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PRIMER OF COSTING

AN INTRODUCTION TO THE SCIENCE
OF COST ACCOUNTANCY

BY

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FELLOW OF THE CORPORATION OF ACCOUNTANTS

FORMERLY HON. SECRETARY AND MEMBER OF COUNCIL OF THE
INSTITUTE OF COST AND WORKS ACCOUNTANTS, ETC.

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PREFACE TO SECOND EDITION

THE development of the science of cost accounting has been most rapid, and the intensive study given to its problems by those engaged in the profession has contributed greatly to its present efficacy.

The depression of 1929 and the years following has given the best proofs of its value. These years, to modern business, have seen the survival of the fittest, and "the fittest" have proved to be those organizations operating an up-to-date system of cost accounting.

To the student prepared to make a study of cost accounting, the science provides an absorbing interest in which the field of endeavour ever widens, offering to the young men and women of to-day unlimited opportunity. To such a student these pages are dedicated, with the advice that the extent of success derived from this study will be measured entirely by the effort and application of each individual.

The object of this book is to enable the beginner to obtain a thorough knowledge and understanding of the elementary principles of costing, and to give descriptions of the various methods used in practice. The elementary principles and methods are also enlarged upon in such a manner as will indicate in a general way how they can be applied in practice.

In dealing with this subject, it is presupposed that the student has acquired a knowledge of Book-keeping and Accounts, a thorough understanding of which is necessary before the subject of cost accounting may be considered.

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PREFACE TO FIRST EDITION

COST accountancy has made such rapid strides during the past ten years that the excellent prospects which are now offered by this comparatively new profession have opened up a very wide field of opportunities for the young man and woman of to-day.

Much literature already exists which deals with the subject of cost accountancy, chiefly for the benefit of those who are already engaged in the profession, and which, consequently, is far too advanced to be of real assistance to those who wish to take the first step towards qualifying as cost accountants.

Furthermore, the training of a cost clerk has unfortunately been regarded as of little relative importance compared to that of the cost accountant. As a consequence, those wishing to enter a cost office as a means of livelihood are more or less without easy means of acquiring an elementary knowledge of the subject.

The recently instituted costing examination of the Royal Society of Arts should go far to remedy this defect, and it is hoped that this book may be of some service to students who intend to present themselves for this examination, as well as for students of the various professional bodies.

The object of this book, therefore, is, firstly, to enable the beginner to obtain a thorough knowledge and understanding of the elementary principles of costing and to give brief descriptions of the various methods used in practice ; and, secondly, to enlarge upon these elementary principles in such a manner as will indicate in a general way to the more advanced student how such methods and principles can be applied.

In dealing with the subject it is necessary to presuppose a knowledge of the principles of book-keeping and accounts.

Grateful acknowledgment is made by the author for the assistance given by Mr. H. J. Fells, B.A., in reading and correcting the proofs during preparation.

R. J. H. RYALL.

LONDON, W.C.1.

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ALSO BY
R. J. H. RYALL

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PRIMER OF COSTING

CHAPTER I

INTRODUCTORY

MUCH misapprehension exists as to what cost accountancy really involves or achieves, and it is therefore desirable to understand clearly the sphere of costing, and how, and to what extent, it differs from ordinary book-keeping and accounts.

It is obvious that when men engage in business they do so in order to obtain a profit. The more simple method of trading is that of merchanting, where a man buys ready-made goods from the makers or their agents and sells them at a higher price in order to make his activity profitable. The method, under normal circumstances, of guaranteeing himself such a profit is simple, as the actual business routine is not complicated, and the cost of such routine can easily be calculated.

Let us now consider a system of financial accounting in so far as the ordinary routine of business is concerned, and assume for the sake of illustration that a trader is engaged in buying ready-made suits for the purpose of sale. In such cases, a system of book-keeping and accounts will correctly record the trader's dealings with his creditors, his debtors, and his bank. It will also enable him to ascertain what money is owing to him or what he owes to his creditors, the total amount of profit made at the end of a trading period, and the amount of capital employed in his business, and numerous other figures relating to his financial or external transactions.

It may be, however, that the trader decides that it

would be more profitable to manufacture all or most of his lines, and it becomes necessary for him to rent a building or acquire a piece of land on which to build his own works. He will then have to buy cloth to work up into garments, and, in addition to this, a stock of buttons, cottons, linings, stiffenings, braid, and other miscellaneous materials must be kept, and a supply of needles, chalk, pins, etc., must also be available. Paper, tape, boxes, brown paper, string, and labels, all described as packing materials, become necessary.

Labour must next be hired to work the cloth into the finished product, and, in addition, there will be required cutters, who will cut out the material to the correct shape and size ; pressers, who press the finished garment ; a storekeeper, to look after the stock of materials ; mechanics, who will attend to the machines ; also sweepers, and numerous other kinds of sundry labour.

A factory manager is essential, to whom the foremen, the warehousemen, and the storekeeper will be responsible.

Plant, machinery, and equipment must be paid for ; also charges for gas, electric light and power, fuel for heating, and many other items of expense. Buildings and machinery will require repairs and renewals, and reserves must be made for depreciation.

It will now be seen that, with all these additional activities, there will be a corresponding increase in the number of financial transactions, and that a system of financial accountancy will require to be arranged to accommodate these changed conditions.

Financial accountancy, however, has developed along scientific lines, so that to-day a manufacturer is as well provided as the merchant with all the information he requires, on the purely financial side of his business. But a system of accounts which deals only with the financial or external transactions of a business will not meet all the requirements of a manufacturing concern ; and, in order to

show this, it is desirable to examine briefly the various accounts prepared from such a system at the end of a financial period.

Before such final accounts can be prepared, a trial

TRIAL BALANCE
AS AT 31ST DECEMBER, 19..

	Dr.	Cr.
	£	£
Cash at Bank	35,600	
Petty Cash	1,000	
Land	10,000	
Buildings	130,000	
Plant and Machinery	150,000	
¹ Sundry Debtors	52,000	
£110,000 Inventory, 1st January	110,000	
350,000 Purchases	350,000	
150,000 Works Pay Roll	150,000	
Salaries	65,000	
Office Supplies	3,000	
Taxes	12,000	
Depreciation—		
Buildings	2,600	
Equipment	15,000	
Carriage	2,500	
Insurance	900	
Light and Power	10,000	
215,300 { Water	1,000	
Travelling Expenses	23,000	
Commissions	6,600	
Royalties	2,500	
Advertising	12,000	
Discounts	1,500	
Interest on Overdraft	4,000	
General Expense	53,000	
Bad Debts	700	
Sales		750,000
Capital		400,000
Sundry Creditors		35,600
Reserve for Bad Debts		700
Reserve for Depreciation		17,600
	<u>£1,203,900</u>	<u>£1,203,900</u>

Inventory at 31st December, £145,000.

¹ These figures do not form part of a trial balance, but are inserted as notations only to enable the student to follow the explanation in subsequent chapters.

balance is first extracted from the ledgers. A Manufacturing and Trading and Profit and Loss Account must then be prepared, and finally a Balance Sheet is drawn up. The extent of this drawing up will naturally depend upon the size and nature of the business, but the example of the accounts referred to will be sufficient for our purpose.

TRADING AND PROFIT AND LOSS ACCOUNT

FOR THE YEAR ENDING 31ST DECEMBER, 19..

<i>Dr</i>				<i>Cr.</i>			
	£	s.	d.		£	s.	d.
Stock on Hand .	110,000	—	—	Sales . . .	750,000	—	—
Purchases . .	350,000	—	—	Stock on Hand	145,000	—	—
Wages . . .	150,000	—	—				
Gross Profit .	285,000	—	—				
	<u>£895,000</u>	—	—		<u>£895,000</u>	—	—
Salaries . . .	65,000	—	—	Gross Profit .	285,000	—	—
Office Supplies .	3,000	—	—				
Taxes . . .	12,000	—	—				
Depreciation .	17,600	—	—				
Carriage . . .	2,500	—	—				
Insurance . .	900	—	—				
Light and Power	10,000	—	—				
Water . . .	1,000	—	—				
Travelling . .	23,000	—	—				
Commissions .	6,600	—	—				
Royalties . .	2,500	—	—				
Advertising .	12,000	—	—				
Discounts . .	1,500	—	—				
Int. on Overdraft	4,000	—	—				
Bad Debts . .	700	—	—				
General Expense	53,000	—	—				
Net Profit . .	69,700	—	—				
	<u>£285,000</u>	—	—		<u>£285,000</u>	—	—

Note. The above account is not intended as a model from the accounting point of view, but is to illustrate a principle only.

It is assumed that the inventory is of raw material only. Usually there will be three inventories—raw material, work

BALANCE SHEET

31ST DECEMBER, 19..

<i>Liabilities</i>		<i>Assets</i>	
	£		£
<i>Current—</i>		<i>Current—</i>	
Sundry Creditors	.	Cash at Bank	35,600
		Cash on Hand	1,000
<i>Shareholders' Equity—</i>		Sundry Debtors	52,000
Capital :		Less Bad Debts Reserve	700
Subscribed and Paid	400,000	Inventory	51,300
Surplus Account	69,700		145,000
	<u>469,700</u>		<u>232,900</u>
		<i>Fixed—</i>	
		Land	10,000
		Buildings	130,000
		Less Reserve Depreciation	2,600
			<u>127,400</u>
		Equipment	150,000
		Less Reserve Depreciation	15,000
			<u>135,000</u>
			<u>272,400</u>
			<u><u>£505,300</u></u>
	<u><u>£505,300</u></u>		

in progress, and finished goods. Raw material and work in progress enter into manufacture, but, of course, the finished goods do not. In complete operating accounts, there would be definite distinctions made among the account that shows the cost of manufacture, the account that shows the gross profit from sales, and the account for profit and loss. Factory salaries, factory depreciation, carriage on raw material, factory insurance, factory light and power, water, and royalties for right of manufacture would all enter into the cost of manufacture; and if there is an account to show that cost, they would be included in that account.

The preceding accounts, when drawn up and arranged in sufficient detail to meet the particular requirements of the individual business, provide the manufacturer or trader with all the information he requires regarding the general finances of his business, but they are of very little value in the *control* of a manufacturing business, as such accounts do not show the cost of any particular stage in the manufacture of the final product, nor where in such stages there is any profit or loss. Moreover, they do not permit prompt comparison of the estimated with the actual cost of manufacturing. They give no clue as to how far time or material are efficiently utilized, or where waste is rampant and economies possible. To ascertain the cost of a single article, process, or batch of articles it becomes necessary to analyse the expenditure directly involved in their manufacture in such a manner as will show not only the elements which constitute a complete cost, but also various other data relating to the many activities of the factory.

Objects and Advantages of Costing

If a system of cost accountancy is to be of any real value to the manufacturer, it must be far more than a mere branch of ordinary financial accounting. Ordinary accounting deals with the *external* transactions of a business from a purely financial point of view, and in all cases in

Various methods of cost finding are used in practice, but these may be conveniently grouped under three main headings, i.e.—

- (1) Job costing.
- (2) Process costing.
- (3) Operative undertaking costing.

(1) **JOB COSTING**, which is very often referred to as the order method, is used when all the various items are charged to a specific order, which may be for one or a quantity of articles or for a particular operation.

With this method, the amount expended on labour and materials is charged to a particular order number, together with its share of expenses, and the sum total constitutes the cost of the job, order, or operation.

