅓% for the first two hours each evening, 50% for Saturday afternoons and full time on Sundays, it is desirable to plan in advance the times at which overtime should be worked to boost production. In theory, the most economical plan may be prepared, from which the number of overtime hours can be calculated for each grade of worker, and the appropriate bonus percentage and wage rates applied, to arrive at the overtime bonus allowance for inclusion in the departmental budget. In practice, however, employees frequently prefer to work on Sundays for double pay, whereas employers may prefer overtime to be worked each evening and for this, and other reasons, it

may be politic to adopt an arbitrary bonus allowance. Even when the volume of output is very low, the possibility of overtime working because of a breakdown or a specific rush order may call for an overtime bonus allowance fixed in nature over a wide range of output, to which an arbitrary variable addition may also be required.

Figure 27 demonstrates a flexible allowance for Space Heating, varying with the time of the year. Of necessity, this is set out in tabular form, and the amount included in the original budget would be the average of the total allowance for the year, *viz.*, £25. Expenses requiring tabular treatment should be symbolised S-V for Semi-Variable to ensure special attention by the cost clerk.

Presentation of Flexible Allowances

Sufficient information must be annexed to the budget to show how each allowance should be increased or decreased to correspond with the actual output achieved. After each account name the appropriate symbol, V, S-V, or F may be added to indicate Variable, Semi-Variable or Fixed. No further information need be given with regard to the variable and fixed expenses, adjustment of the former being very simple, and unnecessary with the latter. With semi-variables, however, the formula may be quoted, together with the amount fixed—if any—and the cost clerk left to work out the allowance for each period in the light of the prevailing output. Alternatively, a graph may be annexed. These methods are suitable where experienced cost clerks are employed. Where, however, results are prepared by young, semi-skilled clerks, under skilled supervision, it may be more satisfactory to prepare a columnar table from the formulae or graphs for each department, showing the allowances at every 5% above or below budgeted output for each item of expense. This idea is demonstrated in Figure 28, but to save space much greater intervals of output are shown, and this in practice would not give sufficient accuracy.

Comparison of Total Variance under Forecast and Flexible Budgets

Figure 29 is a diagrammatic representation of a forecast budget for an output of 3,000 hours, in conjunction with the budget allowances for the actual output achieved—*viz.*, 4,800 hours—together with the costs actually incurred, and the total variance involved under each account heading. If the forecast budget only were employed, variance in total would be an increase in cost of £720, as shown in column E. Usually an increase in cost is taken to denote

inefficiency or loss, but where it is due to additional output this may not be so, and variance may represent merely a difference between the amount planned to be spent and the actual amount disbursed. In view of the additional output, such extra expenditure would, in most cases, give rise to extra profit, and the total increase is misleading inasmuch as it signifies both profit and loss. Conversely, a decrease in cost is usually associated with efficiency or gain, but where it is due to attaining less than the budgeted output, it also indicates a loss of profits due to the diminution in volume of sales and, again, the total variance has two opposite meanings. This is demonstrated in columns F and G, where the increased cost due to additional output is shown (F)—upon the sale of which more profit will be made—and the variations in cost due to efficiency or inefficiency (G). The causes of the latter, amounting in this case to £78, would be closely investigated, a procedure known as Variance Analysis, and considered in detail in the following chapters. It will be seen that the flexible budget has considerable advantages over the forecast type where output is liable to fluctuate.

The Normal Budget

From the foregoing chapters it will be apparent that the preparation of a set of budgets may involve much costly work. In a trade where sales undergo violent fluctuations from year to year, re-budgeting may become a regular and costly feature of the administrative life of the business. Where a firm has been established for a number of years and its sales do not represent a considerable proportion of the output from the whole of that industry, this may be avoided by adoption of a *Normal Budget* in conjunction with the flexible budgeting technique.

It has been shown that sales budgets, even when prepared in great detail with the aid of market research, are essentially estimates in a field external to the business and therefore not fully controllable by its executives. Economic conditions vary so rapidly that this is inevitable. As a consequence, actual sales seldom, if ever, coincide with the budget. Sometimes losses will result, while at other times extra profits will arise because of increased sales. When sales budgets are based primarily upon future prospects, the law of average does not operate, and there is no assurance that, over a long period, the excess profits will offset the losses. It should be remembered that such profits or losses do not vary with the volume of sales, but are modified to the extent that overheads are over or under absorbed. Thus, where overheads are spread over the total budgeted output and this is not achieved, cost represents actually a greater proportion of turnover than was planned, so that budgeted profits

are reduced firstly by diminution of the anticipated volume and the value of transactions, and secondly by the overhead (fixed) which remains unabsorbed.

With its accent on co-ordination of functions and the stability of the business, budgetary control cannot ignore this costing problem of the satisfactory long-term absorption of all overheads. The normal budget takes care of it at the same time as it curtails the necessity for compiling new budgets each year.

In a business which has managed to survive for a number of years, examination of past sales, as advocated in the chapter on the Sales Estimate, will reveal the actual trade achieved, which will have been affected by the normal trade cycle, the secular trend, policy of the business, seasonality of the product, plant capacity, degree of competition, availability of labour, and materials and random fluctuations. Probably over the period, the effects of booms and slumps evened out, all overheads were absorbed by output, and sufficient profit was made to warrant carrying on. Division of the total sales value by the number of years gives an average annual turnover, which may be modified in either direction for known changes in plant capacity, Company or National policy, and secular tendencies to produce a *normal* turnover or sales budget likely to continue to absorb all overheads for a long time ahead, thereby increasing the stability of the business.

Budgeting for " normal " conditions overcomes the difficulty in budgeting sales in, say, jobbing foundries, where detail cannot be determined in advance. It also avoids the need for apportioning the annual budget into uneven control budgets where seasonality is pronounced or, alternatively, of building up a set of annual budgets from a series of seasonal budgets of differing quantities. The annual budgets for each department are simply divided by the number of control periods to arrive at the normal budgets for the control period which, by use of the flexible technique, are made to coincide with any desired level of output for pre-budgeting, or with the actual output obtained for cost control purposes.

Under flexible budgetary control, normal budgets, once prepared, may be operated with satisfaction for a number of years, alterations of a permanent nature in wage rates, material prices, etc., being dealt with in the variance analysis to be considered in the following chapters.

Flexible Budgeting of Overheads

Adjustment of a normal budget for a production department where a departmental unit of output such as hours or standard hours is adopted may be readily understood, but with overhead budgets there is no departmental

unit of output. Nevertheless, a basis for varying the allowances must be found. While certain overheads may be applicable to the activities of particular production departments so that the portions allocated may be adjusted according to the levels of output in those departments, others, although allocated to departments for costing purposes, are of a general nature and unsuitable for such treatment. The cost of the wages department, for instance, may fluctuate, but not necessarily in regard to the output of particular production departments. The guide to changes in overhead allowances must therefore be the extent to which actual output for the works as a whole is above or below the normal amount budgeted. Where a single product is manufactured, this may readily be determined, but where a number of dissimilar products are produced a difficulty arises in equating them to obtain a common unit of output. This is often resolved, where standard costing has been adopted, by expressing the total overhead absorbed in the output of production departments by the total factory overhead budgeted at normal, and adjusting the variable and semi-variable overheads according to the resulting factor.

To arrive at the normal budget for factory overhead, it may be found convenient to establish a budget for the actual conditions prevailing at the time, using the methods already described in the chapter on budgeting overheads, and to ascertain from current results the output factor above or below works normal. Flexible allowances for each item of expense are then determined over a wide range of works output, and a normal budget compiled from the information so obtained. It is important to remember that the " normal " overhead so obtained must be spread to departments for costing purposes, and not the budget for prevailing conditions, from which it is derived.

Flexible Budgets for Service Departments

Flexible budgets may also operate successfully in regard to auxiliary service departments, except that the measure of their own output should not be used to establish the flexible allowances. Service departments must operate to the requirements of the production departments with additions where necessary for services in connection with the capital budget and for any specially authorised uses—*e.g.*, special major maintenance overhauls, etc. If budget allowances were allowed to be commensurate with the service output, and increased output led to greater operating efficiency, the tendency would be for the service to be employed excessively, thereby increasing total costs (and reducing total profits), despite the decreasing cost per unit of service.

XIX

Variance Analysis—(a) Volume Variance

Variance Analysis—
(a) Volume Variance

THE difference between the budgeted or standard cost of a function and the actual expenditure incurred is known as the *variation in cost.* The analysis of variance and its classification by reasons is of prime significance under budgetary control in determining why the budgeted results have not been achieved, and in pointing to the directions in which ACTION must be taken by responsible officials, either to prevent recurrence of a loss, or to maintain an unexpected gain.

Where actual cost is more than standard, variance is an indication of inefficiency and is usually recorded in *italics*, or with a negative prefix " – " or in red figures. Where actual cost is less than standard, variance is an indication of efficiency and is usually recorded in normal black type, or with a positive prefix " +."

An exception occurs, however, where fixed budgets are in use. When an output greater than that budgeted has been attained, actual cost will be in excess of standard cost, but the excess is due to exceeding the output target and will usually result in additional profit from the increased turnover or activity. At the same time, inefficiency may be present, of course. Conversely, where an output less than that budgeted is achieved, there will be a reduction of expenditure which, far from being satisfactory, will result in a contraction of the final profit.

Variance may be regarded from two angles:—

(1) Variation from standard departmental or operation cost.
(2) Variations from standard product costs.

The former is an essential study under budgetary control, while the latter is primarily a matter of standard costing. In certain types of industry, the variations from standard product costs are of greater importance than in others, and variance may also be analysed to selling areas, types of outlet (wholesale, retail, export), etc. Undoubtedly, much benefit may be derived from a careful selection and presentation of all these types of variance to management. The extent to which each is published must depend upon the policy adopted and

particular requirements of the case, the ultimate limit being the value to be derived from the additional clerical effort and cost involved—often a difficult equation to resolve.

Classification of Variance

There may be several causes of variance in connection with an element of cost, or with a single account or item, the interactions of which may tend to cancel out, giving rise to false impressions of efficiency or otherwise. It is important, therefore, to classify variance by main reasons, and to break them down to all the possible causes of deviation from standard. The two main classes of variance are:—

(1) **Those due to changes in VOLUME of output.** That is, due to the effect on cost of producing more or less than the budgeted output.

(2) **Those due to changes in CONDITIONS,** covering all other reasons, whether controllable within the organisation and due to changes in the efficiency of workers, materials and management, or uncontrollable—that is, due to external changes such as variations in material prices, wage rates, etc.

Volume Variance

Volume variance may be considered in two different but related ways. Firstly, under budgetary control, it arises in connection with semi-fixed and fixed expenses contained in the direct expense and overhead budgets. Secondly, it may be determined under standard costing, and represents that portion of semi-fixed and fixed overhead which is either over- or under-absorbed by the actual volume of output achieved in the various cost centres to which overheads are allocated. In both cases it arises when the volume of output is either more or less than that budgeted, or when the assortment or mix of products, although giving rise to the budgeted total of, say, standard hours, differs in detail from the plan laid down.

This book is concerned, primarily with budgetary control, and not costing, but as the information gained for the latter aspect is based upon the former and presents a different aspect of volume variance which may be of considerable assistance in departmental or operating control, it merits consideration here. Furthermore, some system of costing will be adopted, in any case, and it leads to economy of clerical effort if the method chosen is properly integrated with the system of budgetary control.

The Budgetary Control Aspect

Volume variance arises in all departments in connection with semi-fixed and fixed expenses when the actual amount of output—or percentage of activity—is more or less than the amount budgeted. It may be only a *portion* of total variance, and is measured in standard terms, the remainder comprising variances due to changes in conditions.

In each department, the standard cost per unit of output is determined by dividing the amount budgeted under each element of cost by the budgeted volume of production. At all other degrees of activity either above or below the level budgeted, which may be taken to be 100%, the standard cost of production, sometimes known as the amount " cleared-in-cost," is a *pro rata* increase or decrease in amount, ascertained by multiplying the standard rate per unit by the actual number of units produced.

Example

	BUDGET		ACTUAL		ACTUAL	
Output (Units) ..	1,000	Standard Rate per Unit	2,000	Standard Rate per Unit	500	Standard Rate per Unit
	£	*s. d.*	£	*s. d.*	£	*s. d.*
Direct Labour ..	100	2 0	200	2 0	50	2 0
Direct Material ..	200	4 0	400	4 0	100	4 0
Direct Expense ..	400	8 0	800	8 0	200	8 0
	700	14 0	1,400	14 0	350	14 0

Assuming the amount of output varies, but all other conditions remain as standard, the amount of directly variable expenses such as direct labour and materials will increase or decrease in proportion to the fluctuations in activity or volume of output. But in regard to semi-fixed or fixed expenses under the same conditions, the standard allowance will not actually coincide with the standard cost.

Example

In Figure 30 an item of expense is budgeted in relation to an output of 5,000 articles. The effect on the *allowed expenditure*—or budgeted allowance at various other activities above and below that budgeted—is then shown, assuming the expense to be (1) a directly variable item, (2) a semi-fixed containing a fixed element of £100 and a directly variable item of £400, and (3) a fixed expense. It will be noticed that, whereas the standard allowance (D)

and the standard cost (C) coincide at all activities in the case of a directly variable expense, the standard allowance for a semi-fixed or a fixed expense is less than the standard cost at activities above 100% and is more than standard cost when activity is below 100%. Thus, at activities above 100% the standard cost of the departmental production absorbs more than the standard allowance (there are a few exceptions, however) and a *volume profit* will result. On the other hand, if production is less than that budgeted, the standard cost of it will be less than the standard allowance, and a *volume loss* will result. In the example, although the amount of production was shown to fluctuate, standard conditions otherwise prevailed, so that the actual cost involved did in fact coincide with the budget allowance at each activity, and no conditions variance arose.

The desirability of divorcing the fixed element in a semi-fixed expense from the variable element has already been advocated. The fixed part may then be included in the fixed expense budget, leaving a variable element in the direct expense budgets of production departments and in the factory overhead department. It may be argued that, having assessed and removed the fixed element, the remainder is not necessarily a directly variable expense. This may be true, space-heating and overtime bonus, in particular, being of an irregular nature. But in most other cases it will probably give sufficiently accurate results to assume direct variability. In engineering it is customary to work within certain limits or tolerances, and in budgetary control expenses and variance are frequently recorded to the nearest pound and, provided the information ascertained is sufficiently accurate for control purposes, there may be no point in increasing administrative expenses by working to the utmost degree of mathematical accuracy, particularly where the basic information may be a matter of opinion rather than ascertainable fact.

The amount of work coming into a production department is usually governed by the sales position, so that the production foreman has little or no influence in connection with his load. Volume variance, arising as it does in connection with activity, is thus not his prime responsibility. It is important, however, that he should be aware of the effect of volume on the prosperity of the business. He should know, for instance, the effect of idleness, or changes in labour efficiency in his department, on the total profits of the business over and above those effects recorded as conditions variances for which he may be held personally responsible. This information may be presented to him at the foot of the departmental Operating Statement or Variation Sheet showing, periodically, the results of his departmental activities, and is an application of the standard costing technique.

The Standard Costing Aspect

While budgetary control concerns itself with the comparison of *departmental* standard and actual performances, standard costing is interested in comparisons of standard and actual costs by *products*. Such product costs are, roughly speaking, determined by multiplying the amount of effort required in each department through which the products pass by the appropriate costing rates. Direct costing rates have already been considered earlier in the chapter, but in order to build up product costs it is necessary to allocate to production departments the factory overhead and such items from the fixed overhead budget as *could* be included in it, considering each account separately and adopting the most satisfactory methods available. The fixed overhead may be dealt with in a similar manner. As before, the standard cost cleared by the actual amount of production, whether above or below the budgeted level, is the product of the actual output and the costing rate, this time including the standard rates for the overheads.

It is now pertinent to consider what should be the standard allowance for overhead allocated to a production department and, if semi-fixed expenses have been eliminated, the matter is simplified. With the factory or variable overhead, it will be the same at all activities as the standard cost of overhead absorbed by the production of the department. With fixed overheads, the amounts allocated to production departments at all activities will be the same as the amounts allocated at 100% activity. This reproduces in production departments a number of standard allowances which, in total, agree with the total in the fixed expense budget. As far as the production departments are concerned, the allocations of actual factory and fixed overheads *must* coincide with the standard allowances for factory and fixed overheads. " Conditions " variances arising in either of the overhead departments would be allocated to production departments only if they were likely to persist—in which case the original allocations would be revised, necessitating similar revisions to the allocated standard and actual allowances. Over- or under-absorption of overheads by the output of production departments is thus reduced to the amount of conditions variance.

It is now apparent that, whereas direct labour, materials and expense, and factory overheads are vital to production and, in consequence, vary proportionally with the volume thereof, fixed costs, although necessary to the maintenance of the business as a going concern, are not so intimately connected with output. Indeed, for a short time, production could be carried on without many of them. Over a longer period, however, the necessity for adequate administration, supervision, insurance and depreciation—to name but

a few fixed costs—becomes apparent. And if they do not fluctuate in amount with the production load, they must be related to time. This is evident if the above examples are considered individually. Supervisory salaries are payable for a week or month; certain insurance premiums run for a year; depreciation is an annual charge.

Acceptance of this time factor in regard to fixed expenses, and, hence, volume variance, paves the way to an analysis of the latter in the production departments by the following reasons, which can be significant guides in control:—

1. Calendar Variations.
2. Idle Facilities.
3. Idle Time.
4. Overtime Working.
5. Efficiency.

1. *Calendar Variations*

For control purposes it is convenient to divide the full budget period or year into a number of shorter control periods. Fixed overheads may then be divided by the number of these to arrive at the quota to be absorbed in each. Now, although each control period covers the same length of time, *e.g.*, thirteen four-weekly periods, the potential working hours in each may vary owing to the incidence of holidays. As fixed expenses are related to time, therefore, it follows that in those control periods in which the Christmas, Easter, Whitsun and Summer holidays fall, it will be impossible fully to absorb them. To overcome this difficulty, the number of working days in the year may be determined, after allowing for known holidays, and a fixed overhead rate per day calculated, from which a table may be drawn up to show the amounts of fixed overhead which will be absorbed on a daily basis in each control period. These figures will differ from the average absorption, each period giving rise to a volume variance due to CALENDAR CHANGES but, provided the planned holidays are adhered to, at the close of the last control period the cumulative absorption will agree with the total fixed overhead budgeted, and there will be no volume variance.

Example

Figure 31 shows how the amount of calendar variance is established for each control period. A total of £1,300 fixed expenditure has been budgeted, which has to be absorbed in thirteen four-weekly periods. The average absorption per control period is £100, while the net absorption, after allowing

for the holidays as shown in columns C and D, is as given in column G, both F and G totalling £1,300. Notice that the calendar variances shown against each control period in column H cancel out at the end of the year. In the event of a change in the holiday plan, it would be necessary to consider whether to replan the remaining fixed expenditure unabsorbed, or to allow a final over-or under-absorption to be transferred to the profit and loss account at the close of the year.

2. *Idle Facilities*

If the production load on a department is, in practice, less than that budgeted, owing to external reasons such as faulty sales policy or a trade slump, the full allocation of fixed expenses will not be absorbed. The magnitude of this loss may be calculated by applying the departmental fixed expense rate to the actual amount of output—measured in hours or standard hours if possible—and deducting the product from the budgeted absorption. It is a volume variance or loss due to IDLE FACILITIES, and its extent may not be apparent to management if it is accompanied by a slowing down of labour efficiency, so that all the plant is being constantly worked.

3. *Idle Time*

Where production is lost owing to controllable reasons, such as faulty synchronisation of operations, delay in delivering materials to the machines, etc., or to breakdowns, however, an under-absorption of fixed expense again results. Where payment to direct workers is made by piece-work, or an incentive scheme is in operation, idle time will be recorded and the IDLE TIME variance may be ascertained by multiplying such hours by the departmental fixed expense rate calculated when the budget was set. It should be noted that idle time variance is concerned only with the under-absorption of fixed overheads. Payments to direct workers, and others, at time rates throughout such periods do not constitute a volume variance, but a conditions variance, and would be transferred to a special Lost Time account in the direct expense section of the departmental results.

4. *Overtime Working*

If for any reason overtime is worked, the total hours envisaged when the budgets were set may be increased, and potentially more time is liberated in which fixed expenditure is over-absorbed. These hours may be valued at the appropriate departmental fixed expense rate to arrive at a volume variance

due to OVERTIME WORKING. This is always a profit, despite the fact that overtime may be necessary simply to overcome a loss under the heading of idle time.

5. *Efficiency*

In setting up the budgets a certain working speed had to be adopted for each operation. If, in fact, the direct workers work faster than this established rate, the effect is to liberate more hours so that more than the budgeted output may be obtained in the budgeted time. By applying the departmental fixed expense rate to the standard time content of such additional output, a volume variance due to increased EFFICIENCY may be ascertained. On the other hand, if the direct workers produce at a slower rate than that adopted in the budget, a volume loss due to decreased EFFICIENCY results.

Total Volume Variance

Total volume variance, then, is the sum of the above five variances. If more than budgeted output has been obtained, it may, in total, be recorded in black as a volume profit. If less than budgeted output has been achieved it may, in total, be recorded in red as a volume loss. In either case, however, the total figure may not be significant from the point of view of control, as it may comprise several losses and gains at the same time, as indicated above, each needing careful consideration.

Example

Assume a departmental budget based upon 5,000 clock hours. The fixed expense is £300 or £·060 per hour, while the standard time for the sole product is five hours, and the actual output 1,400 articles. The actual hours content of the output is, therefore, 7,000 (1,400 × 5) and these comprise, say:—

Calendar (increase)	400	Hours.
Idle Facilities	—	
Idle Time	−300	,,
Overtime	1,200	,,
Budget or Normal	5,000	,,
	6,300	,,
Efficiency (increase)	700	,,
Total	7,000	,,

From the above information it is required to determine the volume variance in total and in detail.

Total volume variance (V.V.) may be established quickly from the following formula:—

$$\text{V.V.} = \frac{A - N}{N} \times F$$

where A = Actual Clock Hours *absorbed.*
N = Normal or Budgeted Clock Hours.
F = Fixed Expense.

Applying this to the above information,

$$\text{V.V.} = \frac{7{,}000 - 5{,}000}{5{,}000} \times £300$$

$$= £120 \textit{ Profit.}$$

This may be analysed as under:—

Reason	Clock Hours	Rate £/Hour	Fixed Overhead		Volume Variance
			Absorption	Actual	
		£	£	£	£
Calendar	400		24	—	24
Idle Facilities .	—		—	—	—
Idle Time	− 300		− 18	—	− 18
Overtime	1,200		72	—	72
Budget or Normal..	5,000	·060	300	300	—
	6,300		378	300	78
Efficiency	700		42	—	42
Total	7,000		420	300	120

Where departmental budgets are based upon the capacity of the plant involved, the fixed expense incurred in time will also be absorbed in full by the budgeted output. But where the budgets are based upon output lower than working capacity, due, say, to trade depression, they do not absorb all the fixed expense, but only the proportion of the total that the budgeted output bears to total working capacity. This means that if the budgeted performance is achieved, a volume loss due to idle facilities will be recorded. It sometimes happens that a business carries the fixed costs relating to certain redundant

plant and these, too, should not be absorbed by the budgeted output so that, again, if budgeted performance is attained, a volume loss will also be revealed. In this way, management is made aware of the effects of trade depression, faulty selling policy and redundant plant on profits and, at the same time, product costs and, perhaps, selling prices are not artificially inflated by such causes.

XX

Variance Analysis—Conditions—(b) Direct Labour

Variance Analysis—Conditions—(b) Direct Labour

VARIANCE was defined in the previous chapter as the difference between the budgeted or standard cost of an expense or function, and the actual cost. Having considered the effects of changes in the volume of production upon cost and, hence, volume variance, it is now necessary to consider the remaining portion of variance which is attributable to actual conditions differing from those budgeted, and to determine the basic reasons for them. G. Charter Harrison has done much pioneer work in this direction, and the following classification of conditions variance by main reasons, with a few additions, is based upon his findings:—

(1) *Labour Rate Variation.* These variations are due to increases and decreases in the rates of pay to labour above or below those adopted in the budgets.

(2) *Labour Time Variation.* Arising either through employment of more or less than the budgeted number of workers, or through changes in labour efficiency giving rise to more or less hours than budgeted for the same output.

(3) *Material Price Variation.* Due to increases or decreases above or below the standard prices adopted for materials.

(4) *Material Consumption Variation.* These are due to increases or decreases in the amounts of materials used as compared with the standard consumptions laid down in the material specifications for the products.

(5) *Number of Set-Ups Variation.* Fluctuations in standard cost due to the number of machine set-ups actually differing from the budgeted number.

(6) *Set-Up Time Variation.* Fluctuations from the standard times allowed for machine set-ups irrespective of their number.

(7) *Variations in Distribution Expenses.*

(8) *Variations in Miscellaneous Expenses.*

(9) *Variations in Rates of Salary Pay.*

(10) *Variations in the Number of Salaried Staff.*

(11) *Re-Routing Variation.* Being changes in standard cost due to use of unauthorised production planning or routes.

(12) *Methods Variation.* Fluctuations in standard cost due to adoption of an alternative method of production to that authorised in the budget, or upon which a standard product cost has been established.

It should be emphasised that these are main reasons for conditions variances. Several of them are capable of a breakdown to sub-headings in particular circumstances.

Revisions Variance

It is important in all analyses of variance to ascertain how much of each may be influenced by the exercise of control within the business, and what proportion is due to external causes over which no control can be exerted. As the prime object of budgetary control is to control operations so that the planned profit and stability may be achieved, action should spring from consideration of the operations, and great care must be used in presenting them clearly.

Some of the reasons for variance may not occur in all industries. In other businesses they may arise only at infrequent intervals, and not warrant the labour involved in separating them. It is important, however, to differentiate between controllable elements and non-controllable. In the latter category are increases in rates of pay agreed between Trade Unions and Employers' Federations, or on a National basis, and increases in material prices where there is not a free market—*e.g.*, Government control of prices. If it were practicable to re-establish the budgets at frequent intervals, these could be absorbed in new standard rates. Under flexible budgetary control this is, in effect, accomplished simply by recording them in a special budget revision log and expressing the revised total allowance as a ratio to the original amount budgeted. Thus, if the original allowance for an expense was £100 and, owing to an uncontrollable and more-or-less permanent increase for a specific reason, it becomes £120, a factor of 1·20 would be applied to the standard allowance at any level of output achieved to arrive at the revised standard allowance. By deducting the original standard allowance from the revised, the value of the uncontrollable increase in the conditions variance may then be ascertained and recorded in a separate column on the departmental operating statement away from the controllable items. Alternatively, without providing for the subtraction, by applying the percentage increase to the standard allowance at the desired level of output, the amount of REVISIONS variance may be determined and recorded separately.

It is sometimes suggested that in extracting information from departmental variation sheets for presentation to foremen, etc., revisions and volume variances should be excluded, as they are not occasioned by the foreman himself. This is short-sighted policy, however, because the foreman is then not in a position to review the costs of his department as a whole. Every endeavour should be made to bring to his notice the effects of external conditions operating with or against his own efforts, otherwise he may tend to blame the management in all cases where costs increase if he himself is not at fault.

Controllable Variances

Having segregated volume and revisions variances, the remaining difference between budgeted and actual cost is the controllable element of conditions variance, which may be shown in one total or broken down to a number of reasons. Because this is the field in which most action may be taken to reduce losses and to ensure conformity with the budgeted plan, it is desirable to give as much detail as possible, even though the total amount involved appears to be small. It may be that a heavy loss due to a certain inefficiency is being offset by a considerable gain through efficiency in another direction. The net result may thus give rise to unjustified complacency, whereas by furnishing more information action would be taken to eliminate the cause of the inefficiency, so that the full profit might be obtained from the improved efficiency in the other direction.

Scrap and Rectifications as Controllable Variance

For instance, departmental costs under all headings may be high owing to excessive scrap occasioned by a fault in a previous operation. If the standard value *incurred in a department* of all work scrapped *in the same department* is ascertained and recorded as a variance, it may be found that the department itself is working to a high state of efficiency despite the total adverse variance.

Similarly, where a department undertakes to rectify faulty work due to causes originating in other departments, costs increase under all headings because of the additional work involved, which is not allowed for in the standard cost of saleable output. If the standard cost of such rectifications is segregated as a variance, therefore, the true operating efficiency of the department would be apparent.