(2) **PROCESS COSTING** is employed in cases where there is a variety of processes or operations before a completed product is turned out, and where it is necessary to find the cost of each variety of operation. This method is particularly necessary where by-products naturally occur, or where one article out of a batch loses its identity during the process of manufacture. By this method comparison of the costs of different operations is possible, and prices at each stage can be fixed. Process costing is used in most food producing factories, chemical works, and in the manufacture of paint, etc.

(3) **OPERATIVE UNDERTAKING COSTING** is the essential method where services are rendered rather than goods produced. A single measurement demonstrates the work performed, though it may vary in kind, as when a railway company reckons work performed as per ton mile or per passenger mile, etc., or an electric supply company per kilowatt hour. Operative costs render possible the costing of transport undertakings and other public utility concerns, such as water works and gas works, etc.

Many other terms are often used to denote a method of costing, but all of them relate to one of the above. For

instance, SINGLE or OUTPUT COSTING is a term often used to denote the method of costing employed in such businesses as supply one rather than many products, and where it is desired to find the actual or average cost of one unit, weight, measurement, or container, as per ton, per yard, per 1,000 bricks.

Such a term, however, merely refers to the job or process method of costing. Most manufacturing businesses use either the job or process method, or a combination of the two, when departmentalization or a division into processes is usual or desirable.

DEPARTMENTAL COSTING is a term used when it is desired to ascertain the cost of the output of each department separately when a standard article or process only is made. The method used in such cases is also the job or process, or a combination of the two.

TERMINAL COSTING refers to the ascertainment of the cost of carrying out a contract such as the erection of buildings, bridges, or irrigation schemes, etc. This method of costing is the same as the job costing system.

MULTIPLE COSTING relates to the system used in such businesses as make a variety of goods which differ both in value, in kind, and in the number or variety of processes necessary for completion. These accounts are based on the job costing method.

Elements of Cost

To employ any of the above methods of costing it is necessary that money expended be analysed according to its use. This analysis firstly takes the form of segregating expenditure under the heads of—

- (1) Materials.
- (2) Labour.
- (3) Expenses.

Such are known as elements of cost, and the sum of these elements comprises the total cost. The grouping of

these elements has been indicated by inserting on the left-hand side of the specimen trial balance on page 3 the totals of the respective groups.

Relation Between Cost Accounts and Financial Accounts

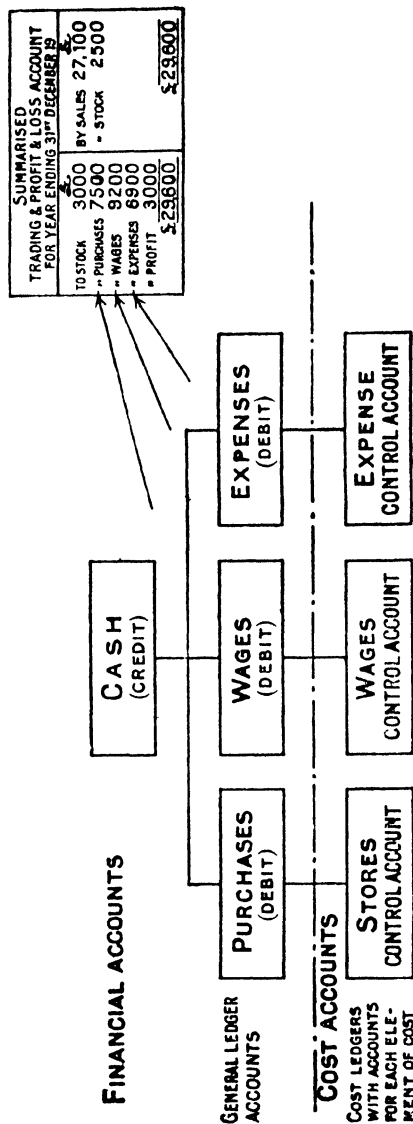
It has already been stated that one of the objects of costing is to reconcile with the financial accounts in terms of true cost the expenditure incurred and charged to production, distribution, and management. It is therefore necessary that a suitable method of reconciliation and control of each element of cost be used. This is effected by means of "control accounts," which are accounts that coincide with the three divisions mentioned above. The Chart (Fig. 1) clearly illustrates the connection between the three cost control accounts, representing the three elements of cost, and the source from which the figures are obtained in the financial books of account.

Costing Terms

To render the subject clear and explicit, it is desirable at this point to define the more usual terms employed in costing. Costing terminology has been so loosely applied in the past that considerable difficulty often exists when it is necessary to define a particular term.

For instance, the word **COST** is very frequently used, and it may refer to the cost of manufacturing only, or the cost of selling and distributing the goods, or it may be used to indicate the total cost of manufacturing, selling, and distribution. Owing, therefore, to the very wide interpretation placed upon this word, it should never be employed unless qualified in some particular way.

Many other terms are given an equally wide meaning, such as **ONCOST**, **OVERHEADS**, **BURDEN**, etc., but all of these relate to one particular element in costs. Such terms do not indicate the nature of the item in question,



SUMMARISED TRADING & PROFIT & LOSS ACCOUNT FOR YEAR ENDING 31st DECEMBER 19

TO STOCK	BY SALES	BY STOCK
3000	27,100	2500
- PURCHASES 7500		
- WAGES 9200		
- EXPENSES 6900		
- PROFIT 3000		
\$29600		\$29600

FIG. 1.—Illustrating the connection between the three Cost Control Accounts, representing the three elements of cost and the source from which the figures are obtained from the financial books of accounts.

and it is recommended that the term **ESTABLISHMENT EXPENSE** should therefore always be used when it is desired to refer to the total expenses of a business.

TOTAL COST is the sum of all items of expenditure incurred to produce, manufacture, and distribute any commodity, or to render a service.

WORKS COST is the sum of all items of expenditure incurred in the manufacture or production of any commodity, i.e. the works cost of materials, labour, and expense (Cost of production and factory cost is sometimes used when referring to works cost)

PRIME COST is a part of the Works Cost and comprises direct materials and direct labour only.

ESTABLISHMENT EXPENSE is the term used to denote all the indirect expenses incurred in running a business both in the works, offices, branches, and other commercial departments, etc.

WORKS EXPENSE is a sub-division of Establishment Expense, and is the term used when referring to all items of expense which have been incurred in the works proper.

SALES EXPENSE is the term used when referring to all the expenses incurred in connection with the selling and distribution of a firm's products. Sales expense is also a sub-division of Establishment Expense.

ADMINISTRATIVE EXPENSE is the term used when referring to the expenses incurred in the general and financial administration of a business only. This item is also a sub-division of Establishment Expense.

It will be noted that Establishment Expenses are divided into three groups, which represent the three main functions of a business, namely: (a) Works or Manufacturing; (b) Sales or Selling; and (c) Administrative, or the Cost of General Management, etc.

With some concerns the Administrative Expense is apportioned over the Works and Sales Expenses, whereas in the large concerns they may be dealt with in many different

ways. This subject will be explained fully in a later chapter, as it is sufficient for the present to study the subject of expenses in its more simple form.

CHART SHOWING COMPONENTS OF TOTAL COST AND SELLING PRICE

$$\begin{array}{l}
 \text{Direct Materials} \\
 \text{Direct Wages}
 \end{array}
 \left. \vphantom{\begin{array}{l} \text{Direct Materials} \\ \text{Direct Wages} \end{array}} \right\} = \left\{ \begin{array}{c} \text{Prime} \\ \text{Cost} \\ + \\ \text{Works Expenses} \end{array} \right\} = \left\{ \begin{array}{c} \text{Works} \\ \text{Cost} \\ + \\ \text{Sales Expenses} \end{array} \right\} = \left\{ \begin{array}{c} \text{Total} \\ \text{Cost} \\ + \\ \text{Profit (or Margin)} \end{array} \right\} = \left\{ \begin{array}{c} \text{Selling} \\ \text{Price.} \end{array} \right\}$$

CHAPTER II

HOW A COSTING SYSTEM WORKS

IN the previous chapter the objects and advantages of costing, the methods employed in cost finding, and the elements of cost have been disclosed. We have observed the necessity of the direct relationship between the cost accounts and the financial accounts of a business, and have acquired an understanding of a few costing terms.

Let us now consider how a costing system works, using, as an example, a business which may be making and selling, say, a line of six or more articles, and whose ordinary financial accounts show the results of its trading in total.

If the nature of the business is such that there are six separate departments, and each department is self-contained and only makes one of the articles referred to, then a system of book-keeping and accounts could be arranged to give a separate manufacturing and trading account for each department. In this special and exceptional instance, it would be possible for the manufacturer to ascertain the amount of profit made on each line or department and to regulate his selling prices whenever it became necessary to meet competition. It will be seen, however, that under these special conditions the selling price could only be adjusted so long as there was a sufficient difference between the total cost and the selling price. If this margin is found to be insufficient, according to the knowledge of total expenditure which his present accountancy system gives him, but prices must be reduced in order to create or maintain a market, it becomes necessary to employ a system of cost accountancy in order that the manufacturer shall know *where* and *how* costs can be reduced on each item.

To know the total cost of an article in such a case will

not be sufficient, because it will not indicate which item of cost is excessive or where waste is prevalent. A manufacturer, therefore, must know not only how much he has spent on materials and wages, but must be informed of the values of each class of material used, the extent of scrapped or spoilt work, and the various kinds of labour used in making the article, as without such information he cannot decide whether the use of cheaper materials is possible or a change in the method of making is more economical, or if costs can be reduced by changing or modifying the existing designs of the products.

Requirements of Modern Industry

It would appear from the above that a system of cost accountancy to meet all his requirements will be of a very complicated and difficult character, but as the working of an accurate system can be an example of simplicity itself and still provide the manufacturer with all the information he requires, we will briefly examine such a system in order to demonstrate how a costing system can fulfil the requirements of modern industry.

Continuing with the class of business already given in Chapter I, let us assume that the manufacturing concern is making "ready-made" clothing. Such a firm will probably make its seasonal "stock" lines: it may also manufacture specially designed garments for special orders or for export, and it may also be necessary to make up sample garments to try out new markets or to enable a factor to put a new line on the market.

The requirements of such a business in regard to its internal organization would be similar to that already described in the previous chapter, and all payments for materials, labour, salaries, and other charges could, as was shown in the specimen account on page 4, be charged *en bloc* against the total sales for the period.

It is true that such a total of debits would give us the

total cost of the business for a year, but it has already been pointed out that such information is quite inadequate for a manufacturing concern. Let us, then, see how a costing system works to make good the deficiencies.

Manufacturing and Stock Orders

It follows from the description of the trade done that it is necessary to identify the different batches of work going through the factory. There will be STOCK ORDERS, or orders for quantities convenient to control (i.e. as large a quantity as it is economical to make in one batch ; if too large, production drags on too long and control is lost ; if too small, the workman does not get a good "run" on the work). These stock orders refer to ordinary lines.

There will also be manufacturing orders (generally known as WORKS ORDERS) corresponding to the customers' orders received. There should be one such order for every *kind* of garment ordered, thus the customer's order received may be split up into items delivered "*ex stock*," and items to be made up specially.

Issues of Materials

As soon as the works order is sent into the factory, the cutting room estimates the quantity of cloth required on a Stores Requisition.

The storekeeper who looks after the cloth does not cut off the actual amount required, but issues a "piece." On the Stores Requisition is recorded the works order number for which the cloth is required. The cutters lay the pattern on the cloth and cut out the garment, and then mark on the Stores Requisition the actual quantity of material used. The remainder of the "piece" is then returned to the storekeeper, together with the Stores Requisition.