As certain of the conditions variances apply to particular elements of cost, it is desirable now to consider the subject under the headings of labour, materials and expense. Later, consideration must also be given to the reasons for variations in sales, cost of sales, profits and balance sheet relationships.

Direct Labour Variances

It is a convenience to express all departmental output, whether physically measured in tons, yards, dozens, gallons, etc., in one common unit, and the desirability of using time—standard time—for this cannot be too strongly stressed, as it affords a comparison with actual hours taken and facilitates calculation of labour efficiencies.

Variance in connection with labour may arise in two ways:—

(1) Through alterations to rates of pay.
(2) Through variations in the number of workers.

Alterations in Rates of Pay

In the budget, a rate of pay for the departmental direct labour will have been established and, if this is actually adhered to, no variance will arise under this heading.

Thus:—

(a) 1,000 hours at budget rate 2*s.* 0*d.*	£100
(b) 1,000 actual hours at actual rate of 2*s.* 0*d.* ..	£100
(c) Variance (Rates) a — b	*Nil*

If, however, it is agreed between the workers and the management to increase the rate to 2*s.* 6*d.* per hour after the budget is in operation, the following position arises:—

(a) 1,000 hours at budget rate 2*s.* 0*d.*	£100
(b) 1,000 hours at revised rate 2*s.* 6*d.*	£125
(c) 1,000 actual hours at revised rate 2*s.* 6*d.*	£125
(d) Variance (Rates of pay or revisions a — b) ..	£ — 25

Taking this example a stage further, suppose that the worker envisaged in the budget is not actually available and his place is taken by a substitute who receives a rate of 2*s.* 9*d.* per hour. This will cause an additional variance as under:—

(a) 1,000 hours at budget rate 2*s.* 0*d.*		£100
(b) 1,000 hours at revised rate 2*s.* 6*d.*		£125
(c) 1,000 actual hours at actual rate 2*s.* 9*d.*		£137·5
(d) Variance:		
Revisions a — b	£ — 25	
b — c	£ — 12·5	
Total a — c		£ — 37·5

The need to replace the worker by one of the correct grade in order to reduce the negative or red variance to a minimum is indicated by this information.

Variations in the Quantity or Number of Workers

To obtain the budgeted output a certain number of workers is needed, and this has been ascertained and recorded in the direct labour budget. Direct labour is considered to be a directly variable quantity and cost with volume of output, so that the standard and revised standard rates of pay used in the preceding examples may be related to any quantity of output as measured in hours. To adhere to the budgeted performance, it is necessary to maintain production at the constant speed and quality established. If, in practice, this is not maintained, labour efficiency is said to vary and the quantity of labour (measured in hours) necessary to produce the budgeted target will either increase or decrease. If no extra labour is taken on, or no redundant labour is discharged, the volume of output actually achieved will fail to agree with that budgeted, because the quantity of hours in relation to the volume of output has not been maintained on a directly variable basis at the level or speed laid down in the budget. If greater speed in conjunction with the maintenance of quality is noticed, efficiency is said to have increased and, because more articles will be produced in the same time, the actual cost of each will be less than the standard. The amount of profit thus obtained may be shown in operating statements as a black EFFICIENCY variance. On the other hand, if the pace of output is actually lower than that recorded in the budget, efficiency has decreased and, because fewer articles will be produced in the budget hours available than those anticipated by the budget, the actual cost of each will be greater than the standard. The amount thus lost may be shown as a negative or red EFFICIENCY variance, and the next two examples demonstrate this:—

(a) Number of articles actually produced	200
(b) Time per article allowed in the budget (standard time)	5
(c) Total standard hours produced a × b	1,000
(d) Actual hours taken to produce 200 articles	800
(e) 1,000 standard hours at budget rate 2*s.* 0*d.*	£100
(f) 800 actual hours at budget rate 2*s.* 0*d.*	£80
(g) Variance (increased efficiency e — f)	£20

(c) Total standard hours produced	1,000
(d) Actual hours taken to produce 200 articles	1,200
(e) 1,000 standard hours at budget rate 2*s.* 0*d.*	£100
(f) 1,200 actual hours at budget rate 2*s.* 0*d.*	£120
(g) Variance (decreased efficiency e — f)	£ — 20

Under day-work, the output from direct workers tends to fluctuate considerably, so that it is important to record labour efficiency variance. At the same time, rates variance may also be present, and if the two are shown on the same statement much useful information is made available to management:—

(a)	1,000 standard hours at budget rate 2*s.* 0*d.*				£100
(b)	1,000 standard hours at revised rate 2*s.* 6*d.*				£125
(c)	800 actual hours at revised rate 2*s.* 6*d.*				£100
(d)	800 actual hours at actual rate 2*s.* 9*d.*				£110
(e)	Variance—Revisions	a — b		£ — 25	
	Efficiency	b — c		£ 25	
	Rates	c — d		£ — 10	
	Total	a — d			£ — 10

In order to overcome this fluctuating labour efficiency, and at the same time to increase the amount of output, piece-work payment may be introduced. A price is offered to the worker for each job. This is based upon the time content of the article in conjunction with the appropriate hourly rate of pay. As output in a given time increases, the earnings of the worker undergo a corresponding increase. This, in effect, creates a black efficiency variance or profit which, however, is offset by a red rates of pay variance or loss as shown in the following example:—

Assume an allowed rate of production of six articles per hour at a revised piece-work price of 5*d.* each. (This is based upon a revised rate of 2*s.* 6*d.* per hour and the original rate may be assumed to be 2*s.* 0*d.*) 6,600 articles are actually produced in 1,000 hours.

(a)	6,600 articles (1,100 hours) at budget rate 2*s.* 0*d.*				£110
(b)	6,600 articles at revised budget rate 2*s.* 6*d.*				£137·5
(c)	1,000 actual hours at revised rate 2*s.* 6*d.*				£125
(d)	Actual cost 6,600 articles at 5*d.*				£137·5
(e)	Variance—Revisions	a — b		£ — 27·5	
	Efficiency	b — c		£ 12·5	
	Rates	c — d		£ — 12.5	
	Total	a — d			£ — 27·5

In practice, line (c) showing the 1,000 actual hours at the revised rate could be omitted, thereby presenting only the loss of £27·5 due to revisions. If this is done, any difference between line (b), the standard hours of actual production, and the actual wages paid under straight piece-work would indicate a rates variance due to the employment of labour at an unauthorised rate.

Under certain incentive payment schemes, introduced with a view to encouraging still greater output in a given time, workers are offered a price or rate which is greater than one directly variable with the quantity produced. Differential piece-work may be cited, for instance, and in order to show the variances which may now be obtained, assume the following circumstances:—

Based upon the data used in the previous example, if 6,600 articles or more are produced in 1,000 hours the piece-work price will be increased from 5*d.* to 6*d.* each, the latter, of course, being based upon a rate of 3*s.* 0*d.* per hour.

(a)	6,600 articles (1,100 hours) at budget rate 2*s.* 0*d.* . .			£110
(b)	6,600 articles at revised budget rate 2*s.* 6*d.* . .			£137·5
(c)	6,600 articles at differential rate 3*s.* 0*d.*			£165
(d)	1,000 actual hours at differential rate 3*s.* 0*d.* . .			£150
(e)	Actual cost of 6,600 articles at differential price 6*d.* each			£165
(f)	Variance—Revisions	a — b	£ — 27·5	
	Differential	b — c	£ — 27·5	
	Efficiency	c — d	£ 15	
	Rates	d — e	£ — 15	
	Total	a — e		£ — 55

Notice that, although the efficiency and rates variances are maintained as equal but opposite, to demonstrate that no unauthorised increases in rates of pay have been made, the standard amount of each has now increased from £12·5 in the previous example to £15. If line (c) were omitted so that the differential variance falls into the rates variance (where it really belongs), the fact that no unauthorised rates of pay were introduced would not be apparent. Also, in setting up differential piece-work prices, it is important to ensure that the total differential variance likely to arise if the workers do increase their efficiency and qualify for the extra payment does not exceed the volume variance that will also arise in connection with the over-absorption of fixed expense, because of the improved efficiency. By showing the differential variance separately from the rates variance, this is at once apparent.

In connection with the Rowan scheme of payment by results, increased labour efficiency is rewarded, in effect, by an increased rate which steadily diminishes as output increases. Thus, instead of the red differential variance encountered in the last example, a black bonus variance or gain arises. If this is recorded in a separate column, once more it is possible to show equal but opposite variances for efficiency and rates, provided no unauthorised rates are

introduced and scrap or rectification work does not arise. (See Chapter 22 in this connection.)

In those industries where a two-part wage rate is used—the base rate applicable to output and the National Bonus in relation to the time worked—positions similar to those instanced in connection with the differential and Rowan types of bonus schemes arise when efficiency differs from that laid down in the budget. It will be appreciated that if, for instance, a worker were to produce twice the budgeted output in the standard time under piecework, his base rate earnings would be doubled, but he would receive National Bonus only once—in relation to the actual hours worked. If the full rate has been adopted in the budget, a black rates variance or profit would be created. To legislate for this to be ascertained and recorded separately does not warrant the labour involved. It is simpler to consider National Bonus as a direct expense and to budget for it under a special account heading in the production department labour section of the direct expense budget. After all, it is not remuneration in connection with output, and for those firms who still apply overheads as a percentage on direct wages—as distinct from direct hours—direct wages then present a more stable basis.

Other items which go to make up the direct worker's total wage, and which are more suitable for allocation to specific accounts in the direct expense budget, as and when they arise, are:—

(1) Amounts paid for idle time.

(2) Where short working is in operation, the make-up or difference between actual earnings and a guaranteed minimum week's wage.

(3) Where payment is made by results and the agreement between the workers and management stipulates that job times should be set so that the average worker should be capable of earning a specified minimum efficiency (27½% in engineering), any make-up to the minimum prescribed incentive earnings.

As conditions variances from many of the preceding causes may be present at the same time, it is necessary to see that they are all based upon the original standard cost and represent, in total, the difference between that figure and the actual payment. It may be argued that variances expressed in terms of original standard cost do not show the true losses or gains and that variances measured in terms of, say, revised standard cost would be more accurate. This may be so, but the difficulties of establishing a simple scheme on such a basis tend to outweigh any possible advantages. It would not be possible, for example, to show the effect of rising costs due to external causes as a separate revisions

variance. And, in any case, original standard cost has been established as a measure. By keeping to it, a stable basis of comparison is maintained, the advantages of which far outweigh the value obtainable from hypothetical " actual " variances which, after all, are only another arbitrary expression of opinion on the part of the person who assesses them.

With the aid of a certain ingenuity, direct labour variances may be expressed on one statement and their juxtaposition makes their meaning clearer. The vertical method used in the preceding illustrations may not in practice be found so flexible as the horizontal way used in the completely worked out example given in Chapter 24.

Basic Information

The information upon which variance statements are built up should be obtained from fundamental sources. With physical units, such as output, these should summarise the information presented in physical terms to departmental heads each day for control purposes. The values should be obtained wherever possible from original or prime accounting sources. At the end of the control period the departmental head then receives a statement summarising information already in his possession and interpreting it in terms of cost.

XXI

Variance Analysis—Conditions—(c) Direct Materials

Variance Analysis—Conditions—(c) Direct Materials

As the cost of direct materials is considered to vary in proportion to the amount of output, volume variance does not arise. Conditions variance, however, may be present in actual material costs, due to:—

(a) Prices differing from those used in the budgets.

(b) Quantities *purchased* differing from the standard quantities authorised in the stock or purchases budgets.

(c) Quantities *used* differing from those recorded in the standard material specifications of the products concerned.

Material price variance occurs, primarily, on *purchase*, although there may also be a certain amount at time of issue, due to the adoption of L.I.F.O., F.I.F.O., or average price method, etc., of booking out. On the other hand, material quantity variance is most noticeable at the date of *usage* although, here again, if a fixed budget system is in operation and the actual production load does not coincide with it, or if speculation is being practised, it may be discerned at the buying stage.

As with other variances, where a fixed budget is in operation and actual output differs from the amount specified, there may be material quantity and price variances relative to the increase where the target is exceeded which, although nominally an excess cost or loss, gives rise to additional profits on the extra sales turnover. Conversely, where production is actually less than the budgeted load, the nominal saving or black variance will give rise to decreasing profits, owing to the diminution of sales turnover. With flexible budgetary control, however, under which the standard allowance in quantity is always made comparable with the actual production load, red variance always denotes cost in excess of the standard allowance and is a loss, while black variance, representing a lower cost than budgeted, invariably denotes a profit.

Material Price Variance

Primarily, price variance arises at the time of purchase, and its significance may be ascertained in conjunction with an analysis of the purchase invoices contained in the purchase journal compiled by the bookkeepers.

Reasons for Price Variance

Material price variance may be due to:—

(a) Increases or decreases in prices caused by:—

(1) Paying more or less than the budgeted price through lack of competitive quotations or information or through placing rush orders for immediate delivery "at any price." This type is, essentially, controllable within the organisation and represents, if a red variance, a loss due to inefficiency—probably on the part of the buyer. On the other hand, efficient buying may result in a black variance and a saving due to purchases at less than the prices used in the budget.

(2) Increases in prices of goods as agreed by a whole industry or through Government intervention—*e.g.*, alterations in the controlled prices. The higher prices paid under these conditions are not controllable within the organisation and may be considered a revision variance as the new prices could be adopted as standards next time the system was being overhauled.

(b) Buying in excess of authorised quantities caused by:—

(1) Speculation. Although this may result in paying a lower price per unit purchased, the total expenditure may be greater than the budgeted amount of capital required to be tied up in material stocks and will consequently affect the stability of the balance sheet besides, perhaps, causing financial embarrassment. Where short supply of materials is the limiting factor in setting the sales budget, an opportunity of obtaining additional supplies may not be speculation, however, provided output is maintained in ratio to the extra supplies available.

(2) Variations in production load where a non-flexible or fixed budget system is in use.

Reasons for Quantity Variance

Material quantity variance may be due to:—

(1) Buying in excess of the authorised quantities as mentioned above.
(2) Consumption relative to the actual production load being greater or less than the standard quantity budgeted. An increased consumption may be due to mere wastefulness or to the incidence of recorded scrap or rectification operations—regarding which, see Chapter 22.

Both price and quantity variance may be shown on one control statement, as the following example shows:—

Example

Budgeted output is 100 articles per week. Each article requires five " pieces " of material at a standard or budgeted price of 2*s.* 0*d.* each. Actually, 120 articles were produced one week and 630 " pieces " consumed at a price of 2*s.* 4*d.* each.

	Production (articles) A	Material used (pieces) B	Price (each piece) C	Total value D = B × C
1.	100 (Budgeted)	500 (Standard)	2*s.* 0*d.* (Standard)	1,000*s.* 0*d.* (Standard)
2.	120 (Actual)	600 (Standard)	2*s.* 0*d.* (Standard)	1,200*s.* 0*d.* (Standard)
3.	120 (Actual)	630 (Actual)	2*s.* 0*d.* (Standard)	1,260*s.* 0*d.* (Standard)
4.	120 (Actual)	630 (Actual)	2*s.* 4*d.* (Actual)	1,470*s.* 0*d.* (Actual)

Variance Analysis:—

1—2	Variance due to increased production ..	— 200*s.* 0*d.*
2—3	Variance due to increased consumption (quantity)	— 60*s.* 0*d.*
3—4	Variance due to increased price	— 210*s.* 0*d.*
1—4	TOTAL VARIANCE	— 470*s.* 0*d.*

Price variance may sometimes be further divided into revisions and controllable. While the buyer should be made aware of the extent of uncontrollable price variance in total and the heads of production departments, too, neither he nor they can be held responsible for this revisions variance. And even where price variance relative to consumption (as distinct from purchase) is shown on the variance statements of production departments it is not controllable on the foreman concerned, but may be a part of the responsibility of the buyer.

Where materials are debited to stores accounts at the actual purchase prices, price variance is sometimes recorded on the variance statements of the production departments. This is only a partial disclosure, however, for some of it is left in " stock " with the unconsumed materials. Price variance is also complicated at this stage because of the alternative methods that may be used in valuing consumption—*e.g.*, L.I.F.O., F.I.F.O., average price, etc. It is inconvenient to have to add up the price variance " consumed " on all departmental statements if control over purchasing is to be maintained—particularly if only part of the story is thus revealed—and control at the purchasing stage is, therefore, advocated. Moreover, the efficiency of the production departments is obscured unless price variance is segregated.

Issuing Materials at Standard Prices

Under budgetary control, the prime concern is fullest operational control, whether at the buying or the production stage, and the adoption of standard material prices, instead of using actual prices for valuing consumption, offers many advantages in this direction. In particular, it ensures that all variance in regard to materials in the production departments is a measure in sterling value of the *quantity* consumed in excess of or less than that authorised by the standard material specification. But in a desire to achieve maximum control, the needs of costing must not be overlooked, and the importance of compiling actual departmental costs must be catered for if the minimum of clerical effort in regard to both budgetary control and costing is to be expended. It is, therefore, desirable to show price variance on the variance statements of production departments, and this may be effected in the following ways:—

(1) By recording the standard and actual value of consumption on stores requisitions.

(2) By recording the standard value of consumption only on stores requisitions and applying a price variance factor against the total cost so that the actual cost of consumption at actual value may be computed in an additional column.

The first method usually entails double clerical effort, as both the standard and actual cost per unit and total value at each price have to be recorded on each stores requisition. The second method is much simpler. By this the purchase of materials may be debited to stock control accounts in convenient groups and at standard values, while the price variance is debited to a price variance suspense account. Or the two may be combined, for convenience, in adjacent columns of the same account, as illustrated in Figure 32. At the end of the

month, all stores requisitions relative to a particular material group are examined and valued at standard. The total standard value of all the requisitions is then credited to the group control account—leaving a balance of materials in stock at standard, and the total price variance in suspense applicable to the opening balance and purchases is apportioned *pro rata* to each, and the price variance factor for the month ascertained. If a summary is made by departments and material groups of the standard values requisitioned, the monthly price variance factors may be applied and the amount of price variance and the total consumption *at actual cost* ascertained as illustrated in Figure 33. All that is then needed on the production department variance statement is a column in which to record full actual costs for costing purposes. Quantitative physical control may be maintained by the storekeeper or stock controller through bin cards or similar records in quantity only. In Figure 32 all the purchases have been made at prices above standard so that the debits in the price variance column are recorded with negative prefixes and the ratios to standard values are shown in italics. For the same reason, the group price variance percentages in Figure 33 are given in italics and the total price variances with negative prefixes. If, however, actual prices are less than standard, price variances and percentages would be printed in normal black type.

Materials of similar types may be grouped together, provided their price variances are fairly similar, otherwise it becomes necessary to isolate exceptional items in separate groups and determine individual price variance factors for them. This treatment may also be extended to suitable indirect materials, particularly where their consumption varies directly with output, and quantity and value are significant—*e.g.*, grinding wheels, electrodes, machine tools, etc.

In dealing with price variance on production department variance statements, it is unnecessary to break down to revisions and controllable, as this is a method of control applicable to purchasing.

Material Price Control through Purchase Analysis

While for costing purposes it may be expedient to record the " consumption " of price variance on production department records, this is purely statistical as far as budgetary control is concerned, and need not be shown on the operating summaries relating to the output of the whole works. In order to produce a profit and loss account, however, the total would be shown on the profit and loss account itself.

In order to consider the problem of price variance as a whole, it must be approached—from the price point of view—at the time the purchase invoices are

passed for payment and entered in the purchase journal, and from the quantitative aspect in conjunction with the planned production load or stores control system.

The quantities required will depend largely upon the order book. Where trade is increasing, there will be a corresponding need for more materials *in the near future*. Control over this should be aimed at ensuring that purchasing is permitted only against specific orders from customers, and the production order number should be recorded on every purchase order placed. If, however, direct materials are maintained on the perpetual inventory system, purchase orders may be placed for authorised quantities when the ordering levels are reached, the head storekeeper notifying the buyer of his requirements on numbered requisitions which then become available for internal audit purposes. A further check on quantities ordered may operate when the cumulative ratio of purchases (in value from invoices) to standard cost of production is noted. The ratio may at times be unstable, however, especially where a long production cycle is involved, as the invoice may be applicable to receipt of materials in the month before consumption.

Price control in relation to materials actually bought and delivered may operate successfully in conjunction with the purchase invoices as entered in the purchase journal for bookkeeping purposes. Each invoice already shows the actual quantity, price and value, but it is necessary to record the standard and revised standard prices on them and then to ascertain the total standard and revised standard values of the actual quantity shown. By sorting the invoices into groups according to the materials purchased, a vertical, columnar summary may be drawn up to give:—

A. Material Group.
B. Standard value of all invoices in each group.
C. Revised standard value of all invoices in each group.
D. Actual value of all invoices in each group.

Each column needs totalling and the grand total of D needs to be agreed with the total of the purchase journal. The type of form envisaged is shown in Figure 34. Notice that further columns are added to record the analysis of price variance and the ratio of actual values to standard—otherwise known as the price variance factors.

Although the *amount* of price variance itself is of great significance with regard to the *liquid position* of the business—an increasing rate of production making greater demands on ready cash—it is the price variance *factor* which is of prime importance in *purchase control*. Where, quantitatively, purchases fluctuate from month to month, the actual amount of price variance may not

readily show the trend of the material group prices, but they can be studied through their respective price variance factors. The moving three-monthly price variance factor will usually show the trend of prices better—better even than the moving annual or cumulative annual to date—because it reflects current conditions. Inclusion of the cumulative standard value of purchases and the cumulative price variance—both by groups—for the year to date are also useful figures to record on the purchase analysis, as they afford a vital link with the financial or published accounts and the monthly statements.

Standard prices have not been advocated in connection with indirect or stores materials as a whole, because the need for such commodities, and the qualities and quantities used, may fluctuate and involve too much clerical work to warrant them. Control of purchasing in this category may be exercised through the stock records, however, and by obtaining competitive quotations, whereas control over usage is best achieved by granting a total sum to the departmental head and leaving it to him to requisition materials, etc., to best advantage, so as not to exceed his allowance. In cases where quantity and price of consumption of an indirect material are significant it may be advisable, however, to establish standards of quantity and price, and to operate as for direct materials. Machine tools, electrodes, polishes, moulding sand and grinding wheels are examples of this.

XXII

Variance Analysis—Conditions—(d) Direct Expense

Variance Analysis—Conditions—(d) Direct Expense

WHAT constitutes direct expense depends upon the particular circumstances of each case. The following list is, therefore, indicative merely of items that frequently feature under this heading, and is by no means exhaustive:—

Indirect Labour.
National Bonus (of direct labour).
Overtime Premium (of direct labour).
Idle Time (of direct labour).
Indirect Materials.
Maintenance.
Fuel.
Supervision.
Space Heating.

It is among the direct expenses and overheads that fixed expenses, as well as directly variables, are encountered. If the fixed elements are dealt with in a special fixed overhead budget, the amount of volume variance arising in the production departments will be small, and related to those expenses of an irregular nature. Semi-variability may, however, arise in connection with some kinds of indirect production department labour which it is advisable to retain in the direct expense budget, so that the total labour cost may be readily available. Detailed consideration of the analyses of variance possible in connection with these budgets may, perhaps, be best approached through examination of each of the typical examples of direct expense listed above.

Indirect Labour

Variances applicable to labour generally have already been dealt with in Chapter 20, and these may apply equally to indirect as well as to direct labour, so that efficiency, rates of pay and differential bonus variances may be obtained. With regard to the indirect production department labour that does not vary directly with output—*e.g.*, cleaners—an element of volume variance may be expected when output is above or below the budgeted level, and the

conditions variance may be attributable to variations in the *number* of workers (as distinct from efficiency) and rates of pay. In practice, the last two are often recorded together as one figure under the heading of " Expense " variance, where the sum involved is comparatively small.

National Bonus

In industries where two-part wage rates are in use, the cost of the National Bonus element in connection with the direct workers would be computed in accordance with the number of direct labour hours budgeted in conjunction with the appropriate rates. The actual amount of this bonus received by such workers would depend upon the actual hours worked. The standard cost of the actual output achieved would contain an element of National Bonus on a directly variable basis, but the standard allowance in relation to the actual output would have to take into consideration not only this but the efficiency of the workers Variance in regard to National Bonus may, therefore, arise under both volume and conditions headings, the apportionment between them depending upon the standard allowance calculated.

The formula for ascertaining the standard allowance at any level of output is:—

$$\frac{\text{Actual Output}}{\text{Budgeted Output}} \times \frac{\text{Budgeted Efficiency}}{\text{Actual Efficiency}} \times \text{Normal Amount Budgeted.}$$

Example

Assume a budgeted output of 264 articles in 44 hours, the National Bonus rate being 22*s.* 0*d.* or 6*d.* per hour or, alternatively, 1*d.* per article. Actual output is 330 articles in 50 hours. What is the variance between the standard and actual cost of National Bonus?

Answer

330 articles at budgeted rate of 6 per hour = 55 hours.
Actual time taken = 50 hours.

Labour Efficiency, therefore, $\frac{55}{50} \times 100$ = 110%.

Level of output above budget $\frac{330}{264} \times 100$ = 125%.

From the formula, standard allowance for National Bonus is:—

$$\frac{125}{100} \times \frac{100}{110} \times 22s.\ 0d. = 25s.\ 0d.$$

Whilst standard cost is 330 × 1*d.* = 27*s.* 6*d.*

Thus:—

a. Standard cost of N.B. in actual output = 27*s.* 6*d.*
b. Budget allowance for actual output = 25*s.* 0*d.*
c. Actual cost of N.B. (50 × 6*d.*) = 25*s.* 0*d.*

The following variances, therefore, arise:—

a — b	Volume	2*s.* 6*d.*
b — c	Conditions	—
a — c	Total	2*s.* 6*d.*

It should be noted that if output is above that budgeted, because of either overtime working or the introduction of additional workers, but the labour efficiency remains constant as budgeted, a conditions variance would arise in addition to the volume variance shown above.

Overtime and Night-Shift Premium

Here, as with National Bonus, the payment is in reference to time, and not output. But whereas National Bonus is an expense which varies directly with the hours worked, overtime and night shift premiums are irregular costs based upon a predetermined series of rates for different days or periods of working—*e.g.*, one-fifth for night shift; one-third for the first two hours after a day shift; full time for Sunday, etc.

Where the budget allowance for any activity or level of output is allowed to be a directly variable with output no volume variance can arise, but if a plan has been formulated to show how and when overtime should be worked in order to increase output and a graph plotted to show the allowed cost at any level, it will be necessary to apply the foregoing formula to the allowances ascertained to adjust them for changes in the efficiency of the direct workers. Both volume and conditions variances may thus arise, the latter being classified in the same manner as those in connection with National Bonus.

Idle Time

If the flow of production has been properly planned in advance, and the purchasing and stores control procedures are satisfactory, it should be unnecessary to budget for idle time. Nevertheless, a certain amount may be experienced in connection with direct labour, and an account should be designated to receive such charges. As no allowance has been set in the budget, and no quantity in hours, or rate of pay, envisaged, the actual cost incurred may be analysed direct to " Expense " variance.

Indirect Materials

Certain indirect materials may be consumed in quantities that vary directly with the volume of output—*e.g.*, moulding sand, grinding wheels, machine tools, etc., and where the quantity and value involved is sufficiently high, it may be worth while to analyse the variances arising between price and quantity, there being, of course, no volume variance. With stores materials or supplies of a general nature—such as belt fasteners, lubricants, cleaning materials, etc.—if a total allowance has been budgeted without disclosing any quantitative details, price variance need not be determined, the variance being, simply, "expense," and the onus is on the foreman to keep, somehow, within the prescribed limit at any degree of activity. Volume variance is, thus, unlikely to arise.

Maintenance

Variance may be considered from two viewpoints in relation to maintenance:—

(1) Where the maintenance is undertaken by personnel attached to, and under the direct control of, the head of a production department, in which case the variances applicable to labour may be ascertained, if required, in addition to price and quantity variance on the spare parts, etc. used.

(2) Or, where it is undertaken by a separate maintenance service department, in which case the charge in relation to the actual hours involved and materials used (in a production department) will be a lump sum, the variance being divided between revisions (if necessary) and "expense." Analysis of labour and materials variances to various other headings would arise in the variance statements of the actual maintenance department.

In either case, maintenance is frequently considered to be an expense varying directly with production department activities, so that volume variance will not arise. But where a detailed routine of regular, preventative maintenance is in operation, this will tend to be a fixed element in the cost, which may be budgeted accordingly. It may then be worth while to graph the allowed expenditure in order to record the authorised allowances at any activity—in which case an element of volume variance would arise.