Recording Labour

Meanwhile the time which the cutters have spent is recorded on a **TIME CARD**, or Time Sheet, which will also have inserted upon it the works order number. A Time Card is the form used for recording a worker's time "on" and "off" a job.

The cut garments are then passed to the makers with a **PIECE WORK NOTE** written out by the foreman's clerk, stating how much will be paid for the work to be done. Again the works order number is quoted. A piece work note is the form used to record a worker's time on a job when paid by the piece and not by time. At the same time the foreman selects the buttons, etc., from the small stock which he keeps under his own control, the issues from stores in bulk being charged to his department and not to the separate works orders. When the work is done the foreman signs the Piece Work Notes and Time Cards and sends them to the pay office, so that the men's pay can be made up.

The clerk makes out a **DELIVERY NOTE**, which goes with the garments to the warehouse. Here the works order number enables reference to be made to the customer's or stock order, and the warehousemen dispose of the goods accordingly. Some of the batch will probably be put into stock and recorded on **BIN CARDS**, and some will be sent straight away to a customer.

Function of Cost Finding

Let us now see how the function of *Cost Finding* is performed.

(1) All the Stores Requisitions referring to the works order are collected. They form the voucher for crediting the Stock Account (i.e. the stores) with the value of materials issued and debited against the works order.

(2) All the Time Cards and Piece Work Notes bearing the works order number are collected. They form the

vouchers for crediting the Wages Account in the Cost Ledgers and debiting the works order with the labour cost.

(3) An estimate, prepared by the works manager's department, of the buttons, cotton, stiffenings, etc., used on a single garment is used as a basis for charging the total cost of the "indirect materials" used on the works order. This will form the basis for crediting the department which made the goods with the value of the indirect materials used thereon (they having been debited with the bulk issued, which, in turn, was credited to Stock Account in the Cost Ledger), and debiting the works order.

(4) A charge is made, based upon some logical method, to cover the expenses incurred, other than those under (1), (2), and (3). This charge is a debit to the works order and a credit to the Expense Account in the Cost Ledger.

(5) By adding the debits made under (1), (2), (3), and (4), the works cost of the batch of garments made to that works order is "found," but "cost finding" has other work to do. We must find the correct figure for the "charge" to be made under (4).

(6) This is done by estimating the normal total of all the indirect expenses (i.e. the establishment expense) for the year, and by dividing this total by a divisor based upon the output which corresponds to the "normal" output of the factory. This divisor may be the number of garments made or the total direct labour costs for the year, or the total productive hours for the year. Whichever method is used, the quotient is the basis for making the charge required, (4). This particular work is perhaps the most difficult of the cost department.

(7) The cost in the warehouse of the packing must also be "found," similarly to (6), and we thus arrive at a charge for packing which must be added to the total works cost to find the profit on a sale.

(8) Similarly, the cost of the indirect labour must be "found" by using what is known as "standing" orders,

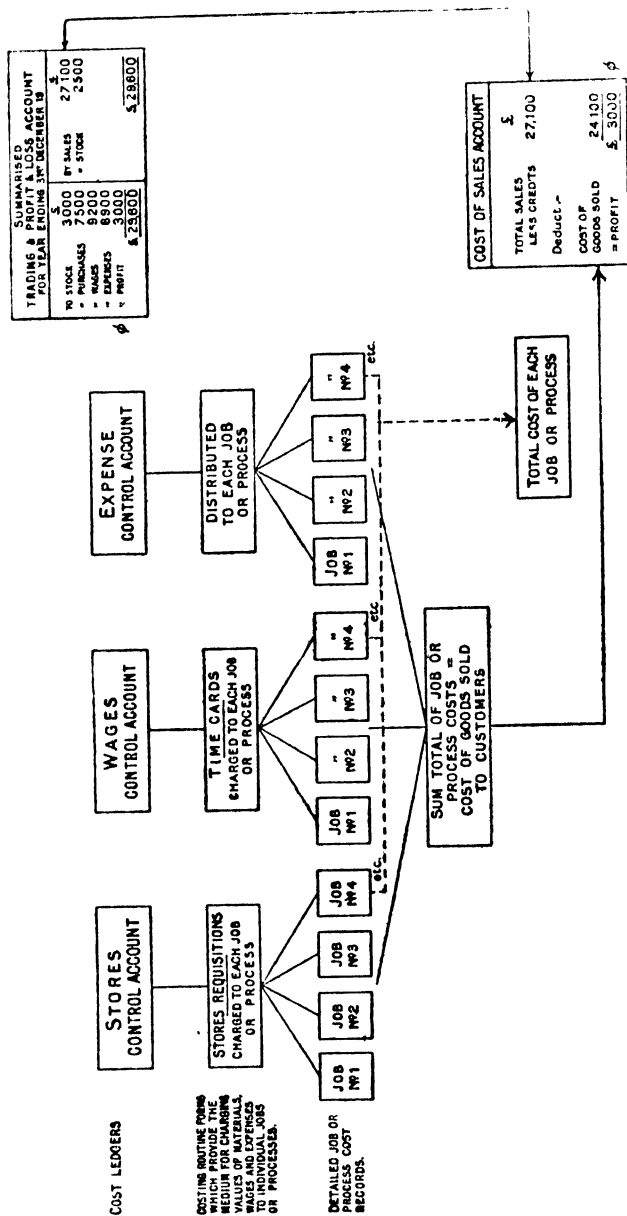


FIG. 2.—Showing how the elements of cost are dealt with in a system of costing.

and by collecting the Time Cards for these ; we have now another credit to the Wages Account in the Cost Ledgers and a debit to the (Establishment) Expense Account also in the Cost Ledger.

Function of Cost Control

We now enter the domain of *Cost Control*.

(9) By summarizing our issues of materials we are in a position to establish a balance between purchases of materials and the issues from stores, and also to ascertain the amount of stocks on hand ; thus we can immediately check any waste or pilferage of material

(10) By summarizing all a man's Time Cards, we can balance these against his wages, and by summarizing the wages by departments we can balance these against the pay roll. Hence, any incorrect charges or costs can at once be detected, departmental estimates checked, and costs proved.

(11) By summarizing all the expenses charged to cost, we can compare the amount of (Establishment) Expense recovered in our costs with that actually incurred. Any difference is carried forward to a Suspense Account (which should, of course, show a zero balance at the end of the year if the work under (6) has been correct). At any time we can compare our estimate with the actual in detail, and can see how we are recovering our establishment expense, a most important point.

Reconciliation of Cost Accounts and Financial Accounts.

We observed in the previous chapter that one of the principal objects in a system of Cost Accounting is the ability to balance such accounts with the ordinary financial records ; this we are now in a position to do. We can with ease account in detail for every penny expended inside the factory for labour (wages), materials (purchases), and

expenses (other disbursements), and to balance our stocks and total cost of production with the totals of wages, purchases, and impersonal Ledger Accounts in the financial books.

A good system of costing does not work on the basis of supposition or guesswork, but is concerned with the recording of actual facts relating to production, distribution, and management. The efficiency of any method of costing will therefore depend to a very great extent upon reliable sources of information.

We have seen that the three factors which enter into the cost of a product are grouped under the main headings of materials, wages, and expenses, and the Chart (Fig. 2) is given to illustrate how these elements of cost are dealt with in a system of costing.

CHAPTER III

ACCOUNTING FOR MATERIALS

HAVING reviewed the objects and advantages of Costing, and having seen how a costing system works, we are now in the position to examine each of the elements in order to see in greater detail how they are dealt with, and the amount and the value are ascertained and charged to each article, order, or process.

The merchant or manufacturer who does not keep a detailed record of stocks must rely upon his Trading Account to provide him with any data in regard to the value of finished goods on hand or sold during a period, and to his Manufacturing Account if he requires to know the value of materials used. In such a case, the amount of stocks would be obtained by making an actual count of all items on hand, and pricing the stock list at current market price or cost price, whichever is the lower. This process has to be carried out at the end of each trading or balance sheet period in order that the usual Trading or Manufacturing, Profit and Loss Account, and Balance Sheet can be prepared.

The correctness of the value so arrived at depends entirely upon the accuracy with which all the items in stock have been counted or weighed, upon no item having been inadvertently omitted, and upon no errors having been made in pricing. Errors in the extending, the adding, and the summarizing of the list must be guarded against.

If it is then desired to know the value of finished goods actually sold, the figure is obtained by adding to the value of stocks at the commencement the total purchases made during the period, and deducting from the total of these two items the value of stocks which are still on hand. The difference is assumed to represent the value of the goods *sold*.

A simple description will serve to illustrate this point.

Taking our figures from the Trial Balance, which appears on page 3, Chapter I, we have—

Stock at commencement	£110,000
Add purchases	350,000
	£460,000
Deduct stock on hand at end of period	145,000
Value of goods sold is assumed to be	<u>£315,000</u>

Having arrived at the value of goods sold, a reconciliation of the above figures with the Trading Account on page 4, Chapter I, will assist in understanding how these figures form part of the gross or trading profit. The example of accounts under review shows a gross profit of £285,000, which is arrived at by compiling a statement according to ordinary accounting procedure. This statement when revised on this basis would be prepared to show the following information—

Dr.	REVISED TRADING ACCOUNT						Cr.	
	£	s	d		£	s	d	
Value of goods used	315,000	—	—	Sales	£750,000	—	—	
Plant labour	150,000	—	—					
Gross profit	285,000	—	—					
	£750,000	—	—					

With the above method in use, the merchant or manufacturer does not know by how much his stocks have depreciated in value during the year, nor will it tell him how much waste or pilferage has occurred, because the figure required is only arrived at by inference.

It must be pointed out, however, that the above method will enable us to ascertain within certain limits the total value of materials or goods *consumed* over a period, but since what we specially require to know is the value of goods sold, it will readily be agreed that this cannot be ascertained simply by inference. Furthermore, we must

also know how much material has been wasted or spoilt during manufacture, the amount of shrinkage in stock, and how much has become obsolete.

It will be noted at this point that a big distinction has been drawn between the value of stock *consumed* and the value of goods *sold*. It is possible that a manufacturing concern may consume, or use, a greater quantity of material than is actually sold to its customers, as materials can be wasted unnecessarily during the course of manufacture. One of the objects of costing, however, is to disclose waste. Continuing with the figures on page 24, a costing system should analyse the difference of £315,000 somewhat as follows—

Stock at commencement.	.	.	.	.	.	£110,000
Add purchases.	.	.	.	.	.	350,000
						£460,000
Deduct cost of goods sold	.				£301,000	
Deduct cost of materials spoilt during manufacture.	.			10,000		
Deduct breakages in stock	.			1,000		
Deduct shrinkage in stock	.			3,000		
					£315,000	
Stock at end	.	.	.	.	145,000	
						460,000
						ϕ

A comparison of the above summary with the one appearing on page 24 will clearly show the type of information that is made available by a system of Cost Accounts.

In the one instance, we could only obtain from the Trading Account the information that the difference between purchases plus the value of stocks at commencement, i.e. £460,000 less the value of stock at the end of the period, i.e. £145,000, was £315,000. In the absence of further details, one is compelled to assume that this represents the value of goods sold during the trading period under review. However, a totally different situation is revealed when the above Cost Analysis of the item of £315,000 is made available.