Fuel

The cost of fuel is sometimes regarded as an expense which should vary directly with the level of departmental output, so that volume variance would not

arise. On the other hand, according to the particular circumstances, a fixed cost for raising to working temperature may be budgeted, so that an element of volume variance would be present under other than budgeted load. Price variance may arise in any case, and be of significance. It may be impossible, however, to state definitely that any other variance represents in value the quantity of fuel used above or below the amount authorised by the budget, so that, once again, a general allocation to the heading " expense " is indicated.

Supervision

Supervision may give rise to volume variance under all headings (calendar, idle facilities, idle time, overtime and efficiency), together with conditions variances in relation to changes in the number of supervisors employed and their rates of pay, some of which might be further analysed to revisions. If the advocated procedure of dealing with the fixed element of this expense in the fixed expense budget is followed, volume variance will not usually arise in the production departments, and it is often satisfactory to analyse all other variance to revisions and " expense ".

Space Heating

When dealing with flexible budgeting in Chapter 18, it was shown that the cost of space heating often varied with the season of the year, and that in order to ascertain the total cost per annum it was necessary to establish the standard consumption for each month, then total their values and, finally, divide by twelve in order to arrive at the standard cost involved each month (Figure 27). Thus, each month, a volume variance would arise measured by the difference between the standard cost for the actual output and the standard allowance in accordance with the time of the year. Some months this would be a loss, while in others a gain would be shown, but at the end of the year the losses and gains would cancel out, and no cumulative volume variance would be shown. While provision should always be made—under all account headings—for the possibility of a revision of the allowance during the life of the budget, price variance may also be significant in regard to space heating and also quantity variance. Often, however, it is sufficient to record all conditions variance under the one heading of " expense."

Non-Productive Output

The budgets for production departments are based upon the budgeted costs of certain volumes of *saleable* output. It sometimes happens, however,

that additional output is undertaken which is not reflected in the actual saleable production of the department concerned and additions to costs under the headings of direct labour, direct materials and direct expense, are incurred. Rectifications and scrap are typical examples of this. Then, again, while the budgeted output may be achieved, and none of the variances so far mentioned may be present, costs may be increased if the work has followed an unauthorised route, or an alternative method of production has been employed. It is desirable to measure the cost of rectifications, scrap, re-routing and alternative methods, and to take the standard cost of rectifications and scrap away from any other variance in which they may be included, and, in the case of re-routing and alternative methods, to determine the difference between the standard cost of the budgeted route or method and the alternatives adopted, and segregate them from any other variance. As the procedure differs in each of these cases, they will be considered separately in greater detail.

Rectifications

Rectification operations are not always undertaken by the departments responsible for the faults and, as the cost involved may be considerable, it penalises the departments which undertake them unless the standard cost is assessed and separated from other variances, so that management may see that it is not due to inefficiencies in the rectifying department.

Where rectification work is a regular feature in the activities of a particular department, the total budgeted cost of the department may be increased by a round percentage addition based upon the average experience of, say, the previous year, as shown in Figure 35. It is important to have a separate document in connection with each rectification job, so that the amount of work involved and its standard cost may be recorded. This is necessary under flexible budgetary control, so that actual costs under each account in a department may be divided between the standard amount due to indirect or rectification output (which is treated as a variance), and the balance applicable to the saleable departmental production. With direct labour, the standard cost of rectifications forms part of the rates of pay variance until separately assessed and segregated. If materials are used in connection with rectifications the cost of them will be included in the direct material quantity variance until separately assessed and recorded, while in regard to direct expenses generally, the " expense " variance includes this cost, as well as all other variances.

When the standard cost of rectifications has been determined in total, it may be apportioned to all account headings according to the ratios they bear to one another in the original budget. This total standard cost of actual

rectifications represents a loss or adverse variance in the department undertaking the work, to be set against the gain arising in connection with the standard allowance, as shown in Figure 35. If the actual standard cost of the rectifications differs from the standard sum allowed, the difference may be expressed as a percentage above or below the standard allowance, and thus made to represent the quantitative improvement or deterioration in performance as well as the value of this. In Figure 35, as both the standard cost of the actual rectifications and the standard allowance are £50, no variance results, and the budget has been met. The other variances shown are truly applicable to the saleable productive efficiency, or otherwise, of the department.

Scrap

The treatment outlined above for rectifications may, with slight modifications, be adopted to deal with scrap. Here, again, the department in which the scrap is located (and which may have completed its own operation) may not be the culpable one, and it is, therefore, important to segregate the cost involved. It was shown in Chapters 11 and 16 that in many cases scrap allowances could not be budgeted with satisfaction in certain production departments, because details of the departmental output could not be predicted. Also, in regard to jobbing work in particular, it was found that products did not necessarily pass through every department so that, once again, the cost involved in departments before the one in which the scrap was located could not always be predetermined. Thus, allowances for scrap could not be included in the budgets of production departments. For these reasons, an overall percentage based upon previous experience was advocated—taking into consideration product assortment—and recorded on the summary statement of all production departments (Chapter 16). As an aid to departmental control, however, the standard cost of actual scrap may be shown in a separate variance column in each department, thus still further improving the variances shown against direct labour (rates of pay), direct materials (quantity) and direct expense (expense). This standard cost is that incurred in the particular department causing the scrap, and does not include the standard cost arising in previous or subsequent departments, which should be shown on the Summary Operating Statement—a statement summarising the costs and variances arising in all production and auxiliary service departments, together with the factory overhead. There it will be placed as a credit below the total of the " expense " column, and as a debit or loss in a corresponding position under the scrap heading, Figure 36. The standard allowance for scrap as a whole may then be computed as a percentage of the total standard cost of production according to the predetermined ratio and,

as there will be no actual cost against this, it will be extended into the scrap column as a profit variance. As with rectifications, the final total of the scrap column then represents the sum by which the standard scrap allowance has been exceeded or reduced and, when stated as a percentage of the total standard scrap allowance, indicates the degree of improvement or otherwise experienced.

Example

Assume two production departments A and B with a factory overhead department C. A scrap allowance of 5% of total budgeted cost in all departments is made. The actual scrap loss, at standard cost, incurred in departments A and B are:—

A, £5.
B, £10.

The standard cost of work done in A contained in the work scrapped in B was £17 so that the total standard value of all scrap is £32.

Figure 36 shows as much of the manufacturing summary as is necessary to demonstrate how the total standard cost of the actual scrap is compared with the standard allowance. As the total scrap allowance is £40 (5% of £800) and the actual scrap is £32, there is a saving or profit variance of £8.

From the individual scrap notes relative to each occurrence, an actual scrap analysis along the lines of that given in Figure 40 (Chapter 24, *post*) may be useful for both control and balancing purposes.

Re-Routing

Re-routing, like rectifications and scrap, is a further breakdown of expense variance in connection with the direct expense section and of rates of pay and quantity in the direct wages and materials sections of the departmental operating results. It arises when a routing other than that allowed for in the production plan or product cost is used, and may affect more than one department. It may, therefore, be most convenient to deal with it on the manufacturing summary. Re-routing variance is the difference between the standard costs of the actual route and the standard route and may be either a profit or a loss. While the effect of re-routing is reflected in the actual costs of production departments, responsibility for its occurrence may lie with the planning or production control department. The sum involved may not warrant the labour of apportionment to all the accounts in the various departments affected, and it is best shown at the foot of the manufacturing summary as a credit in the expense variance column and as a debit in the re-routing one. Its treatment would be similar to that shown for Methods on Figure 35.

Methods

Methods variance is somewhat different from re-routing inasmuch as, although alternative plant is available at differing costs, it may be necessary to use both in order to attain the budgeted output. From a costing or price-fixing point of view, there can be only one recognised standard cost of an operation or process, which may be the dearer or the cheaper of them, or an average based upon the ratio of their employment established in the budget. From a control point of view, however, it may be important to base all variance analyses on the standard cost of the specific plant concerned, so that, if the ratio of plant utilisation is not maintained as set in the budget, a variance, which may be either a loss or gain, results. Typical examples are furnaces for steel making by Electric Arc, Tropenas or Open Hearth methods.

The procedure to adopt is to ascertain the difference between the standard costs of the various plants and the adopted standard cost and, if an increase in cost arises, to credit the sum involved in the expense variance column and debit it to the methods variance column. Alternatively, if a reduction in cost results, the entry would be reversed. The point is illustrated in Figure 35. In view of the fact that budgeted production actually arises in many cases, on a day-to-day basis, it is essential to see that the loading of the alternative plant complies with that set in the budget or, where possible, puts a greater load on the plant which gives the lowest total out-of-pocket cost.

XXIII

Variance Analysis—Conditions—(e) Overheads

Variance Analysis—Conditions—(e) Overheads

HAVING dealt with the types of variance that may be met in connection with direct expense—a major branch of the third main element of cost—we can now consider the variances which may arise in connection with the other branch of expense—*viz.*, Overheads. It was stated in the introduction to labour, material and expense budgets (Chapter 6) that overhead was frequently divided into separate budgets for factory, administration, selling and distribution costs, a further suggestion being that fixed expenses could be taken away from each and segregated in a separate budget.

Factory Overhead

Establishment of an *allowable* expense in relation to the actual output budgeted was seen to be necessary in conjunction with direct expense budgets, in order to form a dividing line between volume and conditions variances. This allowance was the amount of expenditure permitted by the budget in relation to the actual output of the particular production department. In connection with factory overheads, it is again necessary to create this line of demarcation, but the unit of output with which it varies may be at first difficult to determine. There is no unit of overhead output. The total overheads budgeted are determined in relation to the output of the business as a whole, and it is necessary, therefore, when production and sales differ from those budgeted, to ascertain for the business as a whole what the activity actually is. Where a firm produces only one article to a standard pattern, activity may be expressed in terms of the quantity produced or sold and adjustments to the allowed cost of overheads made accordingly. Most firms, however, are of a more complex nature and many articles may be produced which cannot be expressed in terms of a common physical unit of output. There are also the non-standard product and the jobbing producer to be considered. Costing often makes use of direct wages as a measure of departmental output, but certain types of production are not carried out by such labour. There are machining operations or processes where time and, say, chemical reactions

are the governing influences. It is frequently possible to evaluate these in terms of " standard hours," a unit which may equate all productive effort however dissimilar. Use of standard hours as a basis for expressing factory activity, however, has its shortcomings. For instance, the standard hour in the machine shop is more costly than the standard hour for the hand operation. To overcome this, the absorption of overhead in the standard cost of all production from all departments is frequently used as it tends to make allowance for the use of overhead services and facilities in varying degrees.

The general activity of the factory, then, may be expressed in terms of the factory overhead absorbed by the actual production, divided by the factory overhead absorbed in the budgeted load. This gives rise to a factor either more or less than unity, depending on whether output from all departments is above or below the overhead value budgeted. This factor may be converted into a percentage and expressed as activity above or below budget or 100%. Where a maintenance department is responsible for carrying out much of the planned capital development recorded in the capital budget, in addition to its normal maintenance duties, it is important to include in the total of factory overhead absorbed by production the overheads absorbed by such capital work before arriving at the overall factory activity.

With regard to other services which may be budgeted under specific accounts in the factory overhead department, the allowed expense in each case should be based upon the general factory activity, and not the actual activity of the service itself. If this is not followed, the man in charge of a service such as a gas plant could go on producing gas long after the need for it in relation to saleable output had ceased, and his variance might suggest great efficiency in operation, whereas an adverse variance ought to be revealed because of the cost of the excess production.

Once the factory activity has been determined—either as a factor or as a percentage—the standard cost of each item of factory overhead in the budget should be increased or decreased by reference to tables, graphs or multiplication, to arrive at the applicable allowed expenditure. No attempt should be made to establish factory overhead allowed expenditure on the basis of the amount absorbed under each heading by the output of each production department. It should be remembered that apportionment of indirect expenditure to production departments is undertaken for costing purposes *on the most suitable bases available.* As such expenditure is related only indirectly to production, any such apportionment becomes a matter of judgment. The amount of factory overhead under each account heading absorbed by the standard cost of production in the various departments may be quite a different figure from the allowed

expenditure as assessed from the general factory activity, as the following example will show:—

Example

Assume the following simple factory overhead budget totalling £660 in relation to output from two departments of 300 hours, the output and apportionment of overhead to each being:—

	Overhead Budget	Apportionment of Budget	
		Dept. A	Dept. B
	£	£	£
Depreciation	500	100	400
Wages Dept.	100	50	50
Supervision	60	20	40
	£660	£170	£490
Output (hours) ..	300	100	200
Standard Rate per hour		£1·70	£2·45

Now, assume that the total output remained exactly the same but the output of A was 200 hours and of B 100. The standard amount of overhead absorbed in the actual output now becomes £585, as under:—

Department A	200 hours at £1·70	= 340
Department B	100 hours at £2·45	= 245
	300	£585

The actual factory general activity is .. .. .. $\frac{585}{660} \times 100$

88·6%

To determine the allowed expense for each item of factory overhead, the amounts recorded in the budget would be reduced to 88·6% with directly variables and, with semi-variables, graphs or tables would be consulted and the allowance appropriate to 88·6% of the budgeted output of the works adopted. The absorption of overheads in the two departments—£340 in A and £245 in B—could be shown in greater detail by pro-ration according to the budgeted apportionments from which the original costing rates of £1·70 and £2·45 were obtained, and if the absorption by account numbers so obtained were compared with the allowed

expenditure in each case at 88·6% of budgeted output, considerable differences would result, as shown in the following table:—

	Departmental Absorption			Overhead Variance Sheet		
	A	B	Total	Budget	Output	Standard
1	2	3	4	5	6	7
Depreciation ..	200	200	400	500		443
Wages Dept. ..	100	25	125	100	88·6%	89
Supervision ..	40	20	60	60		53
	£340	£245	£585	£660		£585

The allowable overhead expenditure in each case must depend upon the actual volume of output obtained, as represented above by the 88·6% *(column* 7*), and not by an apportionment of overheads "on the most suitable bases," as shown in column* 4.

With so much semi-variable expenditure and, sometimes, fixed expenditure in the factory overhead budget, volume variance may reach considerable dimensions, particularly when there are wide fluctuations from the budgeted output—hence the importance of determining the allowable expenditure. Revision, or non-controllable variance, will usually arise as time goes by and price variance may also be found in conjunction with the usage of stores materials and intangibles such as municipal rates, motor vehicle insurance premiums, etc. All the labour attached to this budget is indirect—much of a staff nature—and quantity and rates variances may, therefore, arise, although in a business of any size operating to a schedule of salaries for different grades and ages in conjunction with sanction in advance of engagement, the latter may not be significant. It is once again suggested that conditions variances may, in many businesses, be recorded under the one general heading of "expense," without appreciable loss of control.

Administrative and Fixed Overhead

In the majority of cases, the entire administrative overhead may be considered as fixed expenses for the short term of the control period, so that each item may be included in the fixed expense budget and an administrative budget dispensed with. In either case, however, volume variance will be of significance, and the importance of determining the allowable expense under

each heading for the actual works output achieved should be emphasised. The many reasons for variance from standard cost met in connection with direct expense budgets and the factory overhead may also be experienced in this section and, again, it is a matter of discretion whether to analyse the conditions variance fully or to treat it as " expense ".

Selling and Distribution Overhead

As with other overheads, volume variance may be a significant feature in the analysis of selling and distribution expense variance. But whereas in connection with factory, administrative and fixed overheads, a *profit* variance results if actual output is more than that budgeted, a *loss* may be experienced in connection with selling expenses, owing to the greater difficulty often met with in obtaining additional sales. On the other hand, when actual sales are below the budgeted level, a volume *loss* usually arises in connection with factory, administrative and fixed overheads, and may also be experienced in selling and distribution owing, partly, to the fixity of some of the items, and also to the greater difficulty and, therefore, greater cost, of inducing sales. As the name implies, sales policy is a " policy " or course of action agreed to be undertaken by a business, and while it may be correct to say in a certain case that selling expenses will increase at a more than directly variable rate—giving rise to a volume loss—in an attempt to obtain a higher level of sales, the amount of selling expenditure may be pinned forcibly at a certain pre-determined level, and much of the expenditure considered as fixed. Discounts, travellers' commission and freight, however, will approximate to directly variables.

As indicated in dealing with the formulation of a selling expense budget, it may be necessary to consider the products separately. It may also be desirable to budget by sales areas or types of outlet, and in all these cases it will be necessary to build up the allowable expenditure from the actual sales by products, or from the various areas or sales channels, before volume variance can be computed. The degree of selling activity above or below the budgeted level is usually expressed in terms of sales turnover although, in connection with distribution costs such as freight and carriage, weight or quantity may be the governing factor. On the other hand, insurances in connection with distribution may vary according to value, so that allowable expenditure within each budget may require to be determined on different " output " bases.

Selling and distribution expenses lend themselves to presentation on one variance statement. Although there may be a separate transport manager, he may be under the control of the sales manager, and there would be nothing inconsistent in adopting such a course. The usual types of expense variance

may be anticipated. In the case of extreme fashion goods, however, owing to the shortness of the budget period, revisions variance and, indeed, price variance may not always arise.

Variance Analysis—The Superficial View

Heads of departments who are rather sceptical of the value of variance analysis as an aid in control may point to what at first seems an anomalous situation. It sometimes happens that when output from a department suddenly increases, adverse variance in total also increases, although if the total actual cost is divided by the output, it would be apparent that the unit cost had decreased and greater efficiency had been obtained. Leaving out the possible incidence of a volume profit variance, this may be so in connection with conditions variances, and give rise to disparagement of the system. For instance, assume production of 100 units, or articles at a standard cost of £100, and an actual cost of £130. If, in the following period, 200 articles are produced at a standard cost of £200, *but an actual cost of* £250, variance has increased from £30 to £50, whereas the actual cost per unit has been reduced from £1·30 to £1·25 each. Conversely, if the budget had been set for production of 200 units and actually 100 were made, leaving out the question of the loss due to volume variance, the foreman might equally well claim credit for an improvement in the efficiency of his department, whereas the unit cost may increase. This is a superficial argument. The reasons for the improvement or deterioration in the performance are not shown by the actual rate per article produced, even if this is recorded against each item of cost. It requires a detailed analysis of variance to show the root cause or causes of the trouble. The value of unit costs should, however, in no way be disparaged.

XXIV

Practical Example of Manufacturing Control

Practical Example of Manufacturing Control

IN the last few chapters, the theory of variance analysis has been expounded. Some of the methods demonstrated of building up the variances from the standard cost to culminate in the actual cost, although mathematically correct, and in a form suitable to show the principles involved, are not very practical in application. This chapter now considers a small, simple business, working to a system of flexible budgetary control, and a more practical layout is adopted in compiling departmental variation statements from the actual results quoted. It should be remembered that budgetary control is a system of control—not of costing. But in view of the need for some form of costing in the business, the forms shown have been designed to facilitate absorption of overheads in production departments, so that costing may be undertaken as economically as possible. No single demonstration of this nature can meet the needs of every case which may arise in practice, but it is suggested that if the will to create a suitable, economical system is present, the basis shown can be modified and adapted to suit most conditions. Much of the enjoyment to be derived from devising and installing systems of budgetary control comes from the fact that a different set of problems has to be considered in each factory and that even when a whole library has been written on budgeting for each industry, the complete answer to all the problems which may arise in a particular case may not be found except by falling back upon principles and adapting them to the needs of the situation.

An example will now be considered in detail under the following main headings:—

1. BUDGETS.
2. STANDARD DETAILS OF THE ACTUAL JOB.
3. ACTUAL PRODUCTION DATA:—
   (a) Output.
   (b) Analysis of actual clock hours
   (c) Costs.
   (d) Budget revisions.

4. INTERMEDIATE CALCULATIONS:—
   (a) Actual clock hours *absorbed.*
   (b) Standard hours in net good production.
   (c) Departmental activities.
   (d) Departmental efficiencies.
   (e) Standard cost of net good production.
   (f) Overhead department activity.
   (g) Allowable expenditure.
   (h) Revised allowable expenditure.

5. INTERMEDIATE DOCUMENTS:—
   (a) Actual Scrap Analysis at standard values.
   (b) Cost recap sheets.

6. FINAL STATEMENTS:—
   (a) Departmental Variation Sheets.
   (b) Summary Operating Statement.

1. *Budgets*

Production Departments. Budget Summaries for departments A and B are shown in Figure 37. The supporting information as to how these figures were compiled, is omitted, but it should be mentioned that the budgeted labour hours have been increased by 20% in each case to arrive at the standard hours in order that the average worker may earn bonus. Costing rates per actual hour, standard hour and per unit of production are given so that the standard value of actual output may be evaluated. This has meant apportioning the overhead budgets (Figure 38) to production departments A and B—a function of costing—and each item has been considered on its own merits and either apportioned on a direct basis, where available, or according to the most suitable means.

Overhead Departments. Separate Budget Summaries are shown in Figure 38 for the Factory and Fixed Overheads. The apportionments to departments A and B are also given although bases are not disclosed.

Summary Operating Budget. In Figure 39 the budgets for departments A and B and the Factory Overheads are summarised. Notice that the totals

for A and B are for direct labour, materials and expenses only and do not include the apportionments of factory overhead as, for control purposes, it is desirable to record the overhead budgeted on this form. A standard allowance of 10% is made at this stage to cover the average scrap experience. As fixed overheads are incurred on a time basis, no allocation is made to the value of goods transferred to finished stock account, the whole amount being a charge against the trading results of the period concerned.

2. *Details of the Actual Job*

The operation times determined in relation to A and B are five and eight hours respectively and, as it is necessary to set standard times which will enable the average worker to earn 20% bonus, the standard hours set are, therefore, 6 and 9·6 in each case.

3. *Actual Production Data*

For the period under review, the following actual results are obtained:—

(a) *Output*

	A	B
Gross	1,500 Units.	1,400 Units.
Scrap	100 Units.	200 Units.
Net Good	1,400 Units.	1,200 Units.

(b) *Analysis of Actual Clock Hours*

	A	B
Overtime	1,200	1,560
Calendar	400	640
Idle Time	-300	-200
Normal (Budget) ..	5,000	8,000
	6,300	10,000

(c) *Costs*

	A	B	Overheads	
			Factory	Fixed
	£	£	£	£
Direct Labour	470	1,300		
Direct Material ..	700	294		
Direct Expense:—				
Indirect Material ..	140	—		
Supervision	90	100		
Overtime Premium ..	55	110		
Idle Time	18	14		
Labourers	—	375		
Factory Overheads:—				
Wages Dept. ..			150	
Clerical			127	
Maintenance ..			280	
W.C. Insurance ..			120	
Storekeepers ..			170	
Fixed Overheads:—				
Salaries				560
Insurances				96
Depreciation ..				225

(d) *Budget Revisions*

Since the budgets were originally compiled, certain costs have altered and budget revisions have been made as under:—

Direct Labour. The rates in the budgets (Figure 37) per standard hour were A, £·050 and B, £·100. These have been increased to A, £·054 and B, £·108. The original and revised rates are both used in the calculations on the departmental variation sheets (Figures 45 and 46) and are shown in columns E and F.

Direct Materials. Although the costs of certain direct materials have increased as shown below, they are considered to be due to bad buying policy and no budget revisions have in consequence been made.

	A	B
Material 1–32 ..	20% increase.	—
Material 2–41 ..	13% increase.	—
Material 3–51 ..	10% increase.	10% increase.
Material 1–31 ..	—	18% increase.

Direct Expense. The prices of indirect materials used in department A have increased by 50%.

Factory Overheads. The rate for W.C. Insurance has increased by 20% and is assumed to be entirely applicable to production department B and results in, approximately, a 4% increase in the absorption of factory overhead in that department. Although the budget allowance for depreciation has been decreased from £250 to £225—giving rise to a revision factor of ·9 in column E of the fixed overhead variation sheet (Figure 47)—this revision has not been passed on in the apportionments to the production departments.

4. *Intermediate Calculations*

From the information already given, the following calculations have now to be made:—

(a) *Actual Clock Hours Absorbed*

Although the actual hours clocked by the workers have been given as 6,300 and 10,000 in A and B respectively, this is not the same as the absorption of clock hours in the net good output and the latter are required in order to facilitate analysis of the volume variance. The actual clock hours absorbed in each case are:—

Dept. A	Dept. B
1,400 Units × 5 hours.	1,200 Units × 8 hours.
= 7,000	= 9,600

(b) *Standard Hours in Net Good Production*

Dept. A	Dept. B
1,400 Units × 6 hours.	1,200 Units × 9·6 hours.
= 8,400	= 11,520

(c) *Departmental Activities*

The output from departments A and B is measured in terms of the standard hours produced in the net good output as shown under (b) above. To gain an idea as to how busy the departments are, these quantities are compared with the standard hours budgeted and expressed as a percentage above or below the normal level budgeted. Activities of the two production departments are thus:—

Dept. A	Dept. B
$\frac{8,400}{6,000} \times 100 = 140\%$.	$\frac{11,520}{9,600} \times 100 = 120\%$.

They are recorded at the top of the Departmental Variation Sheets (Figures 45 and 46).

(d) *Departmental Efficiencies*

The efficiency of the production departments is also recorded at the head of the departmental variation sheets and is measured by dividing the standard hours produced in the net good output by the actual hours clocked by the workers. Bearing in mind that budgeted clock hours have been increased by 20% to arrive at the budgeted or normal output in standard hours, an efficiency of *at least* 120% should be looked for and if anything less than this percentage actually arises, the matter should be seriously investigated and ACTION taken to eliminate inefficiency in the future. Efficiencies of the two production departments are:—

Dept. A

$$\frac{8,400}{6,300} \times 100 = 133{\cdot}3\%.$$

Dept. B

$$\frac{11,520}{10,000} \times 100 = 115\%.$$

Some idea of the cause of the inefficiency in B may be deduced from the fact that one-seventh of the gross output has been scrapped. In A, scrap represents only one-fifteenth and, in both cases, one-tenth has been budgeted.

(e) *Standard Cost of Net Good Production*

This is sometimes known as the amount " Cleared-in-Cost " and is shown in column G of the Departmental Variation Sheets (Figures 45 and 46) in total with sub-totals for direct labour, material and expense and factory and fixed overheads. It is the product of the standard hours produced and the budgeted cost per standard hour, thus:—

Dept. A

1,400 × £1·440 = £2,016

Dept. B

1,200 × £2·640 = £3,168

The cleared-in-cost for factory and fixed overheads shown in Figures 45 and 46 is a memoranda only so that analyses of volume variance may be shown, the appropriate totals, for both departments, being recorded as part of the system of budgetary control in column C of the Overhead Variation Sheet (Figure 47).

	Factory Overhead. £	Fixed Overhead. £	Total. £
Dept. A (Figure 45) ..	294	420	
Dept. B (Figure 46) ..	461	691	
Total per column C (Figure 47)	£755	£1,111	£1,866

(f) *Overhead Department Activity*

The activity of the overhead department is an expression of the overall factory activity and is measured by comparing the total variable overhead cleared-in-cost (£755, column C, Figure 47) with the total factory overhead budgeted (£594, Figure 38). Both are recorded at the top of the Overhead Variation Sheet (Figure 47) together with the resulting factory activity of 127%.

(g) *Allowed Expenditure*

In the case of directly variable expenditure (direct labour and materials and indirect materials in department A; direct labour and materials and labourers in department B) the allowable expenditure is the amount of each cleared-in-cost (columns G and L, Figures 45 and 46). This, of course, may be proved by increasing the amounts budgeted (Figure 37) by the activity percentages as under:—

	Dept. A			Dept. B		
	Budget Allowance (Fig. 37)	Activity (Fig. 45)	Allowable Expense (Col. L, Fig. 45)	Budget Allowance (Fig. 37)	Activity (Fig. 46)	Allowable Expense (Col. L, Fig. 46)
	£	%	£	£	%	£
Direct Labour	300		420	960		1,152
Direct Material	450	140	630	240	120	288
Indirect Material	90		126	—		—
Labourers	—		—	288		346

In connection with Supervision, Overtime Premium and the factory overheads which are marked " S-V " for " semi-variable " in the budgets, the standard allowance relative to each would usually be ascertained from tables or graphs relative to each department, as explained in the chapter on direct expense variance, but these have been omitted from the illustration. The standard allowance in the case of fixed expenditure is the same at any degree of activity as the normal amount budgeted (Figure 38). The standard allowances for semi-variable expenses in A and B are shown in Col. L of the Departmental

Variation Sheets while those for factory overheads and for fixed overheads are given in Column D of the Overhead Variation Sheet (Figure 47).