The manufacturer is now able to study the incidence of his manufacturing or gross profit, and to take the necessary steps to reduce to a minimum all those losses that are excessive, and to eliminate other items that should not exist in a well-managed business.

The above example discloses the fact that £10,000 has been lost through faulty workmanship and materials, that the breakages in stock were £1,000, and the loss through general shrinkage £3,000. Shrinkage in stock occurs in almost all industries, as there is an unavoidable loss in weighing materials, by what is known as "the turn of the scales." In the handling of certain items such as liquids and powders, small quantities will be spilt or lost through evaporation. When their value is accumulated over long periods, it invariably accounts for heavy losses if not properly controlled.

The conclusion to be drawn from the above example is that a Manufacturing or Trading Account will show a cost to make or cost to sell greater than that shown in the Cost Accounts for the reason that all costs, wastage, and similar losses are not segregated, but shown as one total. The basis upon which these financial accounts are prepared is that the difference between the total credits and the total debits represents the profit. In a similar manner, the stock at the beginning of the period plus the purchases and less the stock on hand at the end of the period is taken to represent the value of materials or goods "used" or "sold," whereas in actual fact this difference represents cost of goods sold plus wastage and other losses.

Stores Organization

A system of Cost Accounting is concerned with facts, not inferences. If, therefore, a proper record is to be made of all receipts and issues of stocks, an efficient method of stores organization, accounting, and control becomes necessary.

The correct accounting of all materials consumed or handled in a manufacturing concern will require that a proper method of storekeeping be employed, as every item received into stock must be properly accounted for, as well as all the items issued from the stores to the manufacturing departments.

Cost Accounting involves good management and organization. This applies to the stores department just as much as to the manufacturing or office departments. Storekeeping involves not only a very large number of transactions, but each of these transactions is in itself manifold. Although not all of them come under the heading of Accounting, they are in their entirety reflected in Cost Accounts. It is, therefore, quite evident that the stores department should be thoroughly efficient and well equipped. When it is considered that the value of materials purchased in the course of a year may run into many thousands of pounds, it is obvious that proper provision must be made for their storage.

The operations of storekeeping begin with the receipt of goods or materials. In the organization of a stores, due consideration must be given to the fact that all items of materials represent money, and that the records kept should "balance" in a similar manner to "cash." It should not, however, be assumed that balancing stock means accounting in detail for the last pound of material in the stores. This is sometimes impossible, because allowances of some kind may have to be provided for such contingencies as shrinkage, waste, deterioration of certain materials, etc.

The consideration of materials as an element of cost will fall under the following headings—

- (1) Receiving and storing.
- (2) Issues from stores.
- (3) Recording in costs.

Receiving and Storing

We have seen from the Chart (Fig. 2) that the cost department is debited with the values of all purchases of materials direct from the financial accounts, and in order that we shall be able to keep track of all the items after they have been received into the stores, there must be provided some means of recording both values and quantities.

There are, generally, three separate records in this connection ; a record of the values of materials, in order that we can account for all purchases made (i.e. Stores Account in the Cost Ledgers) ; and two separate records of quantities—one of which is kept in the cost department to enable a check to be made on all stores received and issued (Stock Record Card), and another, with which the storekeeper is provided, so that he has a record of all the items he handles in his stores (Bin Card).

It will be remembered that in Chapter I three clearly defined branches of cost accountancy were indicated. Bearing in mind that a system must not only find the detailed and total cost of an article or process, but also provide the means of control and reconciliation with the financial accounts, we commence to effect this reconciliation by using the actual figures from the general books of account.

With a system of book-keeping and accounts, all purchase invoices are usually entered into a Purchase Day Book or Journal. At the end of each month this book is "ruled off," and the totals posted to the General or Nominal Ledger, as follows—

Dr. Purchases.

Cr. Sundry Creditors.

Credits or allowances for goods which have been returned to the suppliers as defective or not up to standard are entered in a Purchase Returns and Allowances Book, and the totals posted as a debit to Sundry Creditors and a credit to Purchases Account.

We therefore make use of these totals, i.e. the total debits

less the credits, and open a Stores Control Account in our Cost Ledgers by means of the following Journal entry—

Dr. Stores Control Account.

Cr. General Ledger Adjustment Account
(Purchases).

The Cost Ledgers have now been opened on the double-entry principle, and if the Purchases Account is regarded as an "Adjustment Account," the Cost Ledgers will be "self-balancing."

The Stores Control Account in the Cost Ledgers will not be concerned with quantities, as its chief purpose is to provide a check on the value of all materials received and issued, and also to show the values of stocks on hand at any time.

The check upon quantities is provided by the Stock Record Cards, which are maintained in the Cost Department, and are fully described in Chapter IV.

The process of transferring the actual amount of purchases is repeated each month, so that at the end of the year the total amount charged to the Stores Control Account in the Cost Ledgers will agree with the total value of purchases made as shown in the Trading Account.

Using the figures which appear in the Trial Balance, page 3, Chapter I, the Stores Control Account would appear as follows—

STORES CONTROL ACCOUNT (RAW MATERIALS)

<i>Dr</i>				<i>Cr</i>					
19..			£	s.	d.		£	s.	d.
Jan. 1	To Stock		60,000	—	—				
Jan. 31	" Purchases	JE 1	20,000	—	—				
Feb. 28	" "	JE 2	31,000	—	—				
Mar. 31	" "	JE 3	17,000	—	—				
Apr 30	" "	JE 4	28,000	—	—				
May 31	" "	JE 5	49,000	—	—				
June 30	" "	JE 6	25,000	—	—				
July 31	" "	JE 7	30,000	—	—				
Aug. 31	" "	JE 8	50,000	—	—				
Sep 30	" "	JE 9	10,000	—	—				
Oct. 31	" "	JE 10	15,000	—	—				
Nov. 30	" "	JE 11	40,000	—	—				
Dec. 31	" "	JE 12	35,000	—	—				
			<u>£410,000</u>	—	—				

STORES CONTROL ACCOUNT (FINISHED GOODS)

<i>Dr</i>						<i>Cr</i>					
19			£	s	d				£	s	d
Jan. 1	To Stock on hand		£40,000	-	-						

<i>Dr.</i>						WORK-IN-PROGRESS ACCOUNT						<i>Cr</i>					
19			£	s	d.							£	s	d			
Jan. 1	To Balance, being inventory of Work in Progress		10,000	-	-												

It will be noted that we have opened two Stores Control Accounts and a Work-in-Progress Account. The one stores account is required for the purpose of controlling the values of raw materials, and the other to control the value of finished goods. It was necessary to analyse the value of stocks on hand at 1st January (which appears in the specimen Trial Balance on page 3, Chapter I), in order that the control accounts could be set up in a proper manner. The opening balances in the three control accounts will, therefore, balance with the total inventory on 1st January.

The Stores Control Account (Raw Materials) is the account with which we are concerned at the moment, and is the only one that has been referred to in the chapter. The Stores Account of Finished Goods represents the stock on hand at 1st January of goods ready for sale. This account will not enter into our discussion again until after the various methods of accounting for materials used in the process of manufacture have been dealt with, and when such materials have been converted into a saleable product.

The Work-in-Progress Account is an account which is brought into use to control the value of the work whilst it is in process of manufacture in the plant. This account will not enter into the routine of control until the work is

completed and transferred into the Finished Stores. It will, therefore, be dealt with in a later chapter.

The above specimen of the Stores Control Account (Raw Materials) only takes into consideration the debit entries. It is given in this form simply to illustrate clearly the first step in the cost control of materials.

Having debited our Stores Control Account with the values of materials that have been received, we shall now proceed to examine the methods generally used for recording quantities, so completing the analysis and check of all materials received and consumed in manufacture.

STOCK RECORD CARD. The most convenient method for the Cost Department to record the quantities of each item is by means of a card system or a loose-leaf book.

In those businesses where the number of individual items is small, a loose-leaf Stores Ledger will sometimes meet all requirements, but where there is a large number of items and the records are in constant use, cards are more suitable.

A specimen of a Stock Record Card which is kept in the cost department is given (Form No. 1), from which it will be noted that a full description of the material is inserted at the head of the form, together with the number of the bin or rack in which the material is contained or stored.

It will be remembered that our Stores Control Account is debited with the values of materials purchased at the end of each month, but as we shall be receiving goods almost daily, and as all or some of the materials may be issued for manufacturing purposes before the end of the month, it becomes necessary to make provision for recording all receipts, so that the Stock Record Card can be written up immediately the materials are received into the stores.

GOODS RECEIVED BOOK. As the materials are received by the storekeeper, a record is obtained by making an entry into a Goods Received Book of the quantity and description of the materials, by whom supplied, and any other necessary information.

and the Stores in regard to the quantities of each item in stock. The check upon the values of stock on hand is made by means of the Stores Control Account. This check upon values will be explained fully after the various methods of issuing stores have been dealt with in Chapter IV.

It has been necessary up to this point to presuppose a system in order to illustrate the principle of the cost control of materials. The system presupposed or the rulings of forms given must not be taken as the only method that can be adopted in any system of costing. Principles are illustrated only, and the method of applying these principles must be determined by the peculiar conditions that are found in all businesses. The student, therefore, should thoroughly understand that the intention is to teach principles in the first place, and that the practical application of these principles will be dealt with in subsequent chapters.

CHAPTER IV

ACCOUNTING FOR MATERIALS (*contd.*)

BEFORE proceeding with a detailed consideration of stores accounting, it may be well to note that the materials purchased by a manufacturing concern may be utilized in two ways. They may be worked upon for the specific purpose of changing the form or shape or combining with other materials in order to produce a saleable product.

Direct Materials

Materials for this purpose are known as **DIRECT MATERIALS**, and the manner in which they are used is such that they can be correctly measured and charged direct to the job, order, or process. For instance, in the case of a business engaged in the making of suits, the quantity of material and linings used can easily be ascertained, and the correct quantity charged to an order for one suit or a batch of suits.

Direct materials may therefore be defined as—

Materials which can be conveniently measured and which can be directly chargeable to the cost of the product.

Examples of Direct Materials in different industries are as follows—

ENGINEERING PLANT. Castings. Sheet, bar, and angular metal, etc.

CABINET MAKING. Timber.

PAINT INDUSTRY. Oils, pigments, white lead.

Indirect Materials

There are, however, certain other materials which cannot be so easily measured and charged direct to the order, but which are necessary if the workmen are to complete their tasks. Such materials are known as **INDIRECT MATERIALS**, and, in the case of the “ready-made” clothing business,

will include cottons, braid, stiffenings, pins, chalk, buttons, etc. In addition to these, there will be various other items which are used to maintain the plant in good running order, such as belting for driving machines, timber, and nails for repairs, oil, grease and cotton waste; caretakers' supplies, such as soap, brooms, dusters, utensils, and metal polish, etc. As these cannot be charged as a general rule to any specific order, they are all classified as indirect materials.

Indirect materials may therefore be defined as—

Materials which cannot be conveniently measured and cannot be directly chargeable to a product, but only apportioned according to some logical method.

Further examples of indirect materials—

ENGINEERING PLANT. Solder, emery paper, chalk for polishing, and sundry items for maintenance of the Plant, Machinery, and Buildings.

CABINET MAKING. Nails, screws, glue, sandpaper and, in some cases, stain, varnish, and polishing materials, pumice powder, etc.

PAINT INDUSTRY. Various fluids for cleaning machinery after each mix, etc.