(h) *Revised Allowable Expenditure*

Direct Labour. Owing to changes in conditions since the budgets were set, which management consider are not controllable within the organisation, modifications are now necessary to the allowed expenditure. They are introduced, in the case of direct labour, by the application of revised rates per standard hour (Col. F, Figures 45 and 46) to the standard hours produced (Col. B), the products being recorded in columns H and N. These revised rates would be calculated in a Revision Log Book and may be due to alterations in rates of pay or to changes in production methods giving rise to alterations in the standard hours. In the latter case, however, the standard hours shown in the budget are not altered but the rate applied to them is adjusted. Sometimes a revision may be due to a combination of both circumstances and it should be recognised that the basic and revised rates shown in Columns E and F do not necessarily coincide with the rate payable to the workers involved.

Direct Material. In the case of direct material, a revision may be necessary because of a change in price or quantity and the amount involved is ascertained, in the first place, in relation to the amount required to meet the budgeted quantity of output. A new standard in price and quantity having been determined, it is divided by the original standard to arrive at the revision factor to be applied in Column M of the departmental variation sheets (Figures 45 and 46). Column F on these forms—used in connection with direct labour revisions—is not required for direct materials or direct expense.

Direct Expense. The procedure adopted in regard to direct expense is similar in all respects to that for direct material.

Overheads. The procedure for overheads is also similar to that for direct materials and expenses, the revision factors being applied in Column E of Figure 47 to give the revised allowance in Column F. With regard to the apportionment of overheads to production departments, it is necessary to re-apportion a revised item of overhead either direct or according to the most suitable basis available and to express the total overheads apportioned as a factor to the original amount. Thus, although W.C. Insurance in the factory overhead budget has been increased by 20%, the effect on the allocation to department B is only a 4% increase. Notice that although the depreciation has been reduced by 10% (a factor of ·9 in Col. E, Figure 47), as a matter of policy, no revision has been made to the allocation to production departments so that the output still absorbs the full amount originally budgeted.

5. *Intermediate Documents*

(a) *Actual Scrap Analysis at Standard Value*

From the individual scrap notes relative to each case, an Actual Scrap Summary (Figure 40) is prepared. In the illustration, as only one product is involved, the calculations are shown on this summary. Where there are more than one job or product, however, it would be necessary to effect them on the individual scrap notes and simply summarise them on Form 40. At inspection, after operation A, the standard value of the scrap involved is the standard value of the quantity lost in that operation and where work is scrapped before the operation has been completed an estimate of the degree of work carried out is recorded—*e.g.*, three-quarters, half or a quarter. When output is inspected after the operation in department B, however, besides the actual loss at standard cost involved in B (and calculated as for A) an addition must be made for the total standard cost per unit involved in A which is now lost. The standard hours per unit in column E are taken from the budgets for A and B (Figure 37) in this case but where more than one product is involved, they would be ascertained by reference to the standard unit product cost for each.

The lower section of this form shows how the total standard cost of the actual scrap is apportioned between the " culpable " department in which it was caused and the overhead department. Dealing with department A, as this is the first operation, no prior department can be held responsible for the scrap detected at this stage so that the full *direct* cost of the standard hours involved (420) is chargeable at the budgeted direct costing rate of £·155 while the factory overheads lost are ascertained by application of the budgeted rate of £·035 and recorded on the Summary Operating Statement. The thorny subject of scrap was considered in detail in Chapter 11 and in view of the difficulties in establishing budget allowances comprising more than the direct cost lost in the culpable department, the above procedure was advocated. In the illustration under consideration, however, departmental allowances for scrap have not been set but an overall allowance made on the summary operating budget, Figure 39. Turning to the scrap detected after operation B, that department must be charged with the direct cost applicable to the 152 units involved—*viz.*, 1,459 standard hours at £·175 and the summary operating statement will bear the cost of a similar number of standard hours at the factory overhead rate of £·040. From column C of the top section of this form, it is apparent that 200 units were scrapped after B so that the whole standard cost in department A of 200 units must be established, the direct cost of which, at £·930 each, and the factory overhead cost, at £·210 each, being chargeable to the summary operating statement.

Reference to the totals at the foot of each column in the bottom half of Figure 40 shows the total standard cost of the actual scrap chargeable to A and B and the summary operating statement, *viz.*:—

	£
Dept. A (Scrap Variance, Col. Y, Figure 45)	— 65
Dept. B (Scrap Variance, Col. Y, Figure 46)	— 257
Summary Operating Statement (Scrap Variance Column)	— 300
	£ — 622

It should be noted that fixed overheads are not absorbed by the standard cost of scrap, because these are incurred on a time basis and not in relation to volume of output. The apportionment of actual scrap cost in each department to direct labour, material and expense, in total may be on an arbitrary basis—also the breakdown to particular expense accounts—as, often, the benefit derived would not warrant the labour involved in a more accurate assessment.

(b) *Cost Recap Sheets*

While the departmental variation sheets will show the actual cost arising under each account as one sum, the total amount in each case may be derived from a number of different sources in the financial books of the business. For instance, material may have been withdrawn from store by means of a stores requisition. On the other hand, it could also have been sent direct to the production department on receipt from the supplier without passing through the store (a practice to be reduced to a minimum, however) in which case the originating entry for value might be in the purchase journal itself. Two further circumstances may also be considered. If a messenger is sent round to the supplier to take delivery, he *could* pay cash for the stores sent direct to the production department, and the information as to value could then come from the petty cash book. Finally, if the materials did not pass through the stores and no invoice had been received, the value would be assessed and charged from a schedule of provisions.

If budgetary control is treated as a subsidiary to costing, the charge to any department under a particular account heading will have been determined in total already, and is available for use in budgetary control. But this may involve delay in presenting the information, and an analysis of all expenditure by accounts and departments suitable for budgetary control is advocated at the

originating source. Thus, a schedule would be prepared in connection with each of the following:—

(1) Stores (Requisitions).
(2) Purchases.
(3) Wages.
(4) Salaries.
(5) Other cash payments.
(6) Petty Cash.
(7) Provisions—*i.e.*, adjustments for depreciation, accrued charges and payments in advance.

Where there are charges to production departments from auxiliary service departments such as maintenance, power, transport, these, too, may be the subject of schedules showing which accounts are to be charged, the departments concerned and the standard cost involved. A summary form is then needed on which to collect all charges from all sources in each department, and this is known as a recapitulation sheet or, simply, a Cost Recap Sheet. It should be noted that this does not imply additional labour. The recap sheet for budgetary control virtually replaces the collection of items into cost accounts, and by working direct from the fundamental accounting documents the need for preparation of financial accounts at frequent intervals is dispensed with, because they have been integrated with the figures presented by budgetary control.

Figures 41 to 43 show the recap sheets relative to the production and overhead departments adopted in this exercise. Notice that materials are priced out from stores at standard prices in Column B and that an actual cost factor is applied in Column C in accordance with the data given to arrive at the actual costs in Column D. The factors used would be ascertained from the various group stock control accounts discussed in Chapter 21 and shown in Figure 32. The form builds up, horizontally, to the actual cost at standard, and actual in Columns K and L against each account heading, and both of these are recorded on the departmental variation sheet. When each column is totalled vertically downwards, the whole form can be proved to be mathematically balanced and the total line at the foot may then be transferred to a summary recap sheet for all departments (Figure 44) which, again, may be totalled down and the grand totals under each column agreed with the sums recorded on the schedules compiled from the fundamental sources, ensuring proper integration with the financial accounts.

6. *Final Statements*

Departmental Variation Sheets—Production

Figures 45 and 46 show the variation sheets in connection with departments A and B. An attempt has been made to record on one form standard and actual costs and variance analysis relative to direct labour, material and expense, together with the absorption of factory and fixed overheads. In practice, it may be found advantageous to segregate the details of materials on a separate form, bringing in only the total on to the variation sheet. Notice that a horizontal analysis is employed, the variance analysis being determined with the aid of the code letters at the head of each column. As far as budgetary control alone is concerned, the form may terminate halfway down the page—at the total direct cost line—but by doing so, the detailed analysis of volume variance in connection with the fixed overheads would have to be the subject of a second sheet and would, as a result, lose much of its significance to the head of the production department In this connection, a quick check on the volume variance *in total* may be applied by use of the formula given in Chapter 19, page 177.

In columns O^1 and O^2, the actual cost at standard and at actual prices are shown. These are taken from the recap sheets (Figures 41 and 42), the difference between the two being price variance as shown in column X. By using standard material prices, the actual cost (at standard) is comparable for price with the budget allowance, and any difference between the two represents a quantitative difference from the amount allowed by the budget. This quantity is, of course, measured in terms of money, and is recorded in column W—Quantity and column Y—Scrap. An additional column may sometimes be needed for rectifications.

In connection with supervision and overtime bonus, which are marked "S.V." for semi-variable, the allowed expenditure relative to the production activity would usually be obtained from tables or graphs, as explained in the chapter on direct expense variance, but these have been omitted from the illustration. The revisions variance in column R is the difference between the allowed expense at standard and the revised allowable expense (columns L and N).

The departmental variation sheet as shown is the property of the cost department. It may either be produced to the head of the department to which it refers, or extracts may be typed for his information. If the latter course is adopted, it will be unnecessary to reproduce all the columns, many of which are of concern only to the cost clerk in arriving at the variances. Sometimes

the foreman is simply given details of those variances termed controllable and for which he is considered responsible. This is a mistake, however, for he does not then grasp the fact that despite his best efforts there may be external circumstances working against him, *e.g.*, price increases, revisions and volume, which affect the total cost of the output of his department. It does not pay, in the long run, to limit his view. He is, after all, working for the best results of the business *as a whole*, not merely to present himself in the best light.

Overhead Variation Sheet

There is no reason why factory overhead and those fixed overheads arising in connection with the factory and administration should not be included on one form if space permits. It is desirable, however, to keep the fixed selling and distribution expenses on a separate statement or include them on the selling and distribution variation sheet.

As the variance for scrap comprises the standard cost of scrap in all departments other than that in which the scrap arises, it is impracticable to apportion the variance to the many overhead accounts owing to the immense amount of labour involved, and because the total value includes apportionments to direct labour, material and other account headings which are not catered for in the overhead department. It will be seen that the only variance to be shown in detail is the total to be controlled by the various officials responsible for the individual accounts in the budget.

Turning now to the problem of over or under absorption of overheads by the net good production, the *standard* fixed expense of £1,111 has been absorbed by A and B, so that there is *over*-absorption to the extent of the total variance shown on the Overhead Variation Sheet—Figure 47. With regard to the variable overhead, however, *revised* standard expense to the extent of £773 has been absorbed by A and B, and there is *under* absorption amounting to £74. This comprises the total variance on the variable section of the Overhead Variation Sheet, less £18 due to the allowance for Workmen's Compensation Insurance being revised in both the overhead and B departments. Notice, however, that although the total revision is £20, only £18 appears on the statement for B department (Figure 46), owing to rounding off the factor due to the apportionment at 1·04. This sort of difference often creeps in where ratios are rounded off, but since it is so small it should not affect the departmental costing rate used for estimating purposes (a figure which, itself, is frequently rounded off and may allow sufficient margin to cover such differences).

In view of the stability afforded by hours as a basis for expense absorption, together with the fact that volume variance is a profit or loss applicable to the particular period under review, over or under absorption may be expressed as:—

(1) Total controllable variance on the Overhead Department Variation Sheet,

plus or minus

(2) The difference between revisions variance on the Overhead Variation Sheet and the absorption of this on the variation sheets of production departments.

For the example under review, the position is as shown in Figure 48, although, in practice, it should be quite unnecessary to make any special record. It may happen that a controllable variance arises in the overhead department of a more-or-less long-standing nature, and the desirability of creating a revision in the production departments to which the item was originally apportioned should be considered, so that cost estimating may be as accurate as possible. Revision in the overhead budget may be undesirable, however, as it might lead to loss of control.

Summary Operating Statement

The Summary Operating Statement (Figure 49) serves a two-fold purpose. Firstly, it summarises the operating results of all departments for the benefit of higher management, who are shown the activity of each department, together with the standard and actual costs and the total value of each type of variance. Where a department appears from this to be making satisfactory progress, no further action may be called for, but the managing director may ask for the departmental variation sheets relative to those departments where the variance analysis in total shows a marked difference from standard, and pursue the matter in detail. Where departmental outputs fluctuate, inclusion of the ratios of actual cost to standard cost may give a quick indication as to the actual trend of expenditure.

In the second place, the summary operating statement is the starting point from which the true actual cost of the business is determined and apportionments made between cost of sales and stock values. It summarises the total costs charged to all departments *for control purposes* and, as already explained, may give rise to certain duplications and, therefore, overstatement of the true actual costs involved. The amounts recorded against A and B departments are the direct costs only, and do not include the absorptions of overhead. As the total of the overhead departments is shown, however, on the summary

operating statement (Figure 49), the correct actual cost in total is given. But in practice, where auxiliary services are controlled as separate departments with their own budgets and variation statements, and not simply included in the overhead budget, besides showing the total costs and variances applicable to the actual service departments, the standard costs of such services may be charged to the user departments, and feature as actual costs in the direct expense budgets of production departments. Thus, such service costs may be included twice in the results given on the summary operating statement, and it is necessary to deduct the allocations to users to reveal the correct total expenditure.

A 10% allowance for average scrap was made on the summary operating budget (Figure 39), and it is now necessary to calculate the allowance applicable to the actual standard cost of production. This is £407, and extended as a " potential " scrap profit variance. The word potential is used because against it will be set the standard cost of the actual scrap, amounting to an adverse variance of £622 (some of which has already been recorded against departments A and B), the two together resulting in a net adverse variance of £215, which is 53% higher than the allowance budgeted. Reference to the individual scrap notes would show the reasons for the scrap and the particular products where the experience was abnormally heavy, and action should be taken on the strength of these documents immediately the scrap arises, without waiting to ascertain the extent of the loss in value. Although it may be convenient to budget for a round percentage of scrap in relation to total output, differential percentages may be applied, based upon actual experience to particular products, or jobs where the contract is long or a repeat order likely.

The bottom half of the summary operating statement may be a cumulative summary month by month building up to the annual manufacturing account, if required, as shown in Figure 49. It would also agree with the control accounts, if these were prepared as a check on the accuracy of the clerks responsible for establishing departmental results.

XXV

Variance Analysis—(f) Profits

Variance Analysis—(f) Profits

PROFITS are the difference between the actual cost of the goods sold and the selling price obtained. In a business, therefore, where sales and all other functions are budgeted, there should be a constant margin between the two in connection with each product. This is the standard profit margin. It is usually only by chance that the actual sales for a period and those budgeted coincide, so that variation from the standard profit budgeted usually arises. This may be due to:—

(1) Variations from the standard cost of total sales.
(2) Variations from the total standard or budgeted sales.
(3) Variations from the standard selling prices.
(4) Combinations of 1, 2 and 3.

In the same way as variations from the standard cost of production were analysed by reasons, so variations from the standard profit may be ascertained in detail and may be of benefit in controlling a business. The principal reasons for profits variance are:—

1. Changes in Profit Margins.
2. Changes in Sales Volume.
3. Price Mark-up or down.
4. Changes in Variety or Assortment.
5. Changes in Selling Expense.
6. Abnormal Expenses.

1. *Profit Margins*

Volume variance arising in connection with production having been charged in full to the current profit and loss account, the remaining variances may be apportionable between the standard cost of sales, stocks and capital schemes undertaken. Where actual costs are used, the standard costs plus conditions variances may be added together and the actual costs per standard hour as determined on the departmental variation sheets (column ZZ, Figures 45 and 46) applied to the standard times allowed in such departments relative to

specific products or capital projects in order to arrive at their actual costs. Alternatively, where standard costing is employed, it may be necessary to apply variance factors to the standard product costs to build them up to actual cost, and these may be ascertained on the departmental variation sheets (column ZZ) in place of the actual costs per standard hour shown in Figures 45 and 46, care being taken to quote a factor uninfluenced by volume variance. As a further alternative, the " standard cost " of the product or capital development scheme may have been based upon current actual costs (and is therefore not strictly a standard cost), in which case the value of stocks or capital schemes would be determined by reference to such standard product costs, the balance of total cost being treated as cost of sales. Such a method, however, does not lend itself to a final, detailed analysis of profit or loss in as much detail as when real standard costs are used. It is desirable to employ variance factors or actual costs built up from the cumulative experience of at least the most recent three periods, and they are best determined on a separate statistical document.

This valuation of stocks, capital projects, etc., is essentially a matter of costing, but it is not possible to complete a fully comprehensive system of budgetary control without it. It is important, therefore, to ensure that the systems of costing and budgetary control are such that the maximum advantage may be obtained from both with the minimum of clerical effort. An example of the distribution of total production cost between stocks, development schemes and cost of sales is shown in Figure 50. To complete the system of budgetary control, it is necessary to show the standard cost of the goods sold, with the increased or decreased cost due to variance recorded separately. Planned profits will be either decreased or increased to the extent of the latter, and such a variance in the standard profit margin is known as a *Profit Margin Variance.*

2. *Sales Volume*

If the actual volume of sales is greater or less than that budgeted, it follows that the standard profit margin will also undergo a proportional expansion or contraction. By comparing the standard profit under such circumstances with that budgeted, a variance due to the changed *Volume* of sales arises. It is important to notice that this volume variance is due simply to expansion or contraction of sales quantity measured in terms of standard cost, and is not connected with absorption of fixed expense. It may arise where actual sales are compared with a fixed budget. Under flexible budgetary control, the standard cost of the actual sales achieved becomes the sales budget for the particular control period, and no volume variance of this nature can arise.

3. *Price Mark-Up or Mark-Down*

Sometimes it may be necessary to reduce the price of certain goods in order to dispose of them. This naturally reduces the standard profit margin, the extent of which may be measured by multiplying the quantity of articles sold by the difference between the standard and actual selling prices. Such a loss of profits or adverse profit variance is termed a *Price Mark-Down*. Where goods are sold above the standard selling price, conversely, a *Price Mark-Up* variance occurs.

4. *Variety or Assortment*

It frequently happens that a business markets several products at the same time, each with its own particular standard profit margin. In setting the sales budget, it was explained how the quantity of each product should be adjusted so that the maximum profit would be obtained for the business as a whole. In putting the sales policy into operation, the sales manager would then strive to accept orders for each product in the budgeted ratio, and in businesses manufacturing for stock the various products would be produced in the desired ratio. In either case, however, if the actual ratio of sales—in terms of quantity—differed from the standard, the budgeted profit would be modified either by an increase or a decrease despite the fact that, in total, sales turnover might be at the level budgeted. Variations in profits for this reason are due to variations in the budgeted *Variety or Assortment* of product sales.

Example

Assume a sales budget for £900 divided between three products A, B and C each with a differing standard profit margin. Actual sales are £1,200. Determine the Variety variance from the following information:—

Product	Budgeted Sales	Standard Profit Margin	Actual Sales
	£		£
A	300	10%	800
B	150	20%	100
C	450	5%	300
	£900		£1,200

	Total	A	B	C
	£	£	£	£
1. Budgeted Sales	900	300	150	450
2. Actual Sales in total with assortment in ratio to budget	1,200	400	200	600
3. Actual Sales with actual assortment	1,200	800	100	300
4. Difference in Assortment (2—3)	—	400	—100	—300
5. Standard Profit Margins		10%	20%	5%
6. Variety Variance (4 × 5) £	5	40	—20	—15

The answer is £5 additional profit due to change in the variety. While this is a useful theoretical figure which may be produced at the close of a control period, the principle of obtaining the maximum profitability would be applied, in practice, every day and to every customer's order before acceptance. In jobbing work and those industries where a detailed sales budget cannot be prepared in advance, this is particularly important, and may be achieved by comparing the " contribution " made by each order in the same time towards fixed expenditure and profits. It is, in other words, the difference between the variable or out-of-pocket costs of various products, jobs or orders, reduced to a cost per hour and the respective selling prices expressed as a rate of revenue per hour. Where orders available and plant capacity are unlimited, the object is to accept, first, those orders which give the greatest contribution, thereby determining the most profitable assortment or variety.

5. *Selling Expense*

The vagaries of selling and distribution expenses at varying levels of sales have already been considered, and it was found that besides the possibility of conditions variances arising, volume variance could also appear. Where a fixed sales budget is in operation, the standard cost of selling and distribution may undergo increase or decrease in accordance with fluctuations in actual sales giving rise to volume variance of a similar nature to that encountered in connection with sales. At the same time, however, volume variance may also arise due to the over- or under-absorption of fixed and semi-fixed expenses. The fact that a disproportionately greater amount of inducement may be

necessary to secure even a modest increase in sales above the level budgeted may, in addition, cause a volume loss variance when the expenses are increased at a rate that is more than directly variable with the increase in sales value.

As these expenses are not included on the manufacturing summary or summary operating statement, they will be recorded on the trading and profit and loss statement, and variation from the standard amount budgeted—from whatever cause—will increase or decrease the standard profit margin by a similar amount. (The entire actual expense is written off each period to trading and profit and loss account without apportionment to finished stock.)

6. *Abnormal Expenditure*

However carefully all functions of a business are budgeted, unforeseen expenditure may arise uncontrollable by the officials responsible for departmental budgets and of a nature which renders it even unsuitable for charging to them. Sometimes a round figure allowance is made on the profit and loss statement to cover for such contingencies. This gives rise to difficulty in costing, however. Every item of expense budgeted—including an allowance for contingencies—should be apportioned to costing centres for inclusion in the costing rates upon which the pricing policy may depend. But how can an apportionment of an allowance be made which, ultimately, may turn out to be offset by a loss through, say, fire not covered by insurance, or a drop in the value of investments, owing to the liquidation of one of the Companies in which shares were held? Is it reasonable, too, to expect the customer to pay for imprudence in not insuring sufficiently or investing unwisely? It is contended that allowances to cover for such remote contingencies should not be made in the budgets, and this is in line with the principles of costing by which such expenses, as they arise, are specifically excluded from cost by transfer to the profit and loss account direct. The incidence of such abnormal expenses or gains will decrease or increase the standard profit margin by the actual sums involved, which may be considered as *Abnormal Expense* variances. Volume variance (production) may also be included in this category.

Ascertainment of Profit Variances

Example

The following example is designed to show the principles on which calculation of profit variance depend. A simple case is first taken and subsequently elaborated to give an idea of a practical treatment that may be developed in

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businesses marketing more than one product or product group through various distinct areas and separate selling outlets.

Data	Units	£
1. Budgeted total sales at standard prices	50,000	120,000
2. Actual total sales in standard variety at standard prices ..	60,000	144,000
3. Actual total sales at actual variety and standard prices	60,000	142,500
4. Actual total sales at actual variety and actual prices	60,000	150,000
5. Standard cost of budgeted sales		99,500
6. Standard cost of actual sales		115,500
7. Actual cost of actual sales		127,050
8. Budgeted expense of budgeted sales		1,750
9. Standard expense of actual sales		1,875
10. Actual expense of actual sales		2,000

Analysis of Profit Variance:—	Fixed Budget		Flexible Budget	
Sales	£	£	£	£
1–2 Volume (increase) ..	24,000		—	
2–3 Variety	−1,500		−1,500	
3–4 Price Mark-Up ..	7,500		7,500	
		30,000		6,000
Cost of Sales				
5–6 Volume (sales increase)	−16,000		—	
6–7 Profit Margin (conditions)	−11,550		−11,550	
		−27,550		−11,550
Expense				
8–9 Volume (sales increase)	−125		—	
9–10 Expense (conditions and volume)	−125		−125	
		−250		−125
		2,200		−5,675
Abnormal				
Total Profit Variances	£		£	

Notice that the above statement is incomplete, owing to lack of information concerning volume variance and other " abnormal " expenses. Notice, also, that sales volume variance is a profit of £24,000 and cost of sales and selling expense, undergoing a proportionate increase, give rise to volume losses of £16,000 and £125 respectively, and that whereas the actual profit achieved—so far as ascertainable—is £2,200 *greater* than that originally budgeted, it is £5,675 *less* than it should have been for the actual level of sales obtained. This is made clear in the following comparison:—

	Fixed Budget	Flexible Budget	Actual Position
	£	£	£
Sales	120,000	144,000	150,000
Less Cost of Sales	99,500	115,500	127,050
	20,500	28,500	22,950
Less Selling Expense	1,750	1,875	2,000
	18,750	26,625	20,950
Profit variances	2,200	—5,675	—
Actual Net Profit	£20,950	£20,950	£20,950

In Figure 51, the data used in the foregoing illustration is expanded to show the results of the wholesale, chain store and export sales outlets, and it may be found necessary at this stage to determine the actual sales value at *standard* ratios and standard cost (line 2) by an apportionment of the total sales value (£144,000, line 2) on the basis of the original sales value budgeted (line 1). From the information ascertained in this figure, the analysis of profit variance by reasons and selling outlets (Figure 52) is obtained. While a statement along these lines, however, together with a very detailed analysis of sales—by products, product groups, selling areas, outlets, etc.—may be of great use to the sales director, a trading and profit and loss statement showing standard and actual sales with the standard cost of sales and all variances by reasons arriving, finally, at the net profit, may be of greater general interest to management as a whole. Using the information given in the preceding illustration, Figure 53 has been prepared to give an idea of a type of layout that may be used. This is worked in total only for the period under review, but the form is designed to show at the same time the cumulative results to

date agreeing with the financial accounts. Notice the provision for use of ratios or percentage figures to give further significance to the variances. Such a document would be presented to the very highest level of management, together with the summary operating statement, and if further detail were required it could be obtained from the departmental variance statements, the detailed sales analysis and the detailed profit variance statements.

XXVI

Control of Stocks, Purchases and Creditors; Debtors; Cash and the Balance Sheet

Control of Stocks, Purchases and Creditors; Debtors; Cash and the Balance Sheet

CONTROL over stocks, purchases, creditors, debtors, cash and the final balance sheet is exercised by means of statistical ratios rather than by analysis of variance by reasons, and is a method that may also be applied with advantage, to the costs of manufacture, selling and distribution, in addition to analysis by variance, if required.

Stocks, Purchases and Creditors

Stocks, purchases and outstanding balances due to creditors are so clearly related that it is desirable to consider them all together. From earlier chapters it will have been noted that budgets have been established for each of these functions, so co-ordinated as to give the most satisfactory position in total in the light of the information obtainable at the time. Although these and other budgets may be a good guide in the management of a business, no opportunity should be missed of improving on the standard performances indicated, however. This is particularly so with regard to sales, an increase of which may have profound effects on most of the other budgets. If the sales budget has been beaten, there is little to be gained by comparing with the original amounts budgeted stocks and outstanding balances due to creditors or due from debtors. As a result, control is exercised after consideration of the actual ratios of certain expenses or balances to standard ratios established, although this does not preclude direct comparison of amounts where it may be done effectively.

Where production tends to be an even flow throughout the year and sales tend to behave similarly, stocks may be maintained at a more-or-less constant level, and purchases expressed as a percentage to stock value or total budgeted production cost. There may be a noticeable time lag, however, since production in this period may be related to purchases made two or three periods earlier. If in any period this ratio is exceeded, overbuying may be the cause,

and if the ratio decreases, stocks may have been depleted. Other reasons may also be given for such changes, however, and there is no certainty in such control, which simply indicates possibilities. This uncertainty may be aggravated where stocks are maintained on the maximum/minimum basis, the ratios varying between two quite different authorised limits. If demand is seasonal, so that stocks have to be built up at certain periods and buying must be initiated in accordance with such forward output, ratios of purchases to actual stock balances on hand or the actual cost of production in the current period give a false impression of the buying efficiency. It should also be remembered that many businesses will have large sized capital development budgets to buy materials against, so that the purchases in a particular period may be out of all proportion to the current production cost.

Control of purchasing is best initiated through the system of stores control in use. Where production is carried out in accordance with programmes, the production control or planning department may indicate to the buyer what quantities and qualities of material are required, after considering the " free " balances already in stock. On the other hand, where materials and stores are maintained on the maximum/minimum basis, the onus is on the storekeeper to inform the buyer when items have reached the minimum levels, and the buyer should then order in accordance with the standard ordering quantities established. There can be no really accurate and effective control over buying or stocks deduced from the actual results of other functions arising in the same period. The importance of the perpetual inventory system of stock control cannot, therefore, be over-emphasised.

If proper control of purchasing is maintained by means of the perpetual inventory system, a commitments position may be drawn up along the lines of the Purchase Budget shown in Figure 20—provided all purchase orders placed are properly priced—and the contingent liability for goods ordered but not yet received may be found to vary in relation to the value of the forward production programmes.

Close control over the portion of purchases which has actually been received and invoiced may be exercised through detailed analysis of the items appearing in the purchase journal for the current period. Each entry may be coded with the appropriate account number or stores reference and a summary compiled by suitable material groups—reconciling with the total sum shown in the journal—showing the standard and actual values of each, the difference or price variance, being extended into further columns according to whether it is controllable within the business—*i.e.*, because of hasty buying without obtaining competitive tenders—or whether it is non-controllable or due to

external causes such as alterations in controlled prices, etc. Such a statement, although linking up with a book of prime entry from the accounting point of view, would not form part of the actual accounting system, however, and is particular to budgetary control.

With regard to debts due to creditors at the close of a period, these may be totalled and expressed as a ratio to total purchases as recorded in the purchase journal. This ratio may then be compared with the standard ratio already established—an increase being an undesirable sign indicating that more money was outstanding than originally planned. Reference may then be made to the balance sheet to observe the trend of the cash position, which will also have some bearing on the amounts owing at any time.

Debtors

In compiling the set of budgets, a standard value of outstanding debtors' balances at the close of the period was determined, after considering the credit terms and discounts allowed for prompt payment. This standard level may be expressed as a ratio to total net sales. When the actual trading results for a period are considered, the actual ratio arising may then be compared with the standard. If the ratio has increased, the position is deteriorating, and a careful examination of a detailed list of overdue accounts should be made and prompt action taken to call them in where necessary.

Cash

All budgets in the system are related either directly or indirectly to the cash budget, so that deviation from the established plan in any one of them will have repercussions on the liquid position. It is unnecessary to analyse the cash position in detail to arrive at reasons for a shortage or excess of ready money, because the controls set up in regard to the other functions are, in the long run, the answer. Thus, an increase in the balances due from debtors would help to explain a shortage, and so would a decrease in the actual volume of sales.

Although the cash position may have been budgeted in advance for the whole year by, say, quarterly periods as shown in Figure 22, it may become of academic interest only and does not guarantee that sufficient liquid resources would be available at all required times. To maintain full control, it is necessary to set out the actual cash position arising at the close of the last complete control period or month, and to build up a new cash budget month by month—in the manner already described—in the light of the actual prevailing circumstances as to production, sales, capital commitments, etc. A strict watch on the daily bank balance is also essential. An important comparison is usually

the ratio of actual cash to outstanding creditors or total liquid liabilities, a minimum of 100% being essential with the former, while 200% is desirable. An excessively high ratio should not be encouraged, however, as it suggests that better use might be made of the funds—*e.g.*, by additions to the capital development budget or by external investment.

Balance Sheet

Control at the balance sheet stage is aimed at, ensuring the maximum stability to the business, and is exercised by comparing the actual ratios existing between various items or groups of items with the standard ratios established, and noting whether the movement is in a desirable or undesirable direction.

Comparison for one period may give rise to misleading conclusions, however, owing to the effects of unusual, non-recurring expenses. It is the trend of such ratios over a number of periods which is significant, and the position may usually be gauged most quickly by reference to graphs.

Figure 24 shows a simple statistical balance sheet budget in which certain ratios are indicated and used as standards. At the close of each period it would be desirable to present the actual balance sheet in the same way. In fact, it may be possible with advantage to record several consecutive balance sheets in adjacent columns together with their percentages. In some cases a downward trend in the ratios is desirable while in others an upward tendency should be looked for. With regard to the six ratios shown in Chapter 17, the desirable trends would be:—

(1)	$\frac{\text{Fixed Assets}}{\text{Effective Capital}}$	Downward trend desirable.
(2)	$\frac{\text{Excess of Current Assets over Current Liabilities}}{\text{Effective Capital}}$	Upward trend desirable.
(3)	$\frac{\text{Net Sales}}{\text{Effective Capital}}$	Upward trend desirable.
(4)	$\frac{\text{Net Profit}}{\text{Effective Capital}}$	Upward trend desirable.
(5)	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	Upward trend desirable.
(6)	$\frac{\text{Cash}}{\text{Current Liabilities}}$	Upward trend desirable.

In connection with number 6, a ratio of less than 100% would be a very bad sign, indicating insufficient funds readily available to meet immediate liabilities. A ratio of 200% should be aimed at. The ratio of current assets to current liabilities (number 5) should be at least 200%, and anything under 100% would be a sign of insolvency. Although a very high ratio of cash to current liabilities may be construed by creditors as a sign of strength, it may be a weakness from the point of view of the management indicating unprofitable use of the surplus. Consideration may, therefore, be given to the relative merits of either external investment or increasing the capital development budget in order to obtain greater output or cheaper costs.

As noted in Chapter 17, when dealing with the co-ordination of budgets, the return of profits on the *effective* capital is of more importance than the ratio of profits to sales value and an increase in the former ratio (number 4) should be looked for, particularly if consideration is being given to plant development.

The scope for statistical work on the balance sheet, and in conjunction with the sales, profits and balance sheet figures, is very wide and, where much information is called for, it may be advisable to give it in separate tables, or by way of graphs, rather than to overload the budgetary control statements. Where balance sheet ratios actually fall short of the targets set, an indication of instability may be given, despite the fact that each function of the business may, separately, be working to a high level of efficiency. The reason for the situation having been determined, action should follow to retrieve the position so that in future balance sheets return to the most stable conditions—the ultimate aim of the system.

Much more could be said with regard to useful information which may be given to management with the aid of a comprehensive system of budgetary control, but in view of the tendency of many people to " churn out " information and, literally, hurl it at management, a halt will now be called. It is far better to publish just sufficient of the really important facts at first and have them appreciated and acted upon, than to submerge management with a spate of paper it is not ready to assimilate. Let it suffice that budgetary control may be so all-embracing that almost any question with regard to cost or finance could be answered by its aid. When management, executives and foremen begin to ask for information, the system may be considered safely launched, and larger doses of facts and figures may then be given, with the knowledge that appropriate action will follow wherever and whenever possible.

XXVII

Depreciation

Depreciation

Definition

DEPRECIATION is the normal deterioration in value which takes place during the life of an asset. Although not paid out in cash in the ordinary way, it is essentially an expense of the business that has to be calculated on a suitable basis. Theoretically, the life of the asset is estimated together with its residual value as scrap or for use in a secondary capacity. The difference between the amount originally paid and the residual value is the amount of deterioration in value to be recovered over the estimated life of the asset. There are several ways of doing this. Under the " straight line " method, an equal sum is set aside each year by dividing the total depreciation required by the total number of years. It is simple but necessitates records being kept of every asset subject to an allowance for depreciation. Many firms, do not maintain such a record however, and have recourse to the " reducing balance " method under which a percentage of the value of all assets falling into certain broad classes is calculated each year and deducted from the total. Other methods employed in particular cases involve establishment of sinking funds, purchase of annuities or revaluation of the assets at intervals.

Whatever sum is charged in the accounts for depreciation by a prudent management, however, is added back to the profits by the Inland Revenue in determining the amount of profits liable to taxation, and a fresh calculation made using the reducing balance method in conjunction with certain arbitrary percentages for various classes of assets which now have little or no relation to the estimated life or normal rate of deterioration in value of the assets concerned. In 1946, an additional allowance of 20% of the purchase price was introduced by the Inland Revenue in the first year of purchase in addition to this percentage for wear and tear, a figure which has subsequently been raised to 40%. On disposal of the asset, a balancing allowance or charge is also made taking into consideration the amount of initial allowance and wear and tear already granted together with the residual value obtained so that, for income tax purposes, over the actual period of life involved, the actual loss in value only is ultimately allowed as an expense of the business.

Prudent accountants for many years have recognised the inadequacy of the wear and tear allowances granted by the Inland Revenue and depreciation at higher rates has been customary in financial accounts. Within the last decade,

the phenomenal rise in the prices of all assets has introduced a further complication. Depreciation, whatever the method or rate, based upon the original asset values is now quite inadequate as a method of retaining funds in a business with which to replace such assets, and arbitrary appropriations of profits—where available—have been made to specific reserves to meet higher replacement costs. At the same time, higher rates of depreciation than those used in the financial accounts are often used in connection with costing and price fixing.

Example

In Figure 54 an imaginary asset purchased in 1946 at a cost of £1,000 is considered. Experts suggest that its working life should be ten years, and so for accounting purposes depreciation is written off on the straight line method at £100 per annum (Column A). It is further suggested that a replacement of this asset in 1955 might cost around £1,250. Accordingly, £125 has been charged in the Fixed Cost Budget and the cost accounts each year (Column B). In column C the allowances granted by the Inland Revenue for taxation purposes are considered, the asset being classified as warranting $7\frac{1}{2}\%$ wear and tear allowance. This asset remains in use for twelve years instead of the estimated ten and is finally sold at the close of 1957 for £120. From an accounting viewpoint in accordance with the definition given in the opening paragraph, depreciation on the straight line method ceased after ten years when the original £1,000 had been recovered (see column A). By this time, £1,250 has been recovered from customers in the prices of the products sold to them which, it is hoped, will be sufficient to replace the asset. Nevertheless, as it is still in use a further £125 per annum is recovered in costs during the eleventh and twelfth years making a total of £1,500 (column B). If it had been replaced at the end of ten years, depreciation relative to a new asset would have been incurred. By continuing the charge the tendency is for total depreciation and, maybe, product costs and selling prices to be stabilised. Turning to the Inland Revenue aspect in column C, despite the initial allowance on purchase amounting to £200, only £693 has been allowed over the period of twelve years because the diminishing balance method is used, the asset being on record at £307. From this must be deducted the residual value of £120, however, so that the asset—which no longer exists—stands at a value of £187. The Inland Revenue, accordingly, grant a further £187, known as a Balancing Allowance, so that the full loss in value over the actual life is granted to the taxpayer as a business expense. Had the asset been sold for, say, £320, a Balancing Charge of £13 would have been made to ensure that only the actual loss sustained was allowed over the period of life for taxation purposes.

In column B of the foregoing example, an attempt has been made to conserve a sum which it is hoped will be sufficient to replace the asset itself rather than the original amount paid for it. As a result, product costs and selling prices may be more realistic. The basis adopted is arbitrary, however. A more scientific approach to the problem is needed. A lead in this direction may be obtained by considering two impossibilities first:—

(1) It is impossible to decide what the replacement value of a particular asset will be *in the future*. Price levels are external to the business and, therefore, uncontrollable. In addition an exact replacement may not be available then. Either the type of asset may have become obsolete or there may be an element of betterment in it.

(2) It is also impossible to decide what the residual value of an asset will be at a pre-determined future date. So much will depend upon external, uncontrollable conditions which may be complicated by the fact that the asset may be worthless except as scrap or it may have a secondary life. Machine tools may be cited in this respect, those which are no longer satisfactory for fine limit work often being suitable for commercial limits.

From the foregoing it seems desirable, therefore, to base all calculations and theories on present prices and values which are capable of reasonably accurate ascertainment and to ignore the question of residual values until they actually arise. For the sake of simplicity, too, it is convenient to adopt the straight line method of depreciation at this stage. A basis is needed that will be acceptable not only to the cost accountant for budgetary control, costing and pricing, but also to the accountant for the financial accounts to avoid adjustments or reconciliations.

Current Depreciation and the Depreciation Reserve

If a business is run at a profit, depreciation may be considered as subscribed for by the customers when they settle their accounts. Unless special steps are taken and an annuity purchased or an investment made outside the business, depreciation becomes merged into the liquid resources of the business and used as working capital. The amount subscribed may be measured in total by the amount credited to the depreciation reserve. It is desirable that these subscriptions by customers be at the prescribed rate applied to the current conception of asset replacement values. If, next year, asset replacement values increase or decrease, although the rate remains constant, the basis may need adjustment.

Such changes in values imply that the amount of contributions received in previous years will either be inadequate to meet current replacement costs or excessive. If inadequate, it would be unfair to expect customers to make a further contribution; if excessive, it would be unfair for them to expect a rebate on current selling prices beyond what they may already be receiving. In a business that has been established for many years, the cumulative depreciation reserve may be so formidable in amount that annual adjustments might cause instability throughout industry generally if attempts were instigated to adjust the provision already made in previous years in current selling prices. The alternative is to determine the amount of this adjustment and meet it by appropriations from profits. If profits are insufficient to allow this in total, contributions on account may be necessary from time to time.

Determination of Current Replacement Values

On formation of a new business, the assets may all be purchased in the same year, at the same general level of prices. Thereafter, however, additions will be made and replacements effected from time to time when price levels are different so that after a while, it may be true to say that plant additions and replacements are carried out from year to year and, disregarding any question of betterment, prices paid will then be affected by the general level of prices reigning each year. Put another way, each year prices paid for assets will tend to vary from the original price level because of devaluation or appreciation of the currency. This implies adoption of a basic or original year and price levels for various classes of assets with expression of the cost of subsequent replacements as a percentage above or below basic. The most satisfactory basic year may be that in which the changeover from depreciation on original costs to depreciation on replacement values is introduced so that, in an old-established business, many assets will have been purchased previously—often at prices below the basic levels adopted. It will, therefore, be necessary to bring the original prices paid up to the general level prevailing in the basic year and, thereafter, to adjust the replacement values according to changes in the ratio of current prices to those in the basic year.

Example

In Figure 55 an asset was purchased in 1936 for £400 and depreciation on this sum has been calculated up to 1943 when it was decided to base the allowance on the estimated replacement value. Nineteen forty-three is, therefore, the basic year. Column B shows the trend of prices over the period 1936 to 1949

and in column C the resulting replacement values are given. It is apparent that in the basic year, the price level was four times higher than in 1936 so that the original purchase price is 25% of the basic value. Column D shows the relation between the price level of each year and 1943.

Price Indices

To be universally acceptable, a system of asset revaluation should be in accordance with a generally acceptable price index each year for various classes or types of asset. Manufacturers' price lists may be a guide in this connection but they fail when a new type of asset is invented or when an element of betterment is introduced into an old one or when a specific item is no longer marketed. A more general, but none the less acceptable, approach is needed. The Board of Trade publishes monthly wholesale price index numbers, the basic year being 1930, and these might form the nucleus of a suitable basis particularly if they could be elaborated and, perhaps, related to the various categories scheduled by the Inland Revenue for wear and tear allowances. The divisions at present published are:—

(1) Cereals
(2) Meat, Fish and Eggs
(3) Other Food and Tobacco
(4) Total Food and Tobacco
(5) Coal
(6) Iron and Steel
(7) Non-Ferrous Metals
(8) Cotton
(9) Wool
(10) Other Textiles
(11) Chemicals and Oils
(12) Miscellaneous
(13) Total Industrial Materials and Manufactures
(14) Total all articles
(15) Industrial Materials (excluding Fuel):—
  (a) Basic Materials
  (b) Intermediate Products
  (c) Manufactured Articles
(16) Building Materials

To an extent these would, of course, be arbitrary but the same may be said of the cost of living index which is, none the less, found very useful for a number of comparative purposes.

If a " National " index can be created as a reliable measure of relative prices from year to year, it would be desirable to compare the " national " index with 100 in the basic year adopted by a particular business if the basic

years used in each differed. All " national " indices would then be converted to the new base as shown below:—

Year	" National " Price Index		Index for Particular Business
A	B		C
1935	100		43·5
1936	105		45·5
1937	107		46·5
1938	109		47
1939	140		61
1940	150		65
1941	160		69
1942	180		78
1943	195		85
1944	220		96
1945	**230**	**Basic Year**	**100**
1946	245		106·5
1947	255		111
1948	265		115
1949	275		119·5

The Mechanics of Re-valuation

If a satisfactory record of changing asset values is to be maintained and used as a basis for computing depreciation, a series of forms—one for each asset—constituting a plant inventory is essential. This may be obtained from:—

(a) An inventory already in existence.
(b) Records of assets purchased and disposed of.
(c) Re-valuation of plant by experts.

It is important to take stock of the actual assets on hand as a check against the lists compiled in (a) and (b). It is also desirable to examine the records of purchases and disposals as a check against (c) and to include assets which have already been disposed of before the basic year. The depreciation reserve already in existence will contain an amount applicable to them which will need adjustment if price levels change in subsequent years. The form illustrated in Figure 56 has been designed simply to show the mechanics of revaluation, determination of depreciation, profit appropriation, etc., and may need

adaptation before being introduced as part of a plant inventory. The following information is essential with regard to each asset:—

(1) Description.
(2) Date of purchase.
(3) Purchase price.
(4) Ratio of the price paid to the level of prices in the basic year.
(5) Ratio of the price level in the current year to that in the standard or basic year.
(6) The annual depreciation, on a straight line basis (expressed as a percentage of original cost).
(7) Date of disposal.
(8) Amount received on disposal.

The following two sets of circumstances must be considered in connection with assets and, in practice, both are likely to be present at the same time when the inventory is considered as a whole:—

1. An asset may be in use *after* the estimated life has expired.
2. An asset may be disposed of *before* the estimated life has expired.

1. *Assets in Use after their Estimated Life has expired*

The problems involved in this case are:—

(a) To determine the present-day replacement value of each asset and to write-off the appropriate amount of depreciation in the current year at the appropriate rate for each.
(b) On the basis of the present-day replacement value as determined in (a), to reassess the cumulative amount of depreciation required to be written-off in relation to the total " life " expired to date and to adjust the actual amount reserved by a transfer to or from the Profit Appropriation Account.

In the final year when the asset is ultimately disposed of the transfer to or from the profit appropriation account will be modified by the amount of any residual value obtained. One common rate of depreciation is envisaged in the financial and cost accounts and for budgetary control.

Example—Cases A and B

The procedure is demonstrated in Figure 56 where an asset purchased at a cost of £400 in 1936 and with an estimated life of ten years is considered. The basic year in which depreciation on replacement values was introduced

is 1943. The record starts with year one—that in which the asset was purchased —and the amount paid and the year are shown in columns A and B. The price indices used are those shown in Figure 55 from which it is apparent that the price paid is 25% of the replacement cost in the basic year. This is recorded in column C. In 1943, the eighth year, the percentage of current replacement value to the base is shown as 100 in column D from which the steady increase in prices in later years may be noted. Column E gives the estimated replacement value in the basic year (£1,600) which will be the same for all subsequent years. Because of the steady rise in prices after 1943, however, this value is increased in column F in accordance with the ratios shown in column D. As the asset has an estimated life of ten years, straight line depreciation represents 10% of the original price paid or its equivalent estimated cost in the current year. This is quoted in column G followed by the number of years of life expired in column H. It is necessary to determine the amount of depreciation already reserved before changing over to the new method. This is seven years at 10% on £400 amounting to £280 as recorded in column K for 1942 and all subsequent years. At the close of 1943, however, a reserve of eight years at 10% on £1,600 is needed and this amounts to £1,280 as shown in column P. During this year, depreciation on the replacement value has been written-off amounting to £160 (column L) which, together with the £280 already reserved is £440 as noted in column N. The difference between the sum needed (£1,280) and the sum already written-off (£440) cannot be a charge against the current production as it concerns the operations of previous years. It is, therefore, shown in column Q as the cumulative profit appropriation needed. If circumstances permit, the full sum will actually be appropriated as in column R, but if this is not possible, an appropriation on account may be necessary. In the ninth and tenth years the same procedure is followed the current depreciation on the new replacement value plus the previous depreciation on the original cost being deducted from the total reserve needed to reveal the cumulative profit appropriation required. The difference between this and the amount shown above it for the previous year in column Q giving the desired profit appropriation for entry in the current year column (R).

In case A it will be seen that depreciation ceases at the close of the estimated ten years of life by which time a reserve sufficient to meet the cost of replacing the asset has been built up. Thereafter, no further depreciation is charged but profit appropriations are necessary to maintain the reserve at current replacement value because of the subsequent changes in the level of prices recorded in column D. The implication in this case is that no further depreciation of this asset will be included in costs and recovered from customers. Thus,

theoretically, a slightly lower total cost might arise. When the asset is ultimately replaced, however, depreciation would again be introduced so that a slight increase in cost may result. It is suggested that depreciation should continue to be charged in costs and to the fixed overhead department until the asset is ultimately disposed of. It is a consistent attitude on a scientific basis and, in view of the fact that any sum for depreciation has to be added back to the net profits for tax computation purposes, could be used in the financial accounts as well as for costing and budgetary control and is demonstrated in case B, Figure 56.

2. *Assets disposed of before their Estimated Life has expired*

In this case, the question of writing off depreciation at the present-day replacement value may or may not arise according to whether or not the asset was disposed of before or after the basic year adopted by the particular business. In the example shown in Figure 56, case C, the asset has been sold prior to the basic year. In either case it is necessary to adjust the amount of the depreciation reserve relative to this asset in the light of changes in the price index.

Example—Case C. Figure 56

The same asset and conditions are envisaged as in cases A and B but it is sold for £300 in 1940, after 5½ years of service. In practice, if the asset was then replaced, an obsolescence allowance may have been allowed by the Inland Revenue and the actual depreciation written-off in K could be increased by this sum. Case C, however, assumes that the asset was not replaced and that no obsolescence allowance was granted. Accordingly, the depreciation reserve in the basic year contains £220 applicable to this non-existent asset. Thereafter, no depreciation is chargeable at all but the reserve has to be adjusted by profit appropriations because of subsequent increases in the annual price index. As and when a downward trend of prices sets in, the depreciation reserve may be found to be excessive and, on these statements, credits should be made in order to maintain it at the actual replacement level. Whether the matter is adjusted in the financial accounts by a write back to the profit appropriation account will be a question of policy for the individual industrialist to decide.

Current Depreciation Summary

To arrive at the total charge for depreciation for the current year and the current profit appropriation necessary to bring the depreciation reserve based on original asset costs to the level needed on current replacement values, a summary of the information shown on the series of asset depreciation records

(Figure 56) is needed. If the asset depreciation record is incorporated in the plant register, it may be necessary to work out completely each form and then summarise them all. It should be remembered, however, that this form is used here to demonstrate the principles underlying the system of asset revaluation and may not be a practical layout for a plant register. If it is decided to dispense with the calculations on a series of asset depreciation records, it will be necessary to compute the asset replacement values, current and cumulative depreciation and current and cumulative profit appropriations direct on the summary form, and the Current Depreciation Summary—Figure 57—suggests how this may be accomplished. The separate records for each asset will be sorted into groups according to the year of purchase and these will then be broken down into further groups according to the various straight line depreciation rates employed. Further analysis may then be necessary to cater for groups of assets that were disposed of before the basic year, and for current disposals. Assuming that the new system of using current asset replacement values is introduced in the basic year, the whole task may be accomplished on the one summary comprising, perhaps, a number of sheets according to size and the number of asset groups required. Cumulative information in subsequent years is then a matter of adding the figures for the current year to the cumulative shown for the preceding year.

Example—Figure 57

The mechanics of compilation are demonstrated in the five entries on Figure 57 which are assumed to be a summary of all the assets grouped according to purchase years and depreciation rates. Group one comprises assets purchased in 1936 to which a depreciation rate of 10% is applied. The method of bringing the original cost up to replacement in the basic year and then adjusting it by a further factor to give the current estimated replacement cost, may be followed out in columns A to F. It is the same as that used in connection with the asset depreciation record—Figure 56. The life expired in years (column H) has been expanded, however, to show the total years up to, but not including, the basic year (column H^1) as well as the total life involved to the year of disposal or current year if still in use (column H). Thus, the cumulative depreciation reserve already existing, based upon the original prices paid, may be computed in column K. As this asset group is still in use, the depreciation for the current year based upon the current conception of the replacement cost (column F) is then calculated in column L. In the basic year, the cumulative depreciation on replacement cost for inclusion in column M would, of course, be the same as the current charge on the same basis. In the

next year, however, it would be current depreciation (column L) plus the cumulative depreciation for the preceding year (column M). At the close of the current year, the total depreciation written-off, as shown in column N, would be the total reserve based on the original asset values (column K) plus the cumulative depreciation at replacement values (column M). Because this group of assets is still in use, the total depreciation reserve needed at replacement values in the current year, will be the product of the current replacement value (column F), the rate per cent. (column G) and the number of years from date of purchase to current year (column H) all divided by 100 as given in column P and the difference between this sum and the amount actually written-off (column N) represents the cumulative appropriation of profits necessary to bring the total written-off up to the total required as recorded in column Q. Column R, showing the appropriation required for the current year, is the difference between the total appropriation required in the current year and the amount shown in the same column on the statement for the previous year.

Group two is an offshoot of group one due to the fact that although the assets in question were purchased in the same year and depreciated at the same rate, they were actually disposed of after 5½ years for £300. The life involved is all in the pre-basic period and recorded in column H[1]. A reserve of 5½ years at 10% on the original cost is then recorded in column K but there is no current or cumulative depreciation at replacement value to be inserted in L and M. The total amount written-off (column N) comprises the depreciation above referred to plus the residual value as in column J. But although the group of assets is no longer in existence, the total depreciation needed in the current year is not simply the total written-off but 5½ years at the current replacement value as shown in column P. The procedure for determining the profit appropriation is as stated for group one and is shown in columns Q and R.

The third group comprises assets which were also bought in 1936 but the straight line depreciation rate based upon the estimated life is different as noted in column G. As with group one, group three is still in use and the calculations involved are similar.

Group four introduces a complication, however, due to the fact that certain of the assets comprised in the group were sold at the close of the preceding year. The cumulative depreciation and profit appropriations brought forward refer to the total value of £2,500. In the current year, however, current depreciation is based upon the reduced value after transferring £500 to a new group and in this new group there is, of course, no current depreciation (the total life being less by one than in group four) although there is a cumulative sum relative to the preceding years as shown in column M. The pre-basic life of each of these

groups is six years. The total fund needed is a straightforward calculation according to the formula at the head of column P and the cumulative profit appropriation in column Q follows the procedure adopted with all other groups. Turning to the appropriation for the current year (column R), however, a write-back of £525 is shown against group four. This is due to the fact that the cumulative appropriation in the previous year was based upon the current replacement value of £2,500 worth of assets whereas in the current year it is based upon the current replacement value of only £2,000 originally paid. As there was no previous year for group five, the cumulative appropriation (column Q) is the same as the appropriation for the current year (£850 in column R).

Actual appropriations of profit from year to year will depend upon the policy of the management and the availability of profits. Nevertheless, it is important to build up the current depreciation summary to show what the full appropriation for the current year should be in the case of each group. It is assumed in Figure 57 that up to the preceding year the full appropriations had been made. In the current year, however, only £2,500 instead of the full £2,917 is appropriated as shown in column S. The total cumulative actual appropriation is thus £41,005 as given in column T. Armed with this information each year, opportunities may be taken to write-off additional sums in order to bring column T into line with column Q.

Depreciation and Budgetary Control

Reference to the capital budget will show what plant additions or disposals are planned for the current year and a summary similar to the current depreciation summary—Figure 57—is needed to show the anticipated groups of assets by year of purchase and disposal and the depreciation rates. Where it is planned to purchase assets, say, half-way through the year, the estimated purchase price may be considered to be a separate group and the total life expired treated as one-half of a year in column N. Under budgetary control the need to allocate plant values and depreciation to costing centres does not arise, although it may be necessary for costing purposes. The total budgeted amount of depreciation for the current year will be recorded in the fixed cost budget and divided by twelve if monthly control periods are in use.

If the plan is adhered to, actual depreciation will be the same as that budgeted. In practice, however, minor purchases or disposals may be effected that have not been anticipated in the budget but these should be so small that adjustments may be safely left until the close of the year. Price variance will,

however, arise if the price index changes but this may be calculated in total quite easily as shown in the following example:—

Example

Assume the total depreciation budgeted for the year to be £6,188 as shown in column L of Figure 57. For the first three months the ratio of current prices to those in the basic year remains at 140 as shown in column D. In the next quarter, however, the ratio goes up to 154 and in the subsequent quarters there are further increases to 168 and 175 respectively. The total budgeted depreciation for the year is divided into four equal quarterly allowances to which the new price factors as compared with the current price index at the beginning of the year are applied:—

Quarter	Budget for Depreciation	Current Price Index	Ratio to Budgeted Price Index	Actual Depreciation
A	B	C	$D = \frac{C}{140}$	$E = B \times D$
	£			£
1	1,547	140	1·00	1,547
2	1,547	154	1·10	1,702
3	1,547	168	1·20	1,856
4	1,547	175	1·25	1,934
	£6,188			£7,039

Thus, the total actual charge for depreciation in each quarter will be as shown in column E, price variance being the difference between columns B and E.