A thorough understanding of the difference between "Direct" and "Indirect" materials is important, as the correct analysis of the material cost into these two main divisions is the first step towards the more detailed analysis that is to follow when dealing with the costs of individual articles.

Issues from Stores

In Chapter III we learned that the goods were placed in stock, and that a proper record was made on both the Stock Record Card and Bin Card. Following this routine, we shall see how the records are made of all issues from stock, and the basis of pricing these issues and charging our costs with values.

STORES REQUISITIONS. With well-organized stores, the storekeeper is never allowed to issue any materials unless an order in writing, signed by a responsible official, is presented to him. A specimen Stores Requisition is given (Form No. 4), from which it will be noted that, in addition to describing the quantity and nature of materials, the works order number for which the goods are required is quoted.

A Works Order is a written instruction issued by the works manager to his foreman authorizing the manufacture of one or a quantity of articles. With a system of job costing, our object is to ascertain the cost of each Works Order, i.e. each job. The Cost Department, therefore, opens an account for each Works Order issued, so that, as and when we have collected all the items of materials, wages, and expenses for the particular order, we can post the amounts to the accounts and so arrive at the total cost of the job.

The storekeeper, on receipt of a Stores Requisition, issues the materials, enters on his Bin Card the date and requisition number, the quantity given out in the "Out" column, and adjusts the figure in the "Balance" column. He then initials the Stores Requisition and sends it to the cost department. On receipt of the Stores Requisition in the cost department, the stock record clerk refers to his card bearing the same bin number as that stated at the foot of the requisition (which was inserted on the requisition by the storekeeper at the time of the issue of materials) and then books out the materials in the "Out" column. He next inserts on the Stores Requisition the price of the materials, which figure he takes from the left-hand columns of his Stock Card.

The only object of inserting on the Stock Record Card the price at which the goods were originally purchased is simply for the purpose of pricing our stores requisitions. As and when orders are placed for materials, the office

copy is passed on to the cost department, so that a record can be made of the date and price at which the materials have been bought.

There has now been effected a complete record of the movement of all materials in quantities up to the point where they are given out for manufacture. At the same time we have provided the basis for checking such issues and the balance of stock that should be on hand at any time. (Note that we are now only concerned with the direct materials, as the treatment of indirect materials will be considered in a later chapter dealing with indirect expenses.)

Recording in Costs

The next step to be considered in the costing of materials is to record the cost of all material issued against each order or process. The first objective in this direction, however, is to provide the figures for crediting the Stores Control Account in the Cost Ledgers with the *total* value of all issues.

In Chapter III it was explained that as purchases were made and the materials or goods delivered, we debited the Stores Control Account with their value. Specimen Journal entries were also given in further explanation of the principles of control that must be exercised over all functions of a manufacturing concern. On page 38 the principles underlying the issues from stores were dealt with. It follows, therefore, that we must firstly ascertain the values of materials issued and credit Stores Control Account, the corresponding debit entry being placed against each works order.

Pricing Stores Requisitions

It will be remembered that after the cost department had recorded the "quantity" issued on the Stock Record Card, the price of the materials was then inserted on the

Stores Requisition. This pricing of the Stores Requisition does not present any difficulty so long as all materials have been bought at the same price, but should each purchase be made at a different price, we must decide how and at what figure the requisition is to be priced.

Whenever it is possible to keep a record of materials by lots, they should always be figured at their actual purchase price. The system already described enables this to be done. A simple illustration will explain the method of pricing all stores issues at their actual purchase price.

ORDERED AND RECEIVED.			STORES REQUISITIONS PRICED		
Date.	Quantity.	Price.	Date.	Quantity.	Price.
May 1	500	2/-	May 2	300	2/-
" 19	750	2/3	" 5	100	2/-
			" 20	250	100 at 2/-
			" 23	300	150 at 2/3
					2/3

Bearing in mind that cost accountancy is only concerned with recording conditions as they actually exist, and not with estimating them, it follows that any method of pricing materials which has for its basis the averaging of the purchase price will prevent us from arriving at the true material cost. It will, therefore, be seen that the actual purchase price is very necessary where the prices of materials fluctuate violently.

There are, however, four basic methods of pricing stores issues—

1. At actual purchase price.
2. At average purchase price.
3. At market price at time of consumption.
4. At purchase price of highest price stock.

The method explained on page 38 is the actual purchase

price and is the one most commonly used. The remaining methods are used in certain cases, but their use is determined by the nature of the industry which is being carried on and the method of cost finding in use, etc.

Charging Materials to Jobs

From the Chart (Fig. 2, page 20) it will be observed that all Stores Requisitions for each Works Order must be charged to the Cost Account bearing the job or works order number—a necessary procedure if the cost of materials used on each order is to be ascertained. This charging of materials in our individual job costs could be done simply by taking each Stores Requisition as it is received in the cost department and posting the values to the particular works order number.

When a large number of separate orders are dealt with, this method would be far too expensive on account of the large amount of clerical assistance that would be required ; therefore, a considerable amount of time and labour would be saved if the requisitions were dealt with at the end of each week or month by summarizing them under their works order numbers on to a sheet and then posting the total of each summary to the Cost Account in the Job Cost Ledgers.

A convenient and simple method of summarizing the values shown on all Stores Requisitions pertaining to each Works Order is to sort the requisitions by works order number, and to list the values on an adding and listing machine. The totals so arrived at are then posted to the respective cost accounts in the Job Cost Ledger.

Job Cost Ledger

Reference has now been made to two Cost Ledgers, each serving a special purpose. One contains the details of the cost of all work done (the Job Cost Ledger), and the other (the Cost Ledger) contains all the Cost Control Accounts

which form the connecting link with the ordinary financial books of the concern.

A specimen sheet of a Job Cost Ledger is given (Form No. 5). It is specially ruled so that the detailed costs of each order can be tabulated and the total of each element shown separately. The front of the sheet contains particulars of the labour cost and an analysis of the workmen's time. On the back is noted the description and quantities of the materials used.

It will be noted that the information relating to materials issued can be inserted in two different ways on the back of Form No. 5. We can list our Stores Requisitions as just explained and post the totals of this list weekly or monthly; alternatively, we can post each requisition, quoting the serial number and a description of the materials, etc., used.

Crediting Stock Account

In order to complete the entries in connection with our Stores Account in the Cost Ledger, we have yet to credit this account with the values of direct materials issued.

If a large number of requisitions have to be dealt with, the clerk responsible for the extensions and additions, etc., is usually provided with a mechanical calculating machine, which is available for extending and summarizing all the issues for the week or month.

As previously mentioned, the treatment of the stores requisitions will depend upon the number received each day. Where only a comparatively small number have to be posted at a time, this can quite conveniently be done by checking each requisition and posting the amount to its respective account. The requisitions, after they have been extended and checked in the first place, are sorted according to job numbers in order to facilitate the work of posting.

When a large number of works orders are passing through the factory, the number of requisitions that have to be

Form No. 5. (Front)

JOB COST LEDGER

[illegible][illegible]

Form No 5 (Back)

[illegible]

dealt with will be so great that a more speedy and economical method has to be adopted. In this direction it is as well to note that the summarizing of the material cost of each order is more often deferred until the order is completed. In such cases the stores requisitions are sorted and filed under job numbers during the period that the work is in progress.

Upon the cost department being notified each day that certain orders are completed, the requisitions are taken out of the file and summarized upon a materials collecting sheet or totalled by the aid of a mechanical adding and listing machine, and the values are then posted in the usual way to the accounts in the Cost Ledgers.

With the above method in use, it becomes necessary to summarize all requisitions for the week in order that the value of materials issued is obtained for the purpose of crediting the Stores Control Account. This work must therefore be done before the stores requisitions are sorted and filed under their respective job numbers, and the final summary can be very easily and quickly prepared by passing the requisitions through the mechanical adding and listing machine.

From the figures so obtained a Journal entry is made and the items posted to the Cost Ledger, together with the original summary.

Having ascertained the total value of direct materials issued by any of the above methods, a Journal entry can now be made, crediting the Stock Account and charging a Work-in-Progress Account, as follows—

Dr. Work in Progress (Materials) Account
Cr Stock Control Account (Raw Materials).

It will now be seen that if our Stock Account is "ruled off" after making the above entry, the figure brought down will represent the value of the materials which are on hand. Such a figure (easily ascertained) makes it possible for a manufacturing concern to prepare its monthly

accounts with more accuracy than when values of stocks are estimated, which is generally the case when Cost Accounts are not in use.

Continuing with the example of the Stores Control Account which was illustrated on page 29, we would summarize the values of direct materials used and post the totals, say, each month. Our Stores Control Account would then be as follows at the end of the year, i.e. 31st December, 193.. It will be noted that after crediting all issues from stores, the balance carried forward as at 31st December is the value of stocks on hand. This figure will be the commencing balance for the ensuing period.

STORES CONTROL ACCOUNT (RAW MATERIALS)

Dr.					Cr						
19					19						
			£	s	d			£	s	d.	
Jan. 1	To Stock	JE 1	60,000	—	—	Jan 31	By Issues	JE 15	25,000	—	—
Jan 31	" Purchases	JE 1	20,000	—	—	Feb 28	" "	JE 16	21,000	—	—
Feb 28	" "	JE 2	31,000	—	—	Mar 31	" "	JE 17	12,000	—	—
Mar 31	" "	JE 3	17,000	—	—	Apr 30	" "	JE 18	25,000	—	—
Apr 30	" "	JE 4	28,000	—	—	May 31	" "	JE 19	48,000	—	—
May 31	" "	JE 5	49,000	—	—	June 30	" "	JE 20	20,000	—	—
June 30	" "	JE 6	25,000	—	—	July 31	" "	JE 21	28,000	—	—
July 31	" "	JE 7	30,000	—	—	Aug 31	" "	JE 22	45,000	—	—
Aug 31	" "	JE 8	50,000	—	—	Sep 30	" "	JE 23	12,000	—	—
Sep 30	" "	JE 9	10,000	—	—	Oct 31	" "	JE 24	15,000	—	—
Oct 31	" "	JE 10	15,000	—	—	Nov 30	" "	JE 25	34,000	—	—
Nov 30	" "	JE 11	40,000	—	—	Dec 31	" "	JE 26	30,000	—	—
Dec 31	" "	JE 12	35,000	—	—	Dec 31	" Balance c/fwd		95,000	—	—
			<u>£ 410,000</u>	—	—			<u>£ 410,000</u>	—	—	
Jan 1	To Balance b/fwd		95,000	—	—						

Work-in-Progress Account.

When journalizing the value of materials issued, the effect was simply to transfer the values from the Stock Account to another account, called a Work-in-Progress Account, both of which are contained in the Cost Ledger. This transfer of value from one account to another coincides with the transfer of materials from the stores to the works for manufacture.

The Work-in-Progress Account is an account charged with all the expenditure in materials, wages, and expenses. The object of employing such an account is to assist in controlling this expenditure whilst the work is being performed in the factory, and to enable ascertainment of the *value* of work that is passing through the factory at any time. Therefore, as and when a particular job or Works Order is completed, we credit this account and charge to our FINISHED STORES the works cost of the finished goods that have been made. The Work-in-Progress Account will, therefore, only contain figures which relate to the work that is actually *in progress*.