When considering the compilation of the profit appropriation budget, it will be necessary to write-back the depreciation as calculated above and determine the amount of wear and tear, initial allowances and balancing charges and allowances according to Inland Revenue procedure, deducting them from the full profit and making further adjustments for expenses budgeted but not allowed for taxation purposes and, perhaps, items allowed by the Inland Revenue but not included in the budget. Arrived at the profit for taxation, the amount of taxation payable may be computed according to the current rate and appropriated together with preference dividends, etc. The need for making a payment to holders of ordinary shares, for creating specific or general reserves and for carrying forward a balance will be decided by management when the total remaining profits are known. It may be found impossible, or possible but undesirable, to appropriate the full amount required. Whatever

sum is decided upon will, therefore, be inserted in column S of the current depreciation summary and recorded in the profit appropriation budget.

Many firms producing trading results on a monthly basis, estimate their liability for taxation to date on the profits so ascertained. Besides the fact that actual profits may be quite different from those budgeted, the bases of profit computation for tax purposes and the rate of taxation may change thereby affecting the possibilities of making an appropriation against the sum needed to increase the depreciation reserve to replacement value. Direct comparison of actual with budgeted profits and appropriations, therefore, may not be significant. Nevertheless, it is important to project such a budget in order to focus attention on the most desirable ways, as a long-term policy, of expending them. An open mind must then be kept so that this broad policy may be modified to best advantage in the light of actual conditions arising in succeeding budget control periods.

XXVIII

Budget Administration

Budget Administration

The Budget Controller

HAVING established a set of budgets and put them into operation, it is, at last, necessary to consider the man responsible for carrying the scheme into effect. What sort of man is he? What are his qualifications? What are his relations to his colleagues and to the head of the business?

It may be convenient to call him simply the Budget Controller. His duties involve establishing all the budgets. He should, therefore, have a good knowledge of all aspects of the business, and width of vision. Too often specialist qualifications tend to an unbalanced view of a business as a whole—the emphasis resting, usually, on the particular aspect the specialist is most familiar with, to the detriment of others. Nevertheless, he must know something about everything and, in particular, a lot about accounting, costing and budgetary control.

Very often budgetary control is exercised through the medium of committees. Committee work is, however, very much overdone at the moment possibly because of a tendency to bring as many different grades of employee as possible into the " picture "—which is desirable—and because there is a dearth of officials with sufficient personality and knowledge to stand out above the rest and achieve results by good leadership and direct action It is important that the views of all likely to be connected in any way with the system should be canvassed, but how it should be done may depend chiefly upon the particular circumstances. In America, the heads of departments are sometimes given the task of creating their own budgets, co-ordination being left to the budget controller. In Great Britain, however, where the objects and mechanics of the system are not so well appreciated, although desirable, such a course may not be practicable. In some cases, in this country, the introduction of budgetary control is looked upon by managers as an infiltration of bureaucracy or interference in technical matters by lay persons and an attempt to discredit the established habits of the production specialists. As a result, full co-operation may not, at first, be forthcoming. This is a healthy sign in a progressive economy, however, for ever since the industrial revolution, the " bright boys " of the day—when they have finally become established—have been the despair of the bright boys of the next generation twenty years or so later. The budget

controller must, consequently, have a distinct personality, know what he wants and have the power and authority to obtain it if the system is to give good results He must, in addition, be free from a daily routine job, so that he can devote his whole attention to balancing the functions of the business one against the other to obtain the best results under ever-changing circumstances. The position calls for a man of experience and education, in a broad sense, in the fields of management and administration. But at the moment there is no particular " management " qualification. Those of the Cost Accountant, however, tend to come nearest to meeting the requirements and such a person has been visualised throughout this book as the potential budget controller. It is desirable—and practical except in the smallest firms—that despite his qualification as a cost accountant, he should not be in charge of the preparation of the regular monthly operating results. This is a function of the cost department itself, which will work to budgets and revised budgets supplied by the controller.

When considering operating results, the committee method is again frequently adopted, the departmental heads meeting the managing director and the budget controller to go through the figures. This is, of course, an " inquest " point of view. The aim should be to educate all of them up to the stage of appreciating their budgets and taking day-to-day action in accordance with them. Adverse variance of a controllable nature should, thus, be curtailed, and the budget controller, if there is a serious falldown, may then achieve better results by an immediate and personal visit to the manager concerned.

Circumstances in industry are continually changing, and the budgets will soon become out-of-date, so that conditions variance will lose significance in the eyes of the heads of departments unless a system of budget revisions is introduced. When conditions are known to have changed for better or worse—and are beyond the control of the departmental head—the budget allowance concerned may be re-assessed. A log book is often used to record such changes, giving the date, the original allowance and the revision factor determined by dividing the revised allowance by the original. This factor may then be applied to the original rate or allowance when calculating the actual results for a period, so that a portion of variance which would otherwise fall into conditions and be attributable to the head of the department may be segregated and so not hide the actual controllable situation.

Although the original budget allowances and the revised ones may meet with agreement from the head of the department concerned, dissatisfaction may be expressed with the allowances for activities above or below those normally experienced where flexible budgets are in use. Allowances should be determined as accurately as possible—as indicated in earlier chapters—but an

element of negotiation or tolerance may none-the-less be desirable. This may be achieved with semi-variable expenses by establishing the basic fixed element and allowing a directly variable element to be added rather than a curving one. This savours of negotiation rather than science, but the practical aim of budgetary control to attain a desired standard of profit and balance sheet stability should not be forgotten. It is not merely a complicated mathematical problem—an end in itself. Provided the total budget allowance for day-shift capacity working remains less than a directly variable expense by the above means, the satisfactory position established at normal should arise from all other activities between normal and day-shift capacity, and it may be diplomatic to agree the allowance with the departmental head on this basis. Diplomacy as a subject has, somehow, been omitted from the syllabuses of all the present professional bodies connected with industry.

The foregoing remarks visualise a business large enough to warrant the full-time employment of a budget controller. The smaller concern is not precluded from enjoying the full benefits of a comprehensive system of budgetary control, however. A practising cost accountant may be consulted who will advise on the best application to employ and who will, if required, instal it, and instruct personnel in its running, attend periodically thereafter to collect the necessary information, prepare the results and report to management.

Control Accounts

No mention has so far been made of a set of control accounts to demonstrate the accuracy of the results produced. This is not an omission, however, for as the control statements have been prepared direct from the basic financial documents they are in themselves self-balancing. In connection with the presentation of monthly statements to the heads of departments and management generally, it is, however, convenient to show the cumulative standard cost and total variance against each account heading. There is usually more space available on these documents than on the original departmental variation statements. The cumulative figures are obtained by adding the current cleared-in-cost to the cumulative cleared-in-cost recorded on the statements for the preceding period and treating total variance in the same way. They are then totalled and agreed by reference to the current total and the preceding cumulative total on each statement and recorded on the summary operating statement where the total standard cost and variance for all departments are shown for the year to date. As a matter of prudence, the total figures inserted at the bottom of each column of the summary recap sheet (Figure 44) may be checked against them. The trading and profit and loss statement, too, should

be published with cumulative figures adjacent to those for the current period (Figure 53). Because it is built up from the summary recap sheet which obtains its figures from the basic accounting documents, the cumulative profit or loss should be the same as that stated in the financial accounts.

It is possible to dispense with the separate preparation of financial accounts entirely and to use a cumulative presentation of the actual costs—or standard costs and variances—recorded on the departmental variation statements as a basis. This, however, involves not only production of cumulative figures by accounts in regard to each department, as already described, but also compilation of a summary of all such departmental cumulations each period. The result does not always justify the clerical work involved. For instance, where auxiliary services have been treated as separate departments, the costs transferred to production departments relative to usage comprise the labour, material and expenses in one total. Thus, if the costs of services are to be shown in the financial accounts, the cost of labour will be incorrectly stated. On the other hand, if it is desired to show the total amount expended on wages, then the costs of services will be understated. In view of the detail produced under budgetary control for internal control purposes, summarising may be desirable before financial accounts are based upon them otherwise too much information may be given to external parties such as creditors and competitors and, once again, clerical effort is involved. On the whole, therefore, it may be more satisfactory to prepare separate financial accounts direct from the basic documents and to ensure that the profits or losses under both systems agree.

Finale

In the foregoing chapters the scientific bases on which budgetary control rests have been explained, and attempts made to show how they may be adapted to use in most cases. Many businesses obtain satisfactory results from the partial installation of the system. Before installing part only, however, it is suggested that the theory and practice of the whole system should be appreciated so that, if required at a later date, the part may be fully developed without difficulty or waste of effort.

Budgetary control is sometimes called a " tool of management." Knives, forks and spoons are also tools in this respect. But while the uses of table cutlery may be appreciated, conditions sometimes arise when better results can be obtained without them. So, too, in industry, the tool should never be allowed to become the master.

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FIGURE 1

Co-ordination of Budgets in a comprehensive system of Budgetary Control

(*See page* 4)

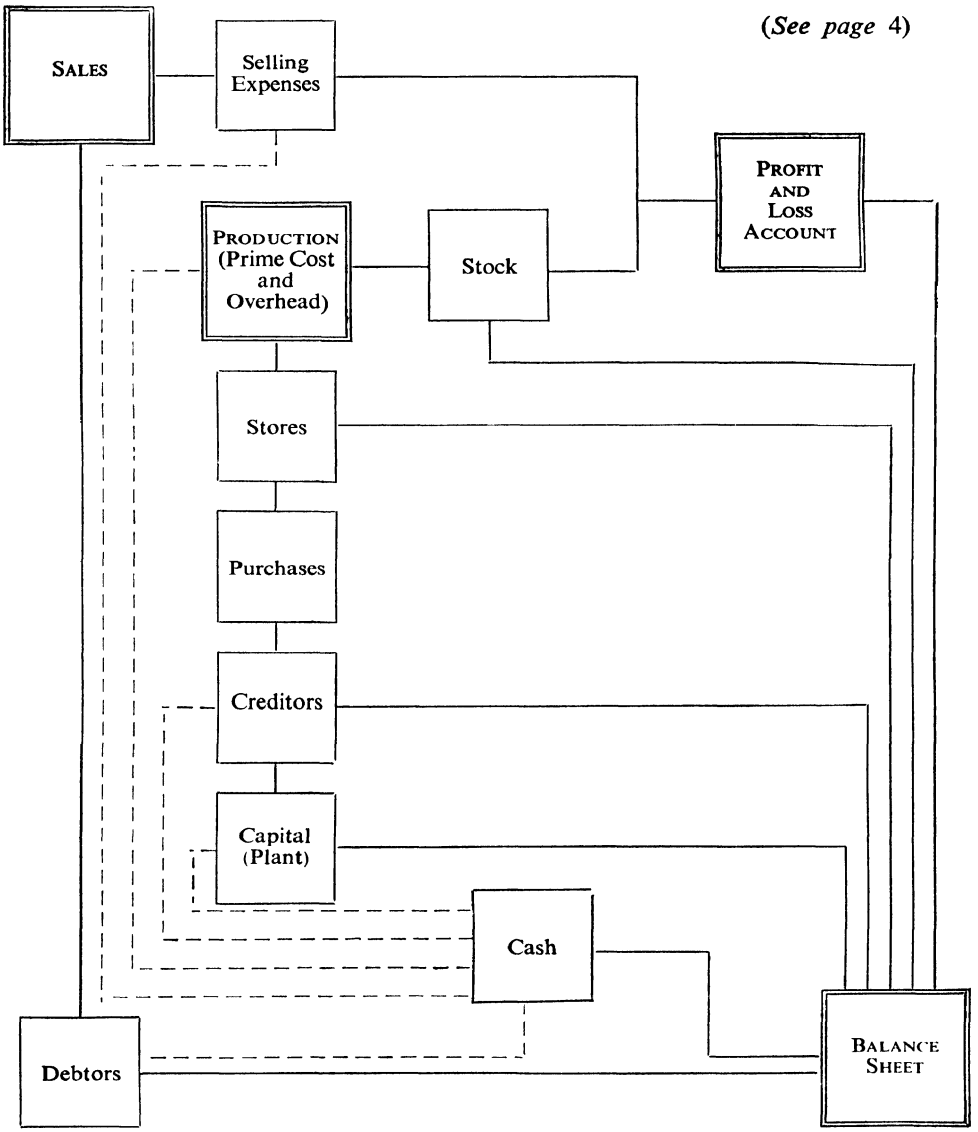


FIGURE 2

Plant Capacity per Four-week Period

(*See page* 26)

Operation	Production Hours per Batch (100)	Plant Capacity		Remainder	
		Hours	Batches (100)	Hours	Batches (100)
1	350	1,150	3·00	100	·29
2	500	1,375	2·00	375	·75
3	150	750	5·00	—	—
	1,000	3,275	3·28		

FIGURE 3

Potential Demand for Year compared with Plant Capacity

(*See page* 26)

Operation	Production Hours per 44 Batches	Plant Capacity		Remainder	
		Hours	Batches (100)	Hours	Batches (100)
1	15,400	14,950	42·72	—450	—1·28
2	22,000	17,875	35·75	—4,125	—8·25
3	6,600	9,750	65·00	+3,150	+21·00
	44,000	42,575		—1,425	

FIGURE 4

Actual Sales and Plant Capacities 1928-1939

(*See page* 32)

Year	Annual Sales		Annual Plant Capacities	
	"A"	Total Industry	"A"	Total Industry
	Units	Units	Units	Units
1928	1,000	11,800		
1929	600	10,000		
1930	1,000	13,500	1,200	15,000
1931	1,000	15,700		
1932	1,000	12,000		
1933	800	9,500		
1934	1,200	10,000		
1935	1,400	17,500		
1936	1,400	15,500	1,500	15,300
1937	1,300	14,400		
1938	1,600	18,000		
1939	1,800	24,000		
	14,100	171,900		

FIGURE 5

Actual Sales of whole Industry analysed to reveal Trade Cycles

(*See page* 32)

Year	Total Sales	Ratio to Average	Position in Trade Cycle
	Units	%	
1928	11,800	82	
1929	10,000	70	Lowest
1930	13,500	94	
1931	15,700	110	Highest
1932	12,000	84	
1933	9,500	66	Lowest
1934	10,000	70	
1935	17,500	122	Highest
1936	15,500	108	
1937	14,400	101	Lowest
1938	18,000	126	
1939	24,000	168	Highest
Total	171,900		
Average ..	14,325	100%	

FIGURE 6

Sales Analysis

(*See page* 32)

"A" Coy 's Policy	Year	Plant Capacity		Actual Sales		"A" Random Adjustments		Sales Ratio "A" to Total	Trade Cycle			Demand			Notes on Secular Trend
		"A" P A	Total Industry P A	"A" P A	Total Industry P A	Reason	Adjusted Sales P A	%	Total Industry %	Position	"A" %	Potential P A	Un-Satisfied P A	Un-Satisfied Cum	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Static and Haphazard	1928	1,200	15,000	1,000	11,800		1,000	8 5	93		111	12,500	700	700	Unemployment Rife
	1929	1,200	15,000	600	10,000		600	6 0	72	Lowest	67	12,500	2,500	3,200	
	1930	1,200	15,000	1,000	13,500		1,000	7 4	106		111	12,500	*1,000*	2,200	
	1931	1,200	15,000	1,000	15,700	4 Weeks' Strike	1,100	6 4	123	Highest	111	13 500	*2,200*	—	Tendency towards use of 2 Units
	Total	4,800	60,000	3,600	51,000		3,700					51 000	—	—	
	Average	1,200	15,000	900	12,750		925	7 1	100		100	12 750	—	—	
Static and Haphazard	1932	1,200	15,000	1,000	12,000		1,000	8 3	98		91	13,500	1,500	1,500	
	1933	1,200	15,000	800	9,500		800	8 4	78	Lowest	73	13 500	4,000	5 500	Government introduces new industries
Expanding but Haphazard	1934	1,500	15,300	1,200	10,000		1,200	12 0	82		109	13,500	3,500	9,000	
	1935	1,500	15,300	1,400	17,500		1,400	8 0	143	Highest	127	13 500	*4,000*	5,000	
	Total	5,400	60,600	4,400	49,000		4,400					54,000	5,000	5 000	
	Average	1,350	15,150	1,100	12,250		1,100	9 0	100		100	13,500	—	—	
Expanding with introduction of Advertising Static	1936	1,500	15,300	1,400	15,500		1,400	9 0	86		92	15,000	*500*	4,500	Growing tendency towards use of 2 Units
	1937	1,500	15,300	1,300	14,400		1,300	9 0	80	Lowest	85	16 000	1,600	6,100	
	1938	1,500	15,300	1,600	18,000		1,600	8 9	100		105	17 000	*1,000*	5 100	
	1939	1,500	15,300	1,800	24,000		1,800	7 5	134	Highest	118	18,000	*6,000*	*900*	
	Total	6,000	61,200	6,100	71,900		6,100					66,000	*900*	*900*	
	Average	1,500	15,300	1,525	17,975		1,525	8 5	100		100	16,500			
Average over 12 years		1,350	15,150	1,175	14,325		1,183	8 3				14,250	*900*	*900*	

FIGURE 7

Man-power Estimate by Sex, Age and Occupation

(*See page* 55)

Occupation	No. Employed		% to Total Direct	Male					Female				
	Detail	Total		Total	Over 21	18–21	16–18	15–16	Total	Over 21	18–21	16–18	15–16
Direct Labour:													
Dept. A. Centre 1	90			90	80		10						
Centre 2	70	160	53.3	50	30	8	12		20	6	9	5	
Dept. B. Centre 1	44			44	27	14		3					
Centre 2	40			40	20		20						
Centre 3	56	140	46.7	—					56	16	20	20	
Total Direct Labour		300	100 0	224	157	22	42	3	76	22	29	25	
Indirect Labour:													
Labourers		10	3.3	10	7	3							
Maintenance Fitters		16	5.4	16	8	4	2	2					
Lorry Drivers		5	1.7	5	4	1							
Gatemen		4	1.4	4	4								
Storekeepers..		4	1.4	4	2	2							
Clerks—Production Control ..		12	4 0	12			12						
Wages		6	2.0	5	1	2	2		1				1
Accounts		8	2 7	6	4	2			2		2		
General		15	5 0	2				2	13	11			2
Typists		10	3 4						10	3	4	3	
Machine Operators .. .		6	2 0						6	4	2		
Supervisors		26	8 7	23	23				3	3			
Selling and Administrative .		4	1.3	4	4								
Telephonists		2	.7						2	1		1	
Total Indirect Labour		128	43 0	91	57	14	16	4	37	22	8	4	3
Total All Labour		428	143 0	315	214	36	58	7	113	44	37	29	3
Ratio to Total		100.0	—	74%	50%	8%	14%	2%	26%	10%	8%	7%	1%

FIGURE 8

Allocation of Indirect Labour to Overhead Budgets

(*See page* 73)

Factory Overhead	Administration Overhead	Selling Overhead	Distribution Overhead	Class of Expense
Storekeepers Progress Chasers Gatemen Wages Clerks First Aiders Truck Drivers Maintenance Fitters	Accounts Secretarial and Buying Clerks Personnel Dept. Typists Telephonists	Sales Office Travellers Advertising—Artists and Reps.	Stockkeepers Transport Drivers Loaders Packers	Variable and Semi-Variable
HEADS OF DEPARTMENTS AND KEY WORKERS				
Chief Storekeeper Factory Manager	Accountant Secretary Working Directors	Sales Manager	Chief Stockkeeper	Fixed

FIGURE 9

Step 1 (*See page* 78)

Product	Total Output (Units)	Cost Centre A — Time		Cost Centre B — Time	
		Per Unit (Minutes)	Total (Hours)	Per Unit (Minutes)	Total (Hours)
W	800	30	400	24	320
X	600		300		240
Y	400		200		—
Z	200		100		80
Production Required			1,000		640
Plant Capacity			900		600
Excess Hours (Overtime) ..			100		40

(*N.B.*—Product Y does not pass through Centre B.)

FIGURE 10

(*See page* 78)

Step 2—DETERMINATION OF DIRECT LABOUR—WORKERS AND HOURS

Men or Women	Cost Centre A — No. of Workers	Hours — Each	Hours — Total	%	Cost Centre B — No. of Workers	Hours — Each	Hours — Total	%
Men	15	44	660	75	—	—	—	—
Women	6	40	240	25	15	40	600	100
	21		900	100	15		600	100
Overtime:—					**Overtime:—**			
15 Men at 6 Hours = 90								
5 Women at 2 Hours = 10					10 Women at 4 Hours ..		40	
			100					
			1,000				640	

(*N.B.*—Figures in the Total Hours columns are obtained from Figure 9, divided by the given percentages and then by the normal hours per man or woman to arrive at the number of workers.)

FIGURE 11

(*See page* 79)

Step 4—DETERMINATION OF STANDARD HOURS OF PRODUCTION

	Clock Hours	Bonus Factor	Standard Hours	
			Detail	Total
Cost Centre A:—				
Men —Day	660	1·25	825·0	
—Overtime	90		112·5	937·5
Women —Day	240		300·0	
—Overtime	10		12·5	
				312·5
	1,000			1,250·0
Cost Centre B:—				
Women —Day	600	1·25	750·0	
—Overtime	40		50·0	
				800·0
	640			800·0

FIGURE 12

(*See page* 79)

Step 5—DETERMINATION OF GROSS WAGES FOR ALL WORKERS

Cost Centre	Class of Labour	Hours				Wage Rates			Wages Payable			
		Clock	Overtime		Standard	Base	N.B.	Total	Base	N.B.	Overtime Premium	Total
			Actual	Bonus		s. d.	s. d.	s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
A	B	C	D	E=D/3	F	G	H	J=G+H	K=FG	L=CH	M=EJ	N=K+L+M
A	Men ..	660	90	30·0	937·5	1 9	9	2 6	82 0 9	24 15 0	3 15 0	110 10 9
	Women ..	240	10	3·3	312·5	1 3	6	1 9	19 10 7	6 0 0	5 10	25 16 5
		900	100	33·3	1,250·0				101 11 4	30 15 0	4 0 10	136 7 2
B	Men ..	600	40	13·3	800·0	1 3	6	1 9	50 0 0	15 0 0	1 3 4	66 3 4
		1,500	140	46·6	2,050·0				151 11 4	45 15 0	5 4 2	202 10 6
Both	Labourers	2,280	36	12·0	2,280·0	1 0	9	1 9	199 10 0		1 1 0	200 11 0
		3,780	176	58·6	—				351 1 4	45 15 0	6 5 2	403 1 6

(*N.B.*—Overtime Premium Hours are assumed to be one-third overtime hours worked.)

FIGURE 13

(*See page* 79)

Answers 2 and 3—DIRECT LABOUR BUDGET AND BUDGET ALLOWANCES FOR INDIRECT LABOUR AND NATIONAL AND OVERTIME BONUSES.

DEPARTMENTAL BUDGET SUMMARY — *Dept.* .....

Period ..... *Weeks*

OUTPUT 2,050 DIRECT LABOUR HOURS — *Ending* .....

Description or Account Name	A/c No.	Standard Hours		% Budget to Capacity	No. of Workers	Rate per Std. Hour s. d.	Detail £	Total £
		Capacity	Budgeted					
Direct Labour:								
Centre "A"—								
Men					15	1 9		82
Women ..					6	1 3		20
		1,125	1,250	111	21	1 8		102
Centre "B"—								
Women ..		750	800	107	15	1 3		50
Total Direct Labour		1,875	2,050		36			152
Direct Expense:								
Labourers	157				51	1 9	200	
National Bonus ..	189						46	
Overtime Bonus ..	191						6	252
Total Prod. Wages ..								404
Supervision ..	201							
Stores Materials ..	235							
Power	270							
Maintenance ..	282							

FIGURE 14

(*See page* 79)

Answer 4—PIECE-WORK PRICES PER PRODUCT.

Cost Centre	Product	No. of Units	Time per Unit (Minutes)	Total Hours		Base Earnings £ s. d.	Piece-work Price s. d.
				Clock	Standard		
A	B	C	D	E	F = E × 1·25	G	H = G − C
"A"	W	800	20	267	334	27 2 6	8
	X	600	36	360	450	36 12 0	1 2½
	Y	400	40	267	334	27 2 6	1 4¼
	Z	200	32	106	132	10 14 5	1 0¾
				1,000	1,250	101 11 5	
"B"	W	800	23	307	384	24 0 0	7¼
	X	600	20	200	250	15 12 6	6¼
	Y	—	—	—	—	—	—
	Z	200	40	133	166	10 7 6	1 0½
				640	800	50 0 0	

FIGURE 15

(*See page* 86)

METAL SPECIFICATION STEEL 3 BY

DATE .....

AMOUNT 600 TONS

Materials			INPUT Quantity Tons	Price £/Ton	Value £ s. d.
Alloys:					
Manganese ·6% (Ex Fe Mn 78)			4·614	16·000	73 16 6
Silicon ·55% (Ex Fe Si 45) ..			7·332	12·000	87 19 8
Aluminium 1 lb. per ton = 600 lbs.			270	51·000	13 15 5
			12·216		175 11 7
Scrap and Pig Iron (Loss in melt 7%):					
Total required = $600 - 12{\cdot}216 \times \frac{100}{93} = 632{\cdot}026$					
Comprising:—	%				
Turnings	20·0	126·405		2·700	341 5 11
Short Heavy	33·5	211·729		3·000	635 3 9
Own Returns	45·0	284·412		2·850	810 11 6
Pig Iron	1·5	9·480		6·700	63 10 4
	100·0	632·026	632·026		1,850 11 6
			644·242		2,026 3 1
Slagging Materials:					
Total required = 9·4% of 632·026					
Comprising:—	%				
Limestone	5·5	34·761		·480	16 13 8
Fluorspar	1·0	6·320		1·870	11 16 4
Iron Ore	1·4	8·848		1·870	16 10 11
Anthracite	1·5	9·480		1·650	15 12 10
	9·4	59·409	59·409		60 13 9
			703·651		2,086 16 10
METAL COST PER TON = £2,086 16s 10d. / 600 = £3 9s. 7d.					

FIGURE 16

Location of the Mode

(*See page* 96)

Average Units Consumed A	No. of Weeks B	C	D	E	F	G	H	J	K	L	
10	4	} 10		} *16*			} *18*				
11	6		} 12		} 14			} 15			
12	6	} 8				} 9			} 17		
13	2		} 3	} 11						} 16	
14	1	} 9			} 14		} 18				
15	*8*		} *13*			} *17*		} *20*			
16	5	} 9		} 12					} *20*		
17	4		} 7		} *15*	•				} *18*	
18	3	} *11*									
19	*8*		} 11			} 14					
20	3										
10				✓			✓				2
11				✓			✓				2
12				✓			✓				2
13							✓				1
14							✓				1
15	✓		✓			✓	✓	✓			5
16			✓			✓	✓	✓	✓		5
17					✓	✓	✓	✓	✓	✓	6
18		✓			✓			✓	✓	✓	5
19	✓	✓			✓				✓	✓	5
20										✓	1

FIGURE 17

(*See page* 100)

DEPARTMENTAL BUDGET SUMMARY — *Dept.* .....

OUTPUT 2,050 STANDARD HOURS — *Period* . .. . *Weeks*

Description or Account Name	A/c No.	Standard Hours		% Budget to Capacity	No. of Workers	Rate per Std Hour s. d.	Detail £	Total £	Stand-By £
		Capacity	Budgeted						
Direct Labour:									
Centre "A" —									
Men			937 5		15	1 9		82	
Women .			312.5		6	1 3		20	
		1,125	1,250	111	21	1 8		102	
Centre "B" —									
Women ..		750	800	107	15	1 3		50	
Total Direct Labour		1,875	2,050		36			152	
Direct Expense:									
Labourers	157				51	1 9	200		
National Bonus ..	189						46		
Overtime Bonus .	191						6	252	
Total Prodn Wages								404	
Other Expense:									
Supervision	104							64	
Machine Tools	231						20		
Electrodes	256						15		
Consumables	260						18		
								53	
Power .	358							40	
Maintenance -									
Direct .	367							20	
Allocation	367							175	
Total Direct Labour and Expenses								756	
Direct Materials	200							1,000	
Total Deptl. Cost .								1,756	
Overhead Allocation									
Factory									
Fixed									
Total Cost .. .									

Date — Approved — Approved

Effective.. . .. .

Deptl. Head — Factory Manager

FIGURE 18

(*See page* 119)

DEPARTMENTAL BUDGET SUMMARY — *Dept* FIXED EXPENSE

OUTPUT . . . . . *Period* . . *Weeks*

Description or Account Name	A/c No	Standard Hours		% Budget to Capacity	No. of Workers	Rate per Std. Hour s. d.	Detail £	Total £	Stand-By £
		Capacity	Budgeted						
Supervision—									
Factory .	104				10		320		320
Admin	105				20		700		700
S. & D. .	106				5		160		160
								1,180	
Executive .	107				5			400	400
Costing and Accounts	108				8			300	—
Secretarial .	109				6			200	—
Buying . .	110				5			150	—
Personnel	111				5			150	—
General Clerical .	112				10			100	10
Watchmen, etc	115				5			100	100
Total Indirect Wages					79			2,580	1,690
Other Fixed Expenses									
Insurance—General	380							75	15
Depreciation . .	381							200	200
Rent, Rates, Taxes	382							80	80
Charities . . .	383							20	—
Professional Fees	384							100	60
Secretarial Exes. .	385							100	10
Total Deptl. Cost . .								3,155	2,055

Date Approved Approved

Effective..... ....

Deptl. Head. Managing Director

FIGURE 19

(*See page* 126)

Stock Budget Summary

	Last Year	This Year				Next Year
	4th Quarter	Total	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter
Production ..		1,000	250	250	250	250	
Opening Stock		150	150	300	200	—	150
Closing Stock	*150*	*150*	*300*	*200*	—	*150*	
Sales . ..		1,000	100	350	450	100	

FIGURE 20

(*See page* 132)

Purchase Budget

.....Weeks ending.....

Detail	Units	Unit Cost	Value	
			Detail	Total
			£	£
Direct Material:				
Dept. A			450	
Maintenance			150	
Steam			180	
				780
Indirect Materials:				
Dept. A			50	
B			80	
C			50	
D			40	
Maintenance			30	
Transport			110	
Steam			20	
Factory Overhead			40	
				420
Intangibles:				
Factory Overhead			60	
Fixed Overhead			200	
S. & D. Overhead			200	
				460
Capital (Balance)				1,800
Total Purchases as per Departmental Budgets				3,460
Stock Requirements (Movement) } Reserve for Scrap and Contingencies }				270
Movement on Payments in Advance				—
Total to be Purchased				3,730
Deduct: Goods Receivable in current period:—				
(1) For Stock and Reserve			50	
(2) For Capital			2,000	
(3) For Production			1,460	
				3,510
Contingent Liability at Period End				£220

FIGURE 21

(*See page* 136)

Summary of Cost Origins

Dept.: ALL DEPTS.

Departments or Accounts	Budgeted Cost £	Source of Cost					Movement of Creditors and Payments in Advance
		Purchases £	Wages £	Cash £	Provisions £	Transfers £	
Production:							
Dept. A	1,680	500	1,000	30		150	
Dept. B	945	80	800	15		50	
Dept. C	660	50	400	10		200	
Dept. D	845	40	500	5		300	
	4,130	670	2,700	60		700	
Auxiliary Services:							
Maintenance	400	180	200	20			
Transport	200	110	80	10			
Steam	300	200	100				
	900	490	380	30			
Overhead:							
Factory	1,700	100	900	100	600		
Fixed	1,300	200	1,000	100			
Selling and Distribution	1,300	200	800	270	30		
	4,300	500	2,700	470	630		
Capital and Research	2,000	1,800				200	
All Departments	11,330	3,460	5,780	560	630	900	
Movement on Balances	270	270					
	11,600	3,730	5,780	560	630	900	
Transfer		*3,510*		3,062	75		373
	11,600	220	5,780	3,622	705	900	373

FIGURE 22

(*See page* 138)

Cash Budget for Year ended 31st December

Details	Total	Quarterly Control Periods ending			
	£	31st Mar. £	30th June £	30th Sept. £	31st Dec. £
Opening Balance ..	4,000	4,000	*500*	4,298	4,298
Add: Receipts from:					
Sundry Debtors ..	8,000	1,500	5,000	1,000	500
Sale of Plant ..	—	—	—	—	—
Loans	—	—	—	—	—
Sale of Investments	—	—	—	—	—
Miscellaneous ..	—	—	—	—	—
Total Debits	12,000	5,500	4,500	5,298	4,798
Deduct: Payments:					
Purchases	3,062	2,062	100	300	600
Wages	5,780	3,840	80	660	1,200
Petty Cash ..	560	98	22	40	400
Profit Appropriations	—	—	—	—	—
Investments ..	—	—	—	—	—
Miscellaneous ..	—	—	—	—	—
Total Credits ..	9,402	6,000	202	1,000	2,200
Closing Balance ..	2,598	*500*	4,298	4,298	2,598

FIGURE 23

(*See page* 152)

Typical Balance Sheet (Abbreviated)

A. B. CO., LTD.

BALANCE SHEET

As at.... .....

	£		£	£
Capital—		Freehold Property ..	4,000	
Authorised and Issued	8,000	*Less:* Depreciation..	500	
				3,500
5% Debentures	2,000			
		Plant and Machinery..	5,200	
Sundry Creditors.. ..	300	*Less:* Depreciation..	700	
				4,500
Reserve	4,300			
		Motor Vehicles ..	2,500	
Profit and Loss Account..	920	*Less:* Depreciation..	1,000	
				1,500
		Fixtures and Fittings..	600	
		Less: Depreciation..	100	
				500
		Goodwill		3,220
		Stocks		600
		Sundry Debtors ..		1,200
		Cash		500
	£15,520			£15,520

FIGURE 24

(*See page* 152)

Statistical Balance Sheet

A. B. & CO. LTD.

BALANCE SHEET

As at.....

	£	%
Effective Capital:		
Capital—Authorised and Issued	8,000	80
Reserve	4,300	43
Profit and Loss Account	920	9
	13,220	132
Less: Goodwill	3,220	32
	10,000	100
Represented by:—		
Fixed Assets, as per details below	8,000	80
Excess of Current Assets over Current Liabilities	2,000	20
	10,000	100
Fixed Assets:		
Freehold Property	3,500	35
Plant and Machinery	4,500	45
Motor Vehicles	1,500	15
Fixtures and Fittings	500	5
	10,000	100
Less: Debentures	2,000	20
	8,000	80
Excess of Current Assets over Current Liabilities:		
Current Assets:		
Stocks	600	6
Sundry Debtors	1,200	12
Cash	500	5
	2,300	23
Less: **Current Liabilities:**		
Sundry Creditors	300	3
	2,000	20

FIGURE 25

(*See page* 155)

Break-even Chart

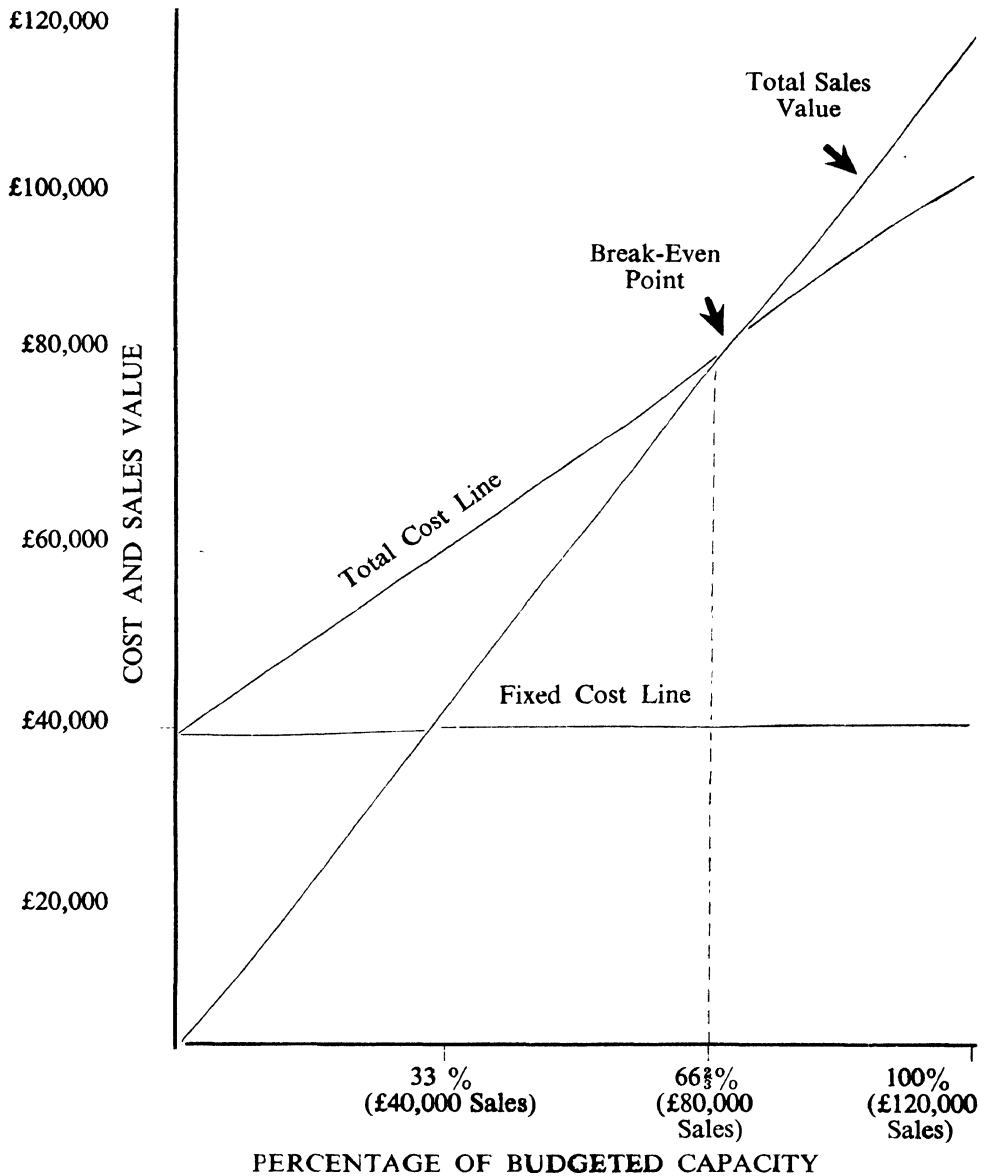


FIGURE 26

(*See page* 161)

Graphic Presentation of Expense Variability

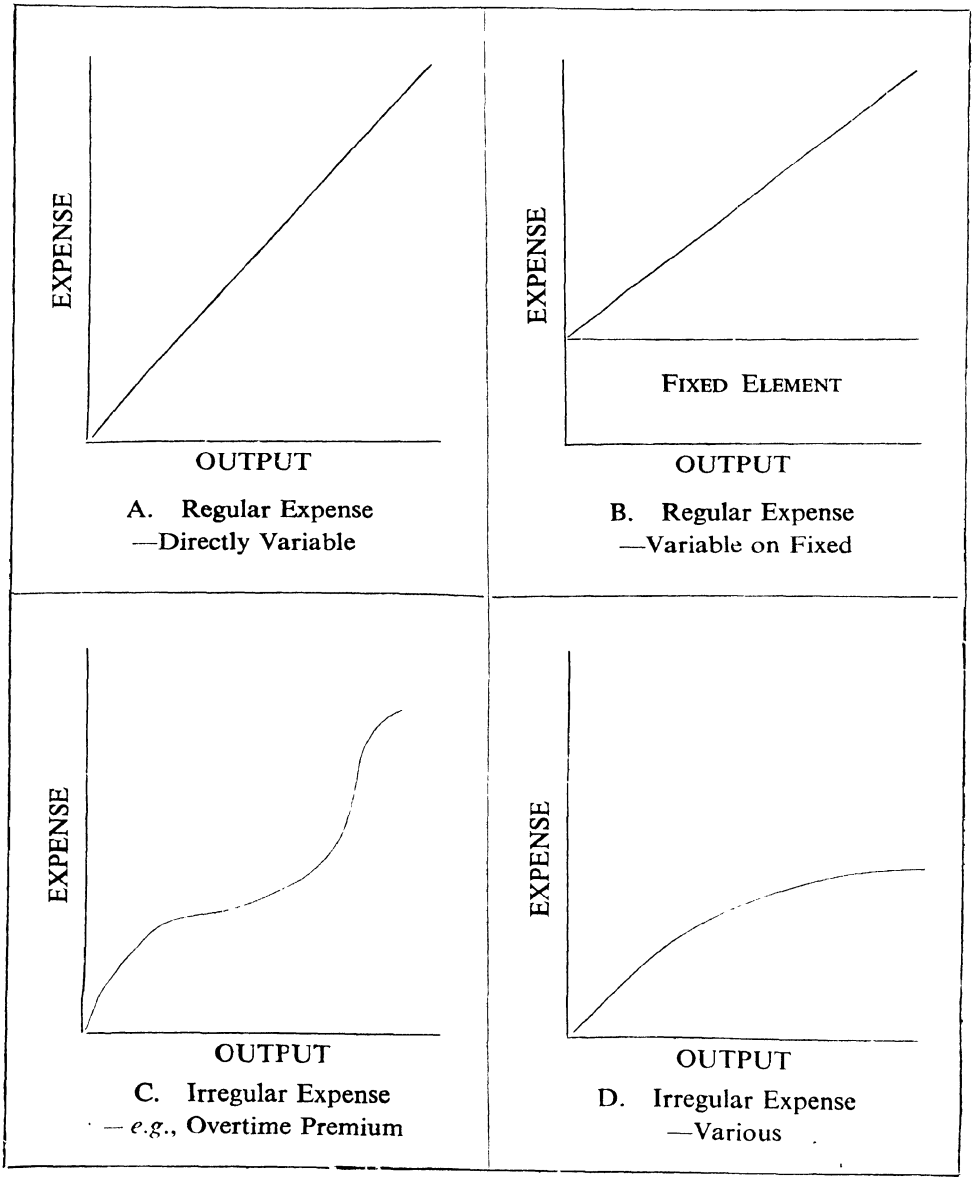


FIGURE 27

(*See page* 163)

Flexible Expense Allowances
Tabular Form

Dept.

Account SPACE HEATING. No. 313 *Period* 4 *Weeks*

PERIOD No.	FROM	TO	ALLOWANCE £
1	2nd Jan., 19..	29th Jan., 19..	50
2	30th Jan.	26th Feb.	50
3	27th Feb.	26th Mar.	40
4	27th Mar.	23rd Apl.	40
5	24th Apl.	21st May	30
6	22nd May	18th June	—
7	19th June	16th July	—
8	17th July	13th Aug.	—
9	14th Aug.	10th Sept.	—
10	11th Sept.	8th Oct.	10
11	9th Oct.	5th Nov.	20
12	6th Nov.	3rd Dec.	30
13	4th Dec.	31st Dec.	30
			£300

Standard Allowance per period, £25

FIGURE 28

(*See page* 163)

Flexible Expense Allowances
Columnar Form

Dept. .....

Period .... *Weeks*

Direct Labour Hours .. .			1,200	1,800	2,400	3,000	4,200	4,800	5,400	6,000
Departmental Activity .. %			40	60	80	100	140	160	180	200
A/c No.	Account		£	£	£	£	£	£	£	£
300	Direct Labour .	V.	120	180	240	300	420	480	540	600
301	Supervision	S.-V	—	40	80	100	120	120	140	160
302	Shop Labour	V	80	120	160	200	280	320	360	400
303	Crane Drivers ..	S.-V.	20	20	40	40	60	60	80	80
304	Overtime Premium	S.-V.	—	—	10	10	20	30	40	50
305	National Bonus ..	V.	20	30	40	50	70	80	90	100
311	Electricity .. .	S.-V.	50	70	90	110	150	170	190	210
312	Maintenance .	S.-V.	20	92	116	140	188	212	236	260
313	Space Heating .	S.-V.				25				
314	Furnace Heating .	S.-V.	130	170	210	250	330	370	410	450
						£1,225				

FIGURE 29

(*See page* 163)

Cost Variance under Forecast and Flexible Budgets

Expense		Original Budget	Budget for Actual Output	Actual Cost of Actual Output	Variance		
					Total	Due to Output	Comparative
Output (Hours)		3,000	4,800	4,800		1,800	
A		B	C	D	E= B—D	F= B—C	G C—D
		£	£	£	£	£	£
Direct Labour	V.	300	480	485	— 185	— 180	— 5
Supervision	S.-V.	100	120	120	— 20	— 20	—
Shop Labour	V.	200	320	350	— 150	— 120	— 30
Crane Drivers	S.-V.	40	60	70	— 30	— 20	— 10
O'time Premium	S.-V.	10	30	40	— 30	— 20	— 10
National Bonus	V.	50	80	80	— 30	— 30	—
Electricity	S.-V.	110	170	173	— 63	— 60	— 3
Maintenance	S.-V.	140	212	232	— 92	— 72	— 20
Space Heating	S.-V.	20	20	10	+ 10	—	+ 10
Furnace Heating	S.-V.	250	370	380	— 130	— 120	— 10
		1,220	1,862	1,940	— 720	— 642	— 78

FIGURE 30

(*See page* 171)

Effect of Volume on a Budget Allowance

1. DIRECTLY VARIABLE EXPENSE

Production		Standard Cost	Standard Allow-ance	Actual Cost	Total Variance	Variance Analysis	
Quantity	Activity %	£	£	£	£	Volume £	Conditions £
A	B	C	D	E	F=C—E	G=C—D	H=D—E
5,000	100	500	500	500	—	—	—
6,000	120	600	600	600	—	—	—
7,000	140	700	700	700	—	—	—
4,000	80	400	400	400	—	—	—
3,000	60	300	300	300	—	—	—

2. SEMI-FIXED EXPENSE (£100 FIXED: £400 VARIABLE)

5,000	100	500	500	500	—	—	—
6,000	120	600	580	580	+ 20	+ 20	—
7,000	140	700	660	660	+ 40	+ 40	—
4,000	80	400	420	420	— 20	— 20	—
3,000	60	300	340	340	— 40	— 40	—

3. FIXED EXPENSE

5,000	100	500	500	500			—
6,000	120	600	500	500	+ 100	+ 100	—
7,000	140	700	500	500	+ 200	+ 200	—
4,000	80	400	500	500	— 100	— 100	—
3,000	60	300	500	500	— 200	— 200	—

FIGURE 31

(*See page* 174)

Establishment of Calendar Variance

Control Period No.	Average Working Days (5 per week)	Holidays		Net Working Days	Fixed Overhead		Volume Variance due to Calendar
		No.	Reason		On average of £5.000 per day £	On net of £5.306 per day £	£
A	B	C	D	E	F	G	H
1	20	—		20	100	106	+ 6
2	20	—		20	100	106	+ 6
3	20	—		20	100	106	+ 6
4	20	2	Easter	18	100	97	— 3
5	20	—		20	100	106	+ 6
6	20	1	Whitsun	19	100	98	— 2
7	20	—		20	100	106	+ 6
8	20	10	Summer	10	100	54	- 46
9	20	—		20	100	106	+ 6
10	20	—		20	100	106	+ 6
11	20	—		20	100	106	+ 6
12	20	—		20	100	106	+ 6
13	20	2	Christmas	18	100	97	— 3
	260	15		245	£1,300	£1,300	— —

FIGURE 32

(*See page* 196)

Stock Control Account Material Group A

Date	Particulars	Standard Value			Price Variance			
		Dr £	Cr. £	Bal. £	Dr. £	Cr. £	Bal £	Ratio to Standard Value %
19 ...								
Oct. 1	By Opening Balance	1,000		1,000	— 250		- 250	*25 000*
Oct. 31	To Purchases .	800		1,800	- 350		— 600	*33 333*
Oct. 31	By Issues .		900	900		300	300	*33 333*
Nov. 30	To Purchases . . .	1,100		2,000	— 500		- 800	*40 000*
Nov. 30	By Issues . . .		800	1,200		320	— 480	*40 000*

FIGURE 33

(*See page* 197)

Actual Material Cost and Price Variance by Departments

Period No
Ending 31st October

Dept	Standard Value of Consumption by Groups						Group Price Variance Percentages					Total	
												P.V.	Value
	A	B	C	D	E	Total	A	B	C	D	E	£	£
	£	£	£	£	£	£							
1	50	90	—	140	—	280						— 67	347
2	—	110	300	80	—	490						— 74	564
3	150	50	—	20	—	220	*33⅓*	*25*	*10*	*20*	*15*	— 67	287
4	300	150	140	300	200	1,090						241	1,331
5	200	—	60	100	—	360						92	452
6	200	—	100	160	—	460						— 109	569
	£900	£400	£600	£800	£200	£2,900						£ —650	£3,550

FIGURE 34

(*See page* 198)

Purchase Analysis by Material Groups

Period No..... .....

Ending.... ....19....

Matl. Group	Account Name	Account No.	Purchases Standard £	Purchases Rev. Std £	Purchases Actual £	Price Variance Total £	Price Variance Revisions £	Price Variance Control-lable £	P.V. Cumulative to Date Standard £	P.V. Cumulative to Date Actual £	Price Variance Factors Current	Price Variance Factors 3 Mths. to Date
A	Scrap and Pig ..											
B	Alloys . ..											
C	Refractories ..											
D	Timber											
E	Grinding Wheels	451										
F	Electrodes ..	467										
G	Machine Tools..	472										
H	Indirect	490										
	Electricity ..	422										
	Insurance ..	440										

FIGURE 35

(*See page* 209)

Deptl. Analysis of Variance to show Treatment of Rectifications and Methods

Account	Std. Cost	Std. All'ce	Revised Std. All'ce	Actual Cost	Total Variance	Variance Analysis							
						Volume	Re-visions	Price	Controllable				
									Expense	Scrap	Rect	Re-Route	Methods
	£	£	£	£	£	£	£	£	£	£	£	£	£
Indirect Labour ..	100	100	120	145	— 45		— 20		— 5	— 10	— 10		
National Bonus ..	20	16	16	21	— 1	+ 4			— 1	— 2	— 2		
Overtime Premium .	5	4	4	4	+ 1	+ 1							
Idle Time	—	—	—	3	— 3				— 3				
Indirect Materials ..	40	40	34	44	— 4		+ 6		— 2	— 4	— 4		
Maintenance	35	35	35	47	— 12			— 3	— 1	— 4	— 4		
Fuel	130	130	138	174	— 44		— 8	+ 5	— 15	— 13	— 13		
Supervision	150	130	140	150	—	+ 20	— 10		+ 20	— 15	— 15		
Space Heating . ..	20	24	24	33	— 13	— 4		— 3	— 2	— 2	— 2		
	500	479	511	621	—121	+ 21	— 32	— 1	— 9	— 50	— 50		
Rectifications 10% ..	50	50	50	—	+ 50						+ 50		
Methods									+ 11				— 11
	550	529	561	621	— 71	+ 21	— 32	— 1	+ 2	— 50	—		— 11

N.B.—The standard cost of actual scrap and rectifications would usually also contain elements of direct labour and, perhaps, direct materials.

FIGURE 36

(*See page* 209)

Manufacturing Summary to Show Treatment of Scrap

Dept.	St'd Cost	All'd Cost	Actual Cost	Total Variance	Variance Analysis		
					Expense	Scrap	All Others
	£	£	£	£	£	£	£
A	500	525	526	— 26	— 2	— 5	— 19
B	180	215	195	— 15	— 8	— 10	+ 3
C	120	110	143	— 23	— 12		— 11
	800	850	864	— 64	— 22	— 15	— 27
5% Scrap	40	40	—	+ 40		+ 40	
Cost in A of work scrapped in B					+ 17	— 17	
	840	890	864	— 24	— 5	+ 8	— 27

FIGURE 37

(*See page* 224)

Departmental Budgets

DEPT. A (PRODUCTION)

Units 1,000. *Clock Hours* 5,000. *Standard Hours* 6,000

		Budget £		Rate per Std. Hour £		Rate per Actual Hour £		Rate per Unit £	
Direct Labour	V.		300		·050		·060		·300
Direct Material	V.		450		·075		·090		·450
Direct Expense:									
Indirect Materials	V.	90		·015		·018		·090	
Supervision	S.V.	60		·010		·012		·060	
O'time Premium	S.V.	30		·005		·006		·030	
		—	180	—	·030	—	·036	—	·180
			930		·155		·186		·930
Overhead:—									
Variable			210		·035		·042		·210
Fixed			300		·050		·060		·300
			£1,440		£·240		£·288		£1·440

DEPT. B (PRODUCTION)

Units 1,000. *Clock Hours* 8,000. *Standard Hours* 9,600.

Direct Labour	V.		960		·100		·120		·960
Direct Material	V.		240		·025		·030		·240
Direct Expense:—									
Labourers	V.	288		·030		·036		·288	
Supervision	S.V.	96		·010		·012		·096	
O'time Premium	S.V.	96		·010		·012		·096	
		—	480	—	·050	—	·060	—	·480
			1,680		·175		·210		1·680
Overhead:—									
Variable			384		·040		·048		·384
Fixed			576		060		·072		·576
			£2,640		£·275		£·330		£2·640

FIGURE 38

(*See page* 224)

Overhead Budgets

Units 1,000. *Clock Hours* 13,000. *Std. Hours* 15,600.

FACTORY—OR VARIABLE—OVERHEAD

		Budget	Apportionments to Depts.	
			A	B
		£	£	£
Wages Dept.	S.-V.	100	25	75
Clerical	S.-V.	80	40	40
Maintenance	S.-V.	212	55	157
W.C. Insurance . .	S.-V.	82	20	62
Storekeepers	S.-V.	120	70	50
		£594	£210	£384

FIXED OVERHEAD

Salaries	F.	530	170	360
Insurances	F.	96	30	66
Depreciation	F.	250	100	150
		£876	£300	£576

FIGURE 39

(*See page* 224)

Summary Operating Budget

	Budget	Allocations to	
		Stock	Sales
Quantity (Units)	1,000	150	850
	£	£	£
Dept. A	930		
Dept. B	1,680		
Variable Overhead	594		
	3,204		
10% Scrap . ..	320		
	£3,524	£528	£2,996

N.B.—Marginal Cost per Unit or Article is $\frac{£3,524}{1,000} = £3\ 10s.\ 6d.$

FIGURE 40

(*See page* 231)

Actual Scrap Analysis

Dept.	Factory Order	Quantity Scrapped (Units)						Standard Hours on Scrap in Culpable Dept.	
		Total Gross	Net in Last Dept.						
			All Scrap	¾ Scrap	½ Scrap	¼ Scrap	Net Total	Per Unit	Total
A	B	C	D—1	D—2	D—3	D—4	D	E	F = DE
B		200	100	40	28	32	152	9 6	1,459
A		100	40	20	20	20	70	6 0	420

"Culpable" Dept.	Details	Charge to Variation Sheet			Total Actual Scrap (at Standard)
		Dept. A	Dept. B	Summary	
		£	£	£	£
B	(1) Standard Cost incurred by Culpable Dept :—				
	(*a*) Direct Cost, 1,459 Standard Hours at £ 175 .		257		257
	(*b*) Factory Overhead, 1,459 Standard Hours at £ 040 .			57	57
	(2) Standard Cost incurred in A Dept.:—				
	(*a*) Direct Cost, 200 Units at £ 930			186	186
	(*b*) Factory Overhead, 200 Units at £ 210 . .			42	42
A	(3) Standard Cost incurred by Culpable Dept.:—				
	(*a*) Direct Cost, 420 Standard Hours at £.155	65			65
	(*b*) Factory Overhead, 420 Standard Hours at £ 035 ..			15	15
	TOTAL STANDARD VALUE OF ACTUAL SCRAP . ..	£65	£257	£300	£622

FIGURE 41

(*See page* 233)

Cost Recap Sheet

DEPT. A *Period Ended* . . . . . .

Account	Standard Price		Actual Prices						Total	
	Stores	Actual Cost Factor	Stores	Pur-chases	Wages	Salaries	Cash	Pro-visions	Standard	Actual
A	B	C	D=BC	E	F	G	H	J	K	L
Direct Materials:										
1—32 . .	300	1·20	360						300	360
2—41 . .	100	1·13	113						100	113
3—51 . .	206	1·10	227						206	227
	606		700						606	700
Direct Labour . .					470				470	470
Direct Expense:										
Ind. Materials . .	93	1·50	140						93	140
Supervision . .						90			90	90
O'time Premium					55				55	55
Idle Time . .					18				18	18
Total . .	699		840		543	90			1,332	1,473

FIGURE 42

(*See page* 233)

Cost Recap Sheet

DEPT. B *Period Ended*.....