Maintenance of Stock

As the manufacture of goods proceeds, and the storekeeper continues to issue materials each day, it is obvious that some provision must be made for replenishing his stocks. In the case of standard or general stock lines, i.e. those materials which are always in daily demand by the factory as opposed to any special items that are only required to fill a customer's particular order, there is fixed a MAXIMUM quantity for each item which should be in stock at any time, and also a MINIMUM quantity, i.e. a quantity below which the stock should not be allowed to fall.

The maximum and minimum figures are entered in the space provided on both the Bin Card and the Stock Record Card. When the storekeeper observes that any of his stocks have fallen to the minimum (or re-order quantity), he immediately sends a note to the cost department requesting that a further quantity be ordered, thus preventing his stock completely running out. This note, which is generally referred to as a PURCHASE REQUISITION, is checked with the Stock Record Card. If the two records agree, the Purchase Requisition is then passed on to the purchasing department for their attention.

Perpetual Inventories

With the method of stores accounting in use as described above, one will often find that the annual process of taking stock is dispensed with, and in its place is adopted a method of continuous check of stocks. With this method, which is also known as "PERPETUAL INVENTORIES," the storekeeper is allotted a fixed number of bins, which have to be counted and checked each day. At least once in each year the contents of every bin in the stores are counted and the actual quantities on hand checked with the Bin Card and Stock Record Card. A further check is also made at the time when the storekeeper notes that any item of stock has reached the re-order quantity. Should, therefore, any difference be discovered between the quantity in stock and that shown on the Bin Card and Stock Record Card, the necessary adjustments are made at the time the Purchase Requisition is passed by the Stock Record clerk.

Whenever a Bin Card has to be corrected, the same alteration has to be made on the Stock Record Card as well. To ensure that this is done, the storekeeper should not be allowed to alter any of his Bin Cards, but should be instructed to pass them on to the Stock Record clerk, who can then effect the necessary adjustments of both records.

The checking and comparing of the actual quantities of materials in the various bins with the amount as shown on the Bin Card and Stock Record Card are most important. In order that a permanent record can be made of this work, the storekeeper is usually provided with a specially ruled book or loose sheets on which to record the results of his daily count of a fixed number of bins.

The book or sheets (of which Form No. 6 is a specimen) are then passed on to the stock record clerk, and the figures compared with those on his record card. Whenever a difference occurs, the detailed entries appearing on the Bin Card should be checked with those on the Stock Record

Control Account and a debit to a "Store Losses and Shrinkage Account."

It is important to note that corrections of the Stock Record Cards or Bin Cards necessitate adjusting the Stores Control Account. This is usually done once each month by taking the total of both the plus and minus columns and preparing a Journal entry to transfer the respective amounts to a "Stores Losses and Shrinkage Account."

Stores Losses and Shrinkage

The Stores Losses and Shrinkage Account is an account to which is charged any loss due to the breaking up of bulk materials for issue in small lots, as would have to be done in the case of a keg of nails, gross packets of screws, rivets, etc., and in making allowances for the "turn of the scales" when weighing out quantities of materials such as brass strip or other metals, solder, etc., in the engineering trades, and glue in the cabinet making industry.

Manufacturing concerns which have their stores organized upon the above principles are in a position to place a check upon the consumption of all materials and to locate and eliminate waste. In fact, they give as adequate a control over materials, or money in another form, as do the accounts in the financial ledgers and actual cash receipts and payments.

CHAPTER V

ACCOUNTING FOR LABOUR

THE treatment of labour as an element of cost will follow slightly different lines from that already described for materials in the previous chapter.

In the first place, provision must be made for recording the attendance of each workman at the factory for the purpose of ascertaining the amount of wages that has to be paid to him at the end of each week.

Secondly, there must be provided a suitable method of control of values, as was done with materials, so that all money spent in wages each week can be controlled and reconciled in total with the financial accounts.

Thirdly, a record has to be made of the detailed times each workman has spent on a separate Works Order, so that the labour cost of each job or process may be ascertained.

It will be observed from the above that there are two separate records of time and one of total value for the purpose of control only. The two records of time are quite separate and distinct. The first forms the basis for compiling the pay roll or wages book at the end of each week by using what are known as GATE CARDS; the second is an analysis which is obtained by the use of JOB or TIME CARDS for charging individual costs with the correct amount of labour expended thereon. These two records, however, are so arranged that an effective check is provided on all work done, and in those cases where a manufacturer pays his workman a bonus for good work in addition to his ordinary pay, the Job Card is used to provide the necessary data.

Direct and Indirect Labour

When discussing the question of materials in a previous

chapter, it was pointed out that materials used by a manufacturing concern may be utilized in two ways, and that in our Cost Accounts they were classified as direct materials and indirect materials. Similarly, the labour hired will also be utilized in two ways. It may be employed in performing work directly on a works or production order, in which case it can be measured and directly allocated to the works order. Such labour is classified as **DIRECT LABOUR**. On the other hand, labour may be employed in such work as repairing machinery, driving a crane, sweeping the shop floor, or in supervising the direct workers. In such cases it is not possible to charge the labour to any specific works order on the basis of the actual work done, although without such labour it is probable that the direct labour could not have been applied with equal proficiency. Such labour is classified as **INDIRECT LABOUR**, and because it is necessary to the efficient conduct of the business, this labour is included in the Establishment Expenses.

DIRECT LABOUR may therefore be defined as—

The labour used in performing work directly upon a saleable article, and which can be measured and correctly allocated to the article, order, or process.

INDIRECT LABOUR may be defined as—

Labour which cannot be directly measured or charged to a specific article, order, or process, but which can only be apportioned according to some logical method.

Recording Attendance at the Factory

There are a number of ways of recording the time a worker enters and leaves the factory, but all of them may be classified into three groups—

- | | |
|----------------------|--------------------------|
| (a) Written records. | (c) Mechanically printed |
| (b) Metal checks. | records. |

(a) **WRITTEN RECORDS.** A written record of the arrival and departure of workers—a legacy of the antiquated

methods of factory management years ago—was, perhaps, the first method used. Owing to the many disputes that invariably arose through inaccuracies and differences, etc., the method **has been modified and amplified in several ways.**

A Time Book is generally used, the actual method of writing up this record varying in almost every case. With the very small concern, the Time Book would be placed in some convenient position at the entrance to the factory, so that each worker could sign his name therein when entering or leaving every morning and midday, etc., but with the larger concerns it was found necessary slightly to modify the method on account of the considerable delays caused by the time taken when signing the book.

The time clerk or gatekeeper would, therefore, stand at the entrance to the factory and note the names and time of each worker entering the plant mornings, midday, etc. In some instances, it was the practice for the time clerk to go round each department during the mornings and afternoons and enter the names of each worker, and so compile the register of attendance. It will readily be seen that any of the above methods are most unsatisfactory. Disputes in regard to errors of booking time can never be settled to the satisfaction of employer or employee.

(b) **METAL CHECKS.** A method which was thought to be an improvement upon the above was to provide each workman with a numbered brass check. These checks were arranged in numerical sequence upon time boards placed outside the gatekeeper's office. As each workman entered the factory, he lifted his numbered check from the board and dropped it into a box near by, then proceeding to his bench or machine. At a stated time, usually two minutes after starting times, the box containing the checks was removed by the gatekeeper and the numbers on each check entered into a Time Book. The numbers on the checks remaining on the time boards, representing the absentees,

were then entered on a separate sheet and both records sent to the wages clerk for compiling his wages book.

This method, however, was found to be as unreliable as the former. Disputes arose in many instances which could rarely be settled to the workman's satisfaction owing to the absence of a reliable written record of the times he entered and left the works. It was not uncommon also for a workman to "lift" his absent friend's check from the board and drop it into the box with his own, thus registering the attendance of absentees.

Various other methods were introduced from time to time, but all of them were marked by the same difficulty, namely, the absence of a reliable and indisputable record made by the workman himself.

(c) **MECHANICALLY-PRINTED TIME RECORDERS.** Eventually, mechanical time recorders were introduced, and it is now recognized that a mechanically-printed record of the time of arrival and departure is necessary if an indisputable and accurate record is to be obtained.

The chief advantages derived by the use of time recorders may be summarized as follows—

1. They prevent disputes in regard to time, as a worker can see for himself the time that he has registered.
2. They enable a correct allocation of the times spent on various jobs or processes to be obtained.
3. They allow the system of time booking to be easily modified or amplified to suit changing conditions, because they can be readily installed in any part of the factory.

Gate Cards

When mechanical time recorders are used, each employee is provided with a form, known as a Gate Card, upon which he records the time he enters and leaves the factory. Many other terms are used when referring to this card, such as Clock Card, Time Card, Wages Card, Time Ticket, etc.; but none of these describes the particular form as correctly

No. 26		Name B. Birt			
		Week ending 10th June 1933			
	1	2	Ord Time	Over time	
	755SA 1200SA	755M 1230M 130M 530M	4 05		
	755Tu 1230Tu 130Tu 530Tu		8 25		
		755W 1230W 130W 530W	8 25		
	755TH 1230TH 130TH 530TH		8 25		
		755F 1230F 130F 530F	8 25		
Total Hours			4 2		
	Hours	Mins	Rate	Amount	
Ordinary Time	4 2	-	2/-	4	14 2
Overtime					
Bonus					
Gross Wages				4	14 2
Deductions	H 10 ⁰ U. 9 ⁰ Sub 3 ⁰				1 10
Total £				4	12 2
A.M. Upright Letter P.M. Horizontal Letter					

as the term Gate Card. A specimen Gate Card is given (Form No. 7), from which it will be noted that there is inserted at the top of the card the workman's name and his clock number, together with the date of the "pay week." The "times" are registered upon the body of the form, and at the foot is a summary of the workman's pay for the week.

With small concerns, the time recorders and racks for holding the cards are usually placed in some convenient position in the factory, so that the same time recorders may be used for booking time to jobs as well as for recording the attendance at the plant. In such cases, four card racks are usually provided, two of which will contain the gate cards and two the job cards. The two racks containing the gate cards are placed one on each side of the clock and are known as the "IN" and "OUT" racks.

With large concerns, the clocks are usually placed at or near the gates and in charge of the gatekeeper or chief time clerk, as it is usual that a method of supervising the men during the process of clocking "in" and "out" be instituted.

We will now see how the Gate Cards are dealt with in the factory. For the purpose of illustration it will be assumed that the works employ fifty workmen, and that each one is paid on the day rate system, i.e. he receives so much per hour for every hour worked, irrespective of the quantity of work he does. The pay week commences, say, on the Thursday and ends each Wednesday, and all wages are paid on the following Friday. The wages clerk prepares the Gate Cards by writing the name and clock number of each workman at the top. After the workmen have gone home on the Wednesday evening, the cards are placed in numerical order in one of the racks, ready for use on Thursday morning.

As each workman arrives in the morning he takes the card bearing his clock number from the rack on the one side of the clock. This rack is usually known as the

"OUT" rack. He then places it in a slot in the clock and registers the actual time. The card is then placed in the second rack, the "IN" rack on the other side of the clock. When leaving the works at midday, the workman takes his card from the "IN" rack, registers his time, and then places it in the "OUT" rack. This process is repeated every time the workman enters or leaves the premises in the morning, midday, and evening.

Calculating and Making-up Workmen's Pay

At the end of the pay week, i.e. Wednesday evening, the wages clerk collects all the cards from the racks, replacing them with fresh ones which have previously been made out for use during the ensuing week.