Account	Standard Prices		Actual Prices						Total	
	Stores	Actual Cost Factor	Stores	Pur-chases	Wages	Salaries	Cash	Pro-visions	Standard	Actual
A	B	C	D=BC	E	F	G	H	J	K	L
Direct Material:										
1—31 ..	100	1·18	118						100	118
3—51 ..	160	1·10	176						160	176
	260		294						260	294
Direct Labour ..					1,300				1,300	1,300
Direct Expense:										
Labourers ..					375				375	375
Supervision ..						100			100	100
O'time Premium					110				110	110
Idle Time ..					14				14	14
Total	260		294		1,799	100			2,159	2,193

FIGURE 43

(*See page* 233)

Cost Recap Sheet

DEPT. OVERHEAD *Period Ended* ... .

Account	Standard Prices		Actual Prices						Total	
	Stores	Actual Cost Factor	Stores	Pur-chases	Wages	Salaries	Cash	Pro-visions	Standard	Actual
A	B	C	D=BC	E	F	G	H	J	K	L
Variable Factory:										
Wages Dept. ..						150			150	150
Clerical					47	80			127	127
Maintenance ..	100	1·40	140	80	40		20		240	280
W.C.Insurance								120	120	120
Storekeepers ..					130	40			170	170
	100		140	80	217	270	20	120	807	847
Fixed:										
Salaries						560			560	560
Insurances ..								96	96	96
Depreciation ..								225	225	225
						560		321	881	881
Total	100		140	80	217	830	20	441	1,688	1,728

FIGURE 44

(*See page* 233)

Cost Recap Sheet

DEPT. SUMMARY *Period Ended*.....

Account	Standard Prices		Actual Prices						Total	
	Stores	Actual Cost Factor	Stores	Pur-chases	Wages	Salaries	Cash	Pro-visions	Standard	Actual
A	B	C	D=BC	E	F	G	H	J	K	L
Dept. A ..	699		840		543	90			1,332	1,473
Dept. B ..	260		294		1,799	100			2,159	2,193
Overhead ..	100		140	80	217	830	20	441	1,688	1,728
	1,059		1,274	80	2,559	1,020	20	441	5,179	5,394
Selling and Distribution ..										

FIGURE 45

(*See page* 226)

Departmental Variation Sheet

STD. HOURS PRODUCED 8,400
NORMAL STD. HOURS 6,000
DEP'T'L ACTIVITY 140%

ACTUAL HOURS 6,300 EFFICIENCY 133⅓%

DEPT..... No. A

Period No. 1 *Ended*.....19....

Production Centre, Material Specification or Account	Hours			Rates		Standard Cost						
	Std.	Allowed	Actual	Basic	Revised	Std. Rate at Std. Hours	Revised Rate			Std. Allowance	Revision Factor	Revised Allowance
							Std. Hours	Allowed Hours	Actual Hours			
A	B	C	D	E	F	G = BE	H = BF	J = CF	K = DF	L	M	N = LM
Direct Labour	8,400	8,600	6,300	·050	·054	420	455	464	341	420	—	455
Direct Material:—												
1—32				·050	·050	420	420			420		420
2—41				·020	·020	168	168			168		168
3—51				·005	·005	42	42			42		42
						630	630			630		630
Direct Expense:—												
Indirect Material V.				·015	·015	126	126			126	1·00	126
Supervision .. S.-V.				·010	·010	84	84			72	1·10	79
Overtime Premium S.-V.				·005	·005	42	42			34	1·20	41
Idle Time												
						252	252			232		246
TOTAL DIRECT COST ..	8,400	8,600	6,300			1,302	1,337	464	341	1,282		1,331
Overhead:—												
Fixed:—												
Overtime			1,200			— 72	— 72			+ 72		+ 72
Calendar			+ 400	·060	·060	+ 24	+ 24			+ 24	1·00	+ 24
Idle Time			— 300			— 18	— 18			+ 18		— 18
Idle Facilities ..												
Normal			5,000			+ 300	+ 300			+ 300		+ 300
Efficiency			+ 700			+ 42	+ 42			+ 42		+ 42
			7,000			+ 420	+ 420			+ 420		+ 420
Variable	8,400			·035	·035	294	294			294	1·00	294
TOTAL OVERHEAD ..						714	714			714		714
TOTAL DEPARTMENTAL COST						2,016	2,051					
TOTAL VARIABLE COST ..						1,596	1,631			1,576		1,625

Actual Cost		Total Variance	Variance Analysis										Actual Cost per Standard Hour
			Volume	Revisions	Controllable								
					Total	Labour			Material		Expense		
						Extra All'ces	Efficiency	Rates of Pay	Quantity	Price	Scrap	General	
At Standard Prices	At Actual Prices												
O¹	O²	P = G—O²	Q = G—L	R = L—N	S N—O²	T H—J	U J—K	V K—O²-Y	W H O¹-Y	X O¹—O²	Y	Z N O¹-Y	ZZ = O²/B
470	470	— 50		— 35	— 15	— 9	+ 123	— 108			— 21		·056
300	360	+ 60			— 60				+ 142	— 60	— 22		
100	113	+ 55			+ 55				+ 76	— 13	— 8		
206	227	— 185			— 185				— 162	— 21	— 2		
606	700	— 70			— 70				+ 56	— 94	— 32		·083
93	140				— 14					— 47	— 6	+ 39	
90	90		+ 12	— 7	— 11						— 4	— 7	
55	55		+ 8	— 7	— 14						— 2	— 12	
18	18				— 18							— 18	
256	303	— 51	+ 20	— 14	— 57					— 47	— 12	+ 2	·036
1,332	1,473	— 171	+ 20	— 49	— 142	— 9	+ 123	— 108	+ 56	— 141	— 65	+ 2	·175
		+ 72			+ 72							+ 72	
		+ 24			+ 24							+ 24	
		— 18			— 18							— 18	
300	300	+ 42			+ 42							+ 42	
300	300	+ 120			+ 120							+ 120	·040
294	294												·035
594	594	+ 120			+ 120							+ 120	·075
1,926	2,067	— 51	+ 20	— 49	— 22	— 9	+ 123	— 108	+ 56	— 141	— 65	+ 122	·250
1,626	1,767	— 171	+ 20	— 49	— 142	— 9	+ 123	— 108	+ 56	— 141	— 65	+ 2	·210

FIGURE 46

(*See page* 226)

Departmental Variation Sheet

STD. HOURS PRODUCED 11,520
NORMAL STD. HOURS 9,600
DEP'T'L ACTIVITY 120%

ACTUAL HOURS 10,000 EFFICIENCY 115%

DEPT..... No. B

Period No. 1 *Ended*.....19...

Production Centre, Material Specification or Account	Hours			Rates		Standard Cost				Std. Allowance	Revision Factor	Revised Allowance	Actual Cost at Standard Prices	Actual Cost at Actual Prices	Total Variance	Variance Analysis									Actual Cost per Standard Hour
						Standard Hours		Allowed Hours at Revised Rate	Actual Hours at Revised Rate							Volume	Revisions	Controllable							
																		Total	Labour			Material		Expense		
						At Basic Rate	At Revised Rate												Extra All'ces	Efficiency	Rates of Pay	Quantity	Price	Scrap	General	
A	Standard B	Allowed C	Actual D	Basic E	Revised F	G = BE	H = BF	J = CF	K = DF	L	M	N = LM	O¹	O²	P G—O²	Q = G—L	R = L—N	S = N—O²	T = H—J	U = J—K	V = K—O²—Y	W = H—O¹—Y	X = O¹—O²	Y	Z = N—O¹—Y	ZZ = O²/B
Direct Labour	11,520	11,600	10,000	·100	·108	1,152	1,248	1,253	1,080	1,152		1,248	1,300	1,300	— 148		— 96	— 52	— 5	+ 173	— 74			— 146		·112
Direct Material:—																										
1—31				·015	·015	173	173			173		173	100	118	+ 55			+ 55				+ 95	— 18	— 22		
3—51				·010	·010	115	115			115		115	160	176	— 61			— 61				— 30	— 16	— 15		
						288	288			288		288	260	294	— 6			— 6				+ 65	— 34	— 37		·026
Direct Expense:																										
Labourers V.				·030	·030	346	346			346	1·15	398	375	375	— 29		— 52	+ 23						— 46	+ 69	
Supervision S.-V.				·010	·010	115	115			108	1·00	108	100	100	+ 15	+ 7		+ 8						— 14	+ 22	
Overtime Premiums S.-V.				·010	·010	115	115			105	1·00	105	110	110	+ 5	+ 10		— 5						— 14	+ 9	
Idle Time													14	14	— 14			— 14							— 14	
						576	576			559		611	599	599	— 23	+ 17	— 52	+ 12						— 74	+ 86	·052
TOTAL DIRECT COST						2,016	2,112	1,253	1,080	1,999		2,147	2,159	2,193	— 177	+ 17	— 148	— 46	— 5	+ 173	— 74	+ 65	— 34	— 257	+ 86	·190
Overhead:—																										
Fixed:—																										
Overtime			1,560			112	112			112		112			+ 112			+ 112							+ 112	
Calendar			640			46	46			46		46			+ 46			+ 46							+ 46	
Idle Time			— 200	·072	·072	— 14	— 14			— 14	1·00	— 14			— 14			— 14							— 14	
Idle Facilities																										
Normal			8,000			576	576			576		576	576	576											— 29	
Efficiency			— 400			— 29	— 29			— 29		— 29			— 29			— 29								
			9,600			691	691			691		691	576	576	+ 115			+ 115							+ 115	·050
Variable	11,520			·040	·040	461	461			461	1·04	479	479	479	— 18		— 18									·040
Total Overhead						1,152	1,152			1,152		1,170	1,055	1,055	+ 97		— 18	+ 115							+ 115	·090
Total Departmental Cost						3,168	3,264			3,151		3,317	3,214	3,248	— 80	+ 17	— 166	+ 69	— 5	+ 173	— 74	+ 65	— 34	— 257	+ 201	·280
TOTAL VARIABLE COST						2,477	2,573			2,460		2,626	2,638	2,672	— 195	+ 17	— 166	— 46	— 5	+ 173	— 74	+ 65	— 34	— 257	+ 86	·230

FIGURE 47

(*See page 227*)

Overhead Variation Sheet

ABSORBED: £755
NORMAL: £594
ACTIVITY: 127%

Period No. 1, *Ending*.....

Account A	Normal Budget B	Actual Overhead Absorbed (C. in C.) C	Std. Allowance D	Revisions Factor E	Revised Allowance F = DE	Actual Cost: At Std. Prices G	Actual Cost: At Actual Prices H	Total Variance J = C—H	Variance Analysis: Volume K = C—D	Variance Analysis: Revisions L = D—F	Variance Analysis: Controllable: Total M = F—H	Variance Analysis: Controllable: Price N = G—H	Variance Analysis: Controllable: Scrap P	Variance Analysis: Controllable: General R = M—N—P
Variable:														
Wages Dept. .. S.-V.	100		120		120	150	150				— 30			
Clerical .. .. S.-V.	80		110		110	127	127				— 17			
Maintenance .. S.-V.	212		260		260	240	280				— 20			
W.C. Insurance .. S.-V.	82		100	1·20	120	120	120							
Storekeepers .. S.-V.	120		150		150	170	170				— 20			
	£594	755	740		760	807	847	—92	+ 15	— 20	— 87	— 40		— 47
Fixed:														
Salaries .. .. F.	530		530		530	560	560				— 30			— 30
Insurances .. F.	96		96		96	96	96							
Depreciation .. F.	250		250	·90	225	225	225							
	£876	1,111	876		851	881	881	+ 230	+ 235	+ 25	— 30			— 30
Total	£1,470	1,866	1,616		1,611	1,688	1,728	+ 138	+ 250	+ 5	— 117	— 40		— 77

FIGURE 48

(*See page* 236)

Over/Under Absorption of Overheads

Department	Revised Overhead Absorption in Production Depts.	Actual Overheads as per Overhead Variation Sheet	Over (+) or Under (—) Absorption			
			Total	Volume	Controllable in total	Revisions
A	B	C	D= B—C	E	F	G
	£	£				
A—Variable ..	294					
B—Variable ..	479					
	773	847	— 74	+ 15	— 87	— 2
A—Fixed ..	420					
B —Fixed ..	691					
	1,111	881	+ 230	+ 235	— 30	+ 25
Total Both Depts.	1,884	1,728	+ 156	+ 250	— 117	+ 23

FIGURE 49

(*See page* 236)

Summary Operating Statement

Period No. 1. *Ended*

Department	Activity %	Std. Cost or C.-in-C.	Actual Cost	Total Variance	Variance Analysis									Ratio of Actual to Std.
					Volume	Revisions	Controllable							
							Total	Labour		Material		Expense		
								Rates	Efficiency	Quantity	Price	Scrap	Genl.	
		£	£	£	£	£	£	£	£	£	£	£	£	
Production—A	140	1,302	1,473	— 171	+ 20	— 49	— 142	— 108	+ 114	+ 56	— 141	— 65	+ 2	
Production—B	120	2,016	2,193	— 177	+ 17	— 148	— 46	— 74	+ 168	— 65	— 34	— 257	+ 86	
Overhead—Variable	127	755	847	— 92	+ 15	— 20	— 87				— 40	—	— 47	
		4,073	4,513	— 440	— 52	— 217	— 275	— 182	+ 282	+ 121	— 215	— 322	+ 41	
Actual Scrap Balance								+ 60		+ 90		— 300	+ 150	
10% Scrap Allowance		407	—	+ 407			+ 407					+ 407		
Fixed Overhead	127	1,111	881	+ 230	+ 235	+ 25	— 30						— 30	
Total	127	5,591	5,394	+ 197	+ 287	— 192	+ 102	— 122	+ 282	+ 211	— 215	— 215	+ 161	

CUMULATIVE

All Depts.:—														
Period 1	127	5,591	5,394	+ 197	+ 287	— 192	+ 102	— 122	+ 282	+ 211	— 215	— 215	+ 161	
Period 2														
Period 3														
Period 4														
Period 5														
Period 6														
Period 7														
Period 8														
Period 9														
Period 10														
Period 11														
Period 12														
Period 13														
All Depts. Total	127	5,591	5,394	+ 197	+ 287	— 192	+ 102	— 122	+ 282	+ 211	— 215	— 215	+ 161	

FIGURE 50

(*See page* 242)

Summary Operating Statement showing Distribution of Production Cost

Department	Activity %	Std. Cost or C-in-C	Actual Cost	Total Variance	Variance Analysis								
					Volume	Revisions	Controllable Total	Labour Rates	Labour Efficiency	Material Quantity	Material Price	Expense Scrap	Expense Genl.
		£	£	£	£	£	£	£	£	£	£	£	£
Production—A	140	1,302	1,473	— 171	+ 20	— 49	— 142	— 108	+ 114	+ 56	— 141	— 65	+ 2
Production—B	120	2,016	2,193	— 177	+ 17	— 148	— 46	— 74	+ 168	+ 65	— 34	— 257	+ 86
Service—Maintenance	125	500	580	— 80	— 10	— 12	— 78	+ 40	— 40	— 20	— 38		— 20
Variable Overhead	127	755	847	— 92	+ 15	— 20	— 87				— 40		— 47
		4,573	5,093	— 520	+ 62	— 229	— 353	— 142	+ 242	+ 101	— 253	— 322	+ 21
Balance of Actual Scrap								+ 60		+ 90		— 300	+ 150
10% Scrap Allowance		407	—	+ 407			+ 407					+ 407	
		4,980	5,093	— 113	+ 62	— 229	— 54	— 82	+ 242	+ 191	— 253	— 215	+ 171
Fixed Overhead	127	1,111	881	+ 230	+ 235	— 25	— 30						— 30
	127	6,091	5,974	+ 117	+ 297	— 204	+ 24	— 82	+ 242	+ 191	— 253	— 215	+ 141

DISTRIBUTION

Stock		1,129	1,136	— 7		— 55	+ 48						
Cost of Sales		3,389	3,426	— 37		— 164	+ 127						
Profit and Loss.—													
Fixed Overhead		1,111	881	+ 230	+ 235	+ 25	— 30						
Volume Variance		62	—	+ 62	+ 62								
Over/Under absorption		—	137	— 137			— 137						
Capital		400	394	+ 6		— 10	+ 16						
		6,091	5,974	+ 117	+ 297	— 204	+ 24						
Duplicated-Maintenance		100	100										
Actual Costs		5,991	5,874	+ 117	+ 297	— 204	+ 24						

FIGURE 51

(*See page* 247)

Profit Variance—Analysis by Selling Outlets

	Sales Analysis by Selling Outlets											
	Total			Wholesale			Chain Store			Export		
	Units	Rate	£	Units	Rate	£	Units	Rate	£	Units	Rate	£
					s. d.			s. d.			s. d.	
1. Budgeted Sales at Standard Prices	50,000		120,000	20,000	50 0	50,000	20,000	40 0	40,000	10,000	60 0	30,000
2. Actual Sales at Standard Ratio and Prices	60,000		144,000	24,000	50 0	60,000	24,000	40 0	48,000	12,000	60 0	36,000
3. Actual Sales Variety at Standard Prices	60,000		142,500	15,000	50 0	37,500	30,000	40 0	60,000	15,000	60 0	45,000
4. Actual Sales Variety at Actual Prices	60,000		150,000	15,000	50 0	37,500	30,000	40 0	60,000	15,000	70 0	52,500
5. Standard Cost of Budgeted Sales	50,000		99,500	20,000	45 0	45,000	20,000	32 0	32,000	10,000	45 0	22,500
6. Standard Cost of Actual Sales	60,000		115,500	15,000	45 0	33,750	30,000	32 0	48,000	15,000	45 0	33,750
7. Actual Cost of Actual Sales	60,000		127,050	15,000	49 6	37,125	30,000	35 2½	52,800	15,000	49 6	37,125
8. Budgeted Expense of Budgeted Sales	50,000		1,750	20,000	1 0	1,000	20,000	6	500	10,000	6	250
9. Standard Expense of Actual Sales	60,000		1,875	15,000	1 0	750	30,000	6	750	15,000	6	375
10. Actual Expense of Actual Sales	60,000		2,000	15,000	8	500	30,000	6	750	15,000	1 0	7

FIGURE 52

(*See page* 247)

Analysis of Profit Variance by Reasons and Selling Outlets

		Profit and Loss Variance							
		Total		Wholesale		Chain Store		Export	
		Detail	£	Detail	£	Detail	£	Detail	£
Budgeted Profit			+ 18,750		+ 4,000		+ 7,500		+ 7,250
Operating Variances:									
Production (Profit Margin)	6–7	— 11,550		— 3,375		— 4,800		— 3,375	
Administration	—								
Selling and Distribution	9–10	— 125	— 11,675	+ 250	— 3,125		— 4,800	— 375	— 3,750
Volume Variances:									
Production	—								
Administration	—								
Sales	1–2	+ 24,000		+ 10,000		+ 8,000		+ 6,000	
Cost of Sales	5–6	— 16,000		+ 11,250		— 16,000		— 11,250	
Selling and Distribution	8–9	— 125	+ 7,875	+ 250	+ 21,500	— 250	— 8,250	— 125	— 5,375
Price Variances:									
Sales	2–4	+ 6,000		— 22,500		+ 12,000		+ 16,500	
Materials	—		+ 6,000		— 22,500		+ 12,000		+ 16,500
Extraordinary Items: (Excluded from Cost)	—		—		—		—		—
Actual Profit			+ 20.950		— 125		+ 6,450		+ 14,625

FIGURE 53

(*See page* 247)

Trading and Profit and Loss Statement

		Current Period . . . . . Weeks Ended 19			Cumulative . . . . . Weeks Ended . . . . . 19 . .		
			£	%		£	%
1	**Budgeted Sales**		120,000				
2	±*Sales Variance:*—						
3	Volume	+ 24,000					
4	Variety	— 1,500					
5	Mark-up	+ 7,500					
6			+ 30,000				
7	**Actual Sales**		150,000	100			100
8	—*Standard Cost of Sales:*—						
9	Manufacturing	115,625					
10	S. & D. Budget	1,750					
11			117,375				
12	**Standard Gross Profit** . .		32,625				
13	±*Cost Variance:*—						
14	Price (Materials) . .						
15	Revisions						
16	Profit Margin (Manufacturing Conditions) . .	— 11,550					
17	S. & D. (Conditions) . .	— 125					
18			— 11,675				
19	**Actual Gross Profit** . .		20,950				
20	±*Abnormal Expenses, etc.:*						
21	Fixed Expense Budget . .						
22	Fixed Expense (Conditions Variance) . .						
23	Volume Variance . .						
24	Over/Under absorption						
25	of Overheads						
26							
27	**Actual Net Profit**	£			£		
28							

FIGURE 54

(*See page* 260)

Three Conceptions of Depreciation

Year	Life Expired	A Accounting		B Budgetary Control and Costing		C Inland Revenue	
		Asset Value	Cum. Allowance	Asset Value	Cum. Allowance	Asset Value	Cum. Allowance
		£	£	£	£	£	£
1946	1	1,000		1,000		1,000	
		100	100	125	125	275	200 I.A. 75 W.T.
		900		875		725	
1947	2	100	200	125	250	54	329
		800		750		671	
1948	3	100	300	125	375	50	379
		700		625		621	
1949	4	100	400	125	500	47	426
		600		500		574	
1950	5	100	500	125	625	43	469
		500		375		531	
1951	6	100	600	125	750	40	509
		400		250		491	
1952	7	100	700	125	875	37	546
		300		125		454	
1953	8	100	800	125	1,000	34	580
		200		—		420	
1954	9	100	900	125	1,125	32	612
		100		—		388	
1955	10	100	1,000	125	1,250	29	641
		—		—		359	
1956	11	—	1,000	125	1,375	27	668
		—		—		332	
1957	12	—	1,000	125	1,500	25	693
						307	
Residual Value						120	813
						187	
Balancing Allowance						187	1,000
						—	

FIGURE 55

(*See page* 262)

Establishment of Price Ratios

Year A	Ratio to Original Price B	Replacement Value C	Ratio to Basic Year D
	%	£	%
1936	100	400	25
1937	160	640	40
1938	200	800	50
1939	240	960	60
1940	280	1,120	70
1941	320	1,280	80
1942	360	1,440	90
1943	**400**	**1,600**	**100**
1944	440	1,760	110
1945	480	1,920	120
1946	500	2,000	125
1947	520	2,080	130
1948	540	2,160	135
1949	560	2,240	140

FIGURE 56

(*See page* 264)

Asset Depreciation Record

CASE "A"

		Original Cost £	Year of Purchase	Price Index for Purchase Year	Ratio of Price in Current to Basic Year	Cost Equivalent	
						Basic Year £	Current Year £
		A	B	C	D	E = 100A / C	F = E × D / 100
	1936	400	1936	25			
	1937						
	1938						
	1939						
	1940						
	1941						
	1942	400					
Basic Year	1943	400		25	100	1,600	1,600
	1944				110	1,600	1,760
	1945				120	1,600	1,920
	1946				125	1,600	2,000
	1947				130	1,600	2,080
Year of Sale	1948				135	1,600	2,160
Current Year	1949				140	1,600	2,240

Straight Line Dep'n Rate %	Life Expired in Years	Residual Value Obtained £	Cumulative Depreciation on Original Cost £	Depreciation on Replacement Cost		Total Depreciation		Profit Appropriation	
				Current Year £	Cumulative £	Written Off £	Needed £	Cumulative £	Current Year £
G	H	J	K = AGH	L = F × G / 100	M	N = J+K+M	P = FGH / 100	Q = P − N	R
	1								
	2								
	3								
	4								
	5								
	6								
10	7		280			280			
10	8		280	160	160	440	1,280	840	840
10	9		280	176	336	616	1,584	968	128
10	10		280	192	528	808	1,920	1,112	144
10			280		528	808	2,000	1,192	80
10			280		528	808	2,080	1,272	80
10		300	280		528	1,108	2,160	1,052	*220*
10		300	280		528	1,108	2,240	1,132	80

CASE "B"

		Original Cost £	Year of Purchase	Price Index for Purchase Year	Ratio of Price in Current to Basic Year	Cost Equivalent	
						Basic Year £	Current Year £
		A	B	C	D	E = 100A / C	F = E × D / 100
	1936	400	1936	25			
	1937						
	1938						
	1939						
	1940						
	1941						
	1942	400					
Basic Year	1943	400		25	100	1,600	1,600
	1944				110	1,600	1,760
	1945				120	1,600	1,920
	1946				125	1,600	2,000
	1947				130	1,600	2,080
Year of Sale	1948				135	1,600	2,160
Current Year	1949				140	1,600	2,240

Straight Line Dep'n Rate %	Life Expired in Years	Residual Value Obtained £	Cumulative Depreciation on Original Cost £	Depreciation on Replacement Cost		Total Depreciation		Profit Appropriation	
				Current Year £	Cumulative £	Written Off £	Needed £	Cumulative £	Current Year £
G	H	J	K = AGH	L = F × G / 100	M	N = J+K+M	P = FGH / 100	Q = P − N	R
	1								
	2								
	3								
	4								
	5								
	6								
10	7		280			280			
10	8		280	160	160	440	1,280	840	840
10	9		280	176	336	616	1,584	968	128
10	10		280	192	528	808	1,920	1,112	144
10	11		280	200	728	1,008	2,200	1,192	80
10	12		280	208	936	1,216	2,496	1,280	88
10	13	300	280	216	1,152	1,732	2,808	1,076	*204*
10		300	280		1,152	1,732	2,912	1,180	104

CASE "C"

		Original Cost £	Year of Purchase	Price Index for Purchase Year	Ratio of Price in Current to Basic Year	Cost Equivalent	
						Basic Year £	Current Year £
		A	B	C	D	E = 100A / C	F = E × D / 100
	1936	400	1936	25			
	1937						
	1938						
	1939						
Year of Sale	1940	400					
	1941						
	1942						
Basic Year	1943	400		25	100	1,600	1,600
	1944				110	1,600	1,760
	1945				120	1,600	1,920
	1946				125	1,600	2,000
	1947				130	1,600	2,080
	1948				135	1,600	2,160
Current Year	1949				140	1,600	2,240

Straight Line Dep'n Rate %	Life Expired in Years	Residual Value Obtained £	Cumulative Depreciation on Original Cost £	Depreciation on Replacement Cost		Total Depreciation		Profit Appropriation	
				Current Year £	Cumulative £	Written Off £	Needed £	Cumulative £	Current Year £
G	H	J	K = AGH	L = F × G / 100	M	N = J+K+M	P = FGH / 100	Q = P − N	R
10	5½	300	220						
10	5½	300	220			520	880	360	360
10	5½	300	220			520	968	448	88
10	5½	300	220			520	1,056	536	88
10	5½	300	220			520	1,100	580	44
10	5½	300	220			520	1,144	624	44
10	5½	300	220			520	1,188	668	44
10	5½	300	220			520	1,232	712	44

FIGURE 57

(*See page* 268)

Current Depreciation Summary

CURRENT YEAR 1949
BASIC YEAR 1943

Group	Original Cost	Transfers	Original Cost (Adjusted)	Year of Purchase	Price Index for Purchase Year	Ratio of Price in Current to Basic Year	Cost Equivalent		Straight Line Dep'n Rate	Life Expired		Residual Value Obtained	Cumulative Dep'n on Original Cost	Depreciation on Replacement Cost		Total Depreciation		Profit Appropriation			
							Basic Year	Current Year		Pre-Basic Years	Total Years			Current Year	Cumulative	Written Off	Needed	Cumulative Required	Current Year Required	Current Actual	Cumulative Actual
	£	£	£				£	£	%			£	£	£	£	£	£	£	£	£	£
	A^2	A^1	$A = A^2 - A^1$	B	C	D	$E = \frac{100A}{C}$	$F = \frac{ED}{100}$	G	H^1	H	J	$K = AGH^1$	$L = \frac{FG}{100}$	M	$N = J - K + M$	$P = \frac{FGH}{100}$	$Q = P - N$	R	S	T
1	5,000		5,000	1936	25	140	20,000	28,000	10	7	14		3,500	2,800	17,200	20,700	39,200	18,500	1,300		
2	400		400	1936	25	140	1,600	2,240	10	5½	5½	300	220	—	—	520	1,232	712	44		
3	6,000		6,000	1936	25	140	24,000	33,600	8	7	14		3,360	2,688	16,512	19,872	37,632	17,760	1,248		
4	2,500	— 500	2,000	1937	40	140	5,000	7,000	10	6	13		1,200	700	4,300	5,500	9,100	3,600	— 525		
5		+ 500	500	1937	40	140	1,250	1,750	10	6	12	50	300	—	900	1,250	2,100	850	850		
	13,900	—	13,900				51,850	72,590				350	8,580	6,188	38,912	47,842	89,264	41,422	2,917	2,500	41,005