The number of hours the workman was in attendance on each day is now ascertained and entered by the wages clerk in the fourth column, headed "Ordinary Time," and the total time to be paid for is inserted at the foot. The summary at the foot of the card is now completed, and deductions for National Health and Unemployment Insurances, and any subscriptions to sports club, etc., made, and the net amount to be paid ascertained.

Pay Roll

We have now ascertained the total "time" and calculated the net "amount" payable to each workman. There remains the writing up of the "pay roll" (or Wages Book) in order to ascertain the total wages payable for the pay week under review. The gate cards are therefore sorted into numerical order, i.e. by clock number, and entered in the pay roll, which is ruled in a similar manner to Form No. 8. If wages are paid in cash, a cheque will be made out for the total amount as shown in the pay roll, and to ensure that a sufficient number of coins of the exact denomination shall be obtained from the bank, the wages clerk prepares a summary showing how the total amount

is to be made up. This is done by running down the column headed "Net Amount Payable" and counting the number of pound notes, ten-shilling notes, half-crowns, two-shilling pieces, shillings, sixpences, and coppers required. The amount to be paid each workman is placed in an envelope or tin box, and the money issued to each man on his departure Friday evening.

It will be noted from the illustration of the pay roll (Form No. 8) that a separate sheet or sheets are used for each department. This is usually found the most convenient method of arranging the pay roll when a separate total for each department is required.

The actual method of arranging a pay roll will differ among companies, as the information required by one concern may not be suitable to another. The method of costing used, i.e. Job or Process Costing, etc., will determine the style of pay roll in most cases. Further examples of pay rolls will be given in subsequent lessons dealing with the several methods of cost finding.

The primary object of a pay roll is, first, to provide a medium for summarizing the amount of wages payable to each worker in order that a "total" can be obtained; and, secondly, to form a permanent record of all wages paid each week.

Gate Cards are usually entered on the pay roll by the aid of an accounting machine. The machines used for this purpose will accumulate the total amounts of each column and also cross add, so proving the correctness of all entries by balancing the gross with the deductions and net columns.

The method just described deals with the recording of an employee's time spent in the factory only. It does not take into consideration any method of payment by results, such as the piece-work or premium bonus methods, etc. In dealing with time records, it will be remembered that there are two main divisions under which these records are arranged. First, we have a record of the time spent in the

factory; and, secondly, a record of time spent on the job. The record of the time spent in the factory forms the primary basis of calculating the worker's pay each week. As this is the only subject that has been dealt with in the above description, it remains to explain how provision is made for analysing the amount of wages paid to both direct and indirect work.

Booking Time of Direct Labour

The principal requirement of Cost Accounting is accuracy, and any system must have for its foundation a reliable source of information. In almost every instance the checking and analysing of the "time spent on the job" can only be done successfully by the aid of mechanical time recorders.

There are numerous methods of booking time to jobs or works orders. The particular method that will be used by any concern will be determined by the class of industry carried on and the method of cost finding in use; for instance, Job Costing will require a different method from Process Costing. Likewise, Direct Labour will generally require a different method from Indirect Labour.

At the moment we are only concerned with booking the time of Direct Labour to specific production orders or articles, etc., and the principle of these methods can easily be understood from the following description.

Job Card

A form known as a "Job Card" is used with most methods. A specimen of such a card is given (Form No. 9). With the smaller concerns two card racks are usually provided, similar to those already described for holding the gate cards, one being headed "Jobs in Hand," and the other "Jobs in Progress."

When a works or production order is issued to the works foreman, the necessary Job Cards are made out at the same time. A full description and quantity of the work to be

OPERATION CARD

Name

Clock No

Week ending

Operation

Works Order No

Drawing No

Name of Piece

Number off

Number finished

DETAILS OF WORK COMPLETED

Quantity	P W Value		Ref	Quantity	P W Value		Ref
	s	d			s	d	
			TOTALS				TOTALS

TOTAL P W VALUE	£	s	d	LABOUR	£	s	d
TOTAL TIME VALUE				OVERTIME			
PROFIT or LOSS				EXTRAS			
WAGES CLERK	COST DEPT			TOTAL TIME VALUE	£		

THIS SIDE TOWARDS YOU
HOLD HERE TO CLOCK

Standard size of card, 7½ins × 3½ins

Form No 9 (Back)

[illegible]

done by each workman is inserted on the card, together with the Works Order No. and the piece-work price, etc.

These Job Cards are placed in the rack "Jobs in Hand," so that they will be available when the men are ready to start on the work. The workman, upon commencing, takes the Job Card from this rack, registers the time, and then places it in the "Jobs in Progress" rack.

By using the two racks referred to the foreman can see what work is in progress and the number of jobs ahead. He is thus able to keep in touch with the progress of the

work in each department. When the job is finished, the workman takes his Job Card out of the "Jobs in Progress" rack, registers the finishing time, and either hands the card to the foreman or drops it into a box labelled "Jobs Finished." These cards are then collected by the foreman's clerk, the quantity of work finished being checked and then noted in the space provided. At convenient periods during each day all the completed Job Cards are passed to the wages clerk, who completes the calculations, and so ascertains the amount of piece work or bonus earnings on each job.

With the above method the rulings of the Job Card will require to show all particulars of the work to be done, together with the quantities given out and finished, but in those cases where the cards are not ruled similar to the specimen Job Card (Form No. 9), a "Work Ticket" on which instructions are given as to the work to be performed must be used.

A specimen work ticket is given, Form No. 10, from which it will be noted that full details of the work are inserted and space provided for noting the quantities inspected and passed.

On completion of the job, the Job Card and the Work Ticket are dropped into the "Jobs Finished" box.

Checking Job Cards with Gate Cards

If each workman has been provided with continuity of work, the total times as shown on the Job Cards will agree with the total time on the Gate Card. In order to prove the correctness of these records, the Job Cards for each workman must all be summarized, and the total compared with the Gate Card. Furthermore, piece-work or bonus earnings of each workman must also be added together in order to ascertain how much has to be paid over and above his ordinary day rate. This summarizing and checking is effected by the wages clerk when extending the figures on

WORK TICKET				No. 22397	
Operation to be done		Date Required	To Department	W Order No.	
No	Description	Operator		M/c No	
OUT		PART & DRAWING No.			
	In	Passed	Checked	Recorded by Planning Department	
Sig.					
Date					
Return with work to Inspection Department as soon as possible					

Size of Form, $5\frac{1}{4}$ " wide $\times$ $3\frac{1}{4}$ " deep.

the Gate Card at the end of the pay week, and to facilitate this work the back of the Gate Card (Form No. 7) is generally ruled as shown in the illustration (Form No. 11).

In describing the routine in connection with the Job Card it has been assumed that all the workmen were paid according to the piece-work system, but had there been in use a premium or bonus system, the routine would have been just the same, only the ruling of the Job Cards (Form No. 9) requiring alteration. On the front of the card, space must be provided for the "Time Allowed" on the work; and in place of the columns for piece-work prices, etc., there appear suitable rulings to accommodate the calculations of the bonus earnings as described on pages 80 to 84, Chapter VI.

Charging Labour in Costs

Having analysed all our direct labour by the use of Job Cards, we are now in the position to charge the correct amount of labour that has been consumed on the respective works orders just as we debited the works orders with the values of materials used by means of the stores requisitions.

The routine in connection with the summarizing and posting of the amounts of wages and number of hours expended on each job will be similar to that described for the stores requisitions.

After completing the checking of the Gate Cards, the Job Cards are passed on to the clerks who are responsible for compiling the labour cost of each works order. The routine in connection with the summarizing and posting of the wages and number of hours to each Cost Account will be similar to that described for materials, the Job Cards being filed until the work is completed or posted from day to day direct to the account in the Job Cost Ledger.

In those cases where the Job Cards have to be filed until the order is completed, it will be necessary to write up the several statistical records that are prepared from

the details shown on the Job Cards before the cards are sorted and filed under their respective order numbers.

Record of Bonus and Piece-work Earnings

A record of bonus and piece-work earnings will usually be required. For this purpose a card similar to Form No. 12 is used. A separate card is allocated to each article or to every single operation on such article. The information is obtained from the respective Job Cards and the name of the operator, quantity passed and rejected, and rate of bonus earned is recorded.

These records enable the cost department to notify the planning or other works department of any abnormal earnings so that the matter can be investigated, and the necessary steps taken. Any alterations or modification following an investigation are noted in the remarks column. The cards will thus contain a complete history of any changes made either in the rates of pay or method of manufacture.

Employees' Weekly Pay Record

All classes of manual workers are assessed for income tax, and it is compulsory for all firms to make a return showing the total earnings of each employee over the standard amount.

To facilitate the compilation of this return a Record Card similar to Form No. 13 is used, and the gross earnings entered each week, either direct from the Gate Cards or the pay roll.

With the large manufacturing concerns there will usually be an employment department, whose chief duty is to ensure that a regular supply of the right type of labour is always available. In such instances the Wages Section will have a separate record of the rates of pay for each workman, as the employment department will retain the employee's record card.

Form No. 13

EMPLOYEE'S WEEKLY PAY RECORD

Check No.

Employee's Name

Department

Address

Trade

FIRST QUARTER			SECOND QUARTER			THIRD QUARTER			FOURTH QUARTER		
Week Ending	£	s. d.	Week Ending	£	s. d.	Week Ending	£	s. d.	Week Ending	£	s. d.
1			14			27			40		
2			15			28			41		
3			16			29			42		
4			17			30			43		
5			18			31			44		
6			19			32			45		
7			20			33			46		
8			21			34			47		
9			22			35			48		
10			23			36			49		
11			24			37			50		
12			25			38			51		
13			26			39			52		
Total 1st Quarter, £			Total 2nd Quarter, £			Total 3rd Quarter, £			Total 4th Quarter, £		

Card No.

TOTAL FOR YEAR ENDING

. 19 £ : :

Size of Card 8" x 5"

The ruling of "Rate Cards" is very simple. They will usually have the employee's name, address, age, clock number and trade at the top of the form, and columns to note the commencing and subsequent rates of pay.

When separate Rate Cards are used, they will be the medium for issuing the Gate Cards and the checking of rates, etc., in place of the employee's Record Card.

CHAPTER VI

ACCOUNTING FOR LABOUR (*contd.*)

IN the previous chapter it was shown how all employees recorded the times of their arrival and departure at the works, and how the time spent on a particular works order or article was also ascertained. Reference was also made to the necessity of reconciling the times shown on the various Job Cards with the Gate Card or Pay Roll. In order that this important phase will be properly understood, it is desirable that the reader be conversant with a certain part of the routine followed when a worker enters the employ of a works. Certain records are maintained in the pay roll department which enter into the reconciliation just referred to.

Engagement of Workers

Upon the engagement of a worker, a record will be required of the man's name and the rate at which he is to be paid, so that all information necessary for the issue of the Gate Cards is available. A record of employees is usually kept on the card system, all the cards relating to each department being filed together in the order of name or clock number. If, therefore, a worker should be transferred from one department to another, it will then be an easy matter for his card to be removed and placed amongst those relating to his new department. The employee's record card is ruled to accommodate full particulars, such as name and address, age, previous employers, trade, etc. The commencing rate of pay must also be shown and sufficient space provided so that any increases granted from time to time can be recorded. As and when an employee leaves the service of the company, his record card is removed and filed separately.

Record cards are generally used as the medium for preparing all the Gate Cards each week, and to guard against errors in rates of pay, etc., the Gate Cards are checked before being placed in the card racks. The writing up of the pay roll will also be done from this same record, the work being usually performed mid-week, as the wages clerk will be fully occupied towards the end of the pay week in calculating and checking the details of each man's pay. In the first instance, the preparation of the pay roll will consist only of inserting the worker's clock number, name, and rate, as the remaining columns cannot be filled in until after the calculation of each worker's time has been completed.

There are many different methods of compiling pay rolls. With the smaller concern these records will usually be written up by hand or by typewriter. In some cases the various kinds of accounting machines will be used as already explained in Chapter V. But one will also find that the use of plates or stencils for use on the addressograph and other similar types of machines will be very efficient.

The issue of the Job Cards will usually be done by the planning, progress, or other factory department, and the wages clerks will not generally be concerned with these until each man has completed his task, and the card is sent into the office. As and when the Job Cards are received, therefore, the calculations of the piece-work or bonus earnings will be completed and the cards temporarily filed under order of clock number or worker's name pending receipt of the Gate Cards, so that all the cards relating to each workman will be in the correct order for comparing with the Gate Cards when received at the end of the pay week. It will be remembered that the back of the Gate Card (Form No. 11) was ruled, so that each Job Card could be entered thereon and the total hours summarized.

This summarizing of the Job Cards is only the first step towards agreement with the Gate Cards. The total number

of hours as now shown by this summary will agree only in a very few instances, as it will readily be seen that all work on the respective orders will not be completed at, say, 5 o'clock on the Wednesday evening. It is, therefore, necessary to ascertain the number of hours each worker has booked to "jobs in hand." The actual checking in this direction will depend upon the routine in each factory. In some instances it is the practice for the gate-keeper to make out a list of all the Job Cards in the racks, quoting the clock number, order number, time and date each job was commenced, whereas in other cases the wages clerk will go to the card racks, and refer to each Job Card, noting the order number and time commenced, etc., which he afterwards inserts upon the back of the Gate Card. In the majority of cases the total number of hours spent on the various production orders, etc., will agree with the number stated on the Gate Card. The calculations may be completed, the amount of piece-work or bonus earnings added, and the total pay arrived at. Certain cards, however, may still show a difference, and the foreman of the men concerned should investigate the figures on the few remaining cards with a view to confirming any errors in booking of time, etc.

It is the general practice for the gate-keeper or time clerk to prepare a list of all absentees each morning and midday by listing all the Gate Cards remaining in the "out" rack at a stated time after the men have "clocked in." These lists are sent to the Wages Section and checked with the Gate Cards before writing up the pay roll.

It has already been stated that if each worker is provided with continuity of work all the Job Cards for the week, when added together, will agree with the Gate Card, but as there will usually be a certain amount of time lost in changing over from one job to another, or for other reasons, each worker will have clocked on to a "standing" or "service" order number when delayed in commencing or completing his next task.

It must be borne in mind that the system of service orders bears no relation to the works or production orders referred to in earlier chapters. A works order is an instruction to manufacture for sale. A service order is an instruction for a service to be rendered by the works to the works.

Service orders are brought into use so that the cost of each class of "indirect" work can be ascertained by charging to a separate order in a similar manner as was done when "direct" work was charged to a Works Order number to find the cost of each job or article. Such orders are sometimes known as "Standing" orders. The reason for naming this class of order as "Standing" is due to their permanence, i.e. they stand from month to month, and through them the indirect expenses or costs are controlled in detail, both in regard to indirect materials and indirect labour, and also other sundry indirect expenses.

When agreeing the total times between the Job Cards and Gate Cards, as mentioned above, one will have Job Cards which relate to both works orders and service orders.

Having agreed the times shown on the cards, the pay roll can now be completed, the amounts entered in the remaining columns, the pages added, and a final total ascertained. The actual making up of the money into tins or envelopes should not be done by the wages clerks; the pay roll should be passed on to the cashier.

It may be well to note that when the Job Cards were compared with the Gate Cards there was in almost every case a "carry over" of time on jobs in progress. In order to facilitate the work for the ensuing pay week, it is a very good plan to insert on the back of the new week's Gate Card the order number and number of hours which have been credited to the previous week. If this is done, it will not be necessary to refer again to the Gate Cards of the previous week.

With those concerns which employ a large number of workers the pay roll will invariably be arranged according to the departments, and to ensure that the Wages Section

are notified whenever a worker is transferred from one department to another, or when a change is made in clock number or occupation, a "Worker's Transfer Note" is made out, containing particulars of the transfer or new clock number, etc. Form No. 14 is a specimen of such a form. On its receipt in the pay roll or wages department, the necessary alterations on the employee's record card will be made, and a fresh Gate Card issued should the change require it.

With the above description of the routine in regard to the engagement of workers, and the explanation as to how those records are used in the reconciliation of the Gate Cards and the Job Cards, a student should now be able to follow the essentials involved in this work of reconciliation—one of the important functions of the pay roll or wages department.

It remains, however, to explain how the amount spent in wages is controlled and also reconciled with the financial accounts, as was done with materials.

Wages Control Account

The control of wages will proceed on similar lines to that described for materials. Continuing with the illustration of the routine that was followed when describing the pay roll in Chapter V, the cheque drawn for wages will have been entered in the Cash Book and the item posted as a credit to cash (or bank), and a debit to Wages Account in the General Ledger. We now prepare a Journal entry in the cost department, journalizing the total paid each week as follows—

Dr Wages Control Account.

Cr. General Ledger Adjustment Account (Wages).

The process of journalizing the total amount of wages paid is repeated each week. At the end of the year the total amount so charged to the cost department must be the total which appears in both the General Ledger and the Trading or Manufacturing Account.

The cost department has now been debited with the

WORKER'S TRANSFER

To	DEPARTMENT	DATE
		DEPT

Clock No	Please confirm your agreement to transference of Trade Department	Remarks
----------	---	---------

from this department to

Foreman:

TRANSFER APPROVED BY

RECEIVING FOREMAN

Signature _____	Clock No.
-----------------	-----------

Works Manager

NOTE TO RECEIVING FOREMAN—

If accepted in a trade different from above, state in what capacity worker will be employed

THIS FORM MUST BE SENT TO COST DEPARTMENT IMMEDIATELY WORKS MANAGER'S APPROVAL IS OBTAINED

amount of the wages cheque, and as these debits are made each week or month throughout the year, the Wages Control Account would appear at the end of the year as follows—

WAGES CONTROL ACCOUNT

<i>Dr</i>				<i>Cr</i>			
		£	s	d		£	s. d.
Jan 31	To pay roll	12,500	—	—			
Feb. 28	" "	13,000	—	—			
Mar 31	" "	15,500	—	—			
Apr 30	" "	13,000	—	—			
May 31	" "	12,000	—	—			
June 30	" "	14,500	—	—			
July 31	" "	9,000	—	—			
Aug 31	" "	11,000	—	—			
Sep 30	" "	13,000	—	—			
Oct 31	" "	12,500	—	—			
Nov 30	" "	11,500	—	—			
Dec. 31	" "	12,500	—	—			
		£ 150,000	—	—			

Crediting Wages Control Account

To credit our Stock Control Account with the direct materials issued, we summarized all our stores requisitions. In a similar manner we must now analyse the wages by using our Job Cards, in order that we can correctly account for all moneys expended in wages in so far as Direct Labour is concerned. The student will make special note that we have only dealt with the routine for analysing *Direct* wages by using Job Cards. In Chapter V it was explained that there are two kinds of labour, i.e. Direct and Indirect. The Job Card is used for the recording of the time expended on the various jobs by the Direct Workers only. The analysis of the time of Indirect Workers will be dealt with in a slightly different manner, fully explained in a later chapter.

The credits representing Direct Labour to the Wages Control Account can now be effected and a Journal entry prepared as follows—

Dr. Work-in-Progress Account (Direct Labour).
Cr. Wages Control Account

It will be remembered that after crediting the Stock Control Account with the value of materials issued, the balance remaining represented the value of stocks on hand. In the case of wages, however, there can be no stock of labour on hand, and we must account for *all* the money spent in wages each week.

The balance shown at this point in the Wages Control Account, therefore, represents the amount of Indirect Labour still to be accounted for, which will be explained in the following chapters dealing with Indirect Expenses. The journalizing of the wages amounts from the Wages Control Account to Work-in-Progress Account will coincide with the entries made in regard to the Direct Materials issued from stores. This process is followed for the reasons explained in Chapter IV when describing the purpose of the Work-in-Progress Account.

The student will now observe that the movement of production costs is being reflected in our Control Accounts, as the Work-in-Progress Account forms part of such control. A specimen Wages Control Account is now given to embody the credit entries made up to this point.

WAGES CONTROL ACCOUNT

Dr						Cr					
			£	s	d				£	s	d
Jan. 31	To Pay roll	JE	12,500	-	-	Jan. 31	By Transfer	JL	8,200	-	-
Feb. 28	" "	"	13,000	-	-	Feb. 28	" "	"	7,300	-	-
Mar. 31	" "	"	15,500	-	-	Mar. 31	" "	"	8,700	-	-
Apr. 30	" "	"	13,000	-	-	Apr. 30	" "	"	8,150	-	-
May 31	" "	"	12,000	-	-	May 31	" "	"	9,050	-	-
June 30	" "	"	14,500	-	-	June 30	" "	"	7,750	-	-
July 31	" "	"	9,000	-	-	July 31	" "	"	6,200	-	-
Aug. 31	" "	"	11,000	-	-	Aug. 31	" "	"	9,050	-	-
Sep. 30	" "	"	13,000	-	-	Sep. 30	" "	"	8,250	-	-
Oct. 31	" "	"	12,500	-	-	Oct. 31	" "	"	9,150	-	-
Nov. 30	" "	"	11,500	-	-	Nov. 30	" "	"	10,000	-	-
Dec. 31	" "	"	12,500	-	-	Dec. 31	" "	"	8,200	-	-
							To Balance				
							c/d		50,000	-	-
			150,000	-	-			£	150,000	-	-
	To Balance	£									
	b/d		50,000	-	-						

(NOTE. The balance in this account is only brought down

to show that there is still a difference, representing Indirect Labour, to be accounted for. A further Journal entry has yet to be made at this stage, but this will be fully explained in the following chapters.)

A specimen of the Work-in-Progress Account cannot yet be given as there are several other entries to be made in this account before we have completed the process of control, and these entries will be explained as they arise.

We have, however, reviewed the detail which brings the Work-in-Progress Account into operation in so far as it relates to Labour, this being necessary to show the student the disposal of credits through Wage Control Account.

Methods of Remunerating Labour

It may now be well to review briefly the various methods of remunerating labour for work done, since the systems of booking time to jobs are affected by methods of remuneration, as, for instance, where the workmen are paid according to the amount or quantity of work done.

DAY RATE OR TIME RATE. When describing the routine in regard to the pay roll, etc., it was assumed that all employees were paid at the rate of so much per hour, irrespective of the quantity of work performed. This was one of the first methods used in factories, and is known as the **DAY RATE** system. For every hour or part of an hour worked, the employee is paid a fixed sum. This method, however, is generally used as the basis for calculating the amount payable to indirect workers, as the nature of their work is such that "time" is the only basis upon which their efforts can be valued.

PIECE-WORK. In the case of direct workers, i.e. men engaged on direct production, the day rate system is not a

satisfactory method, as the rate of pay is not co-related to the quantity of work done, and, consequently, there is no incentive provided for increased effort. In order to overcome some of the drawbacks attached to the above method there was introduced the **PIECE-WORK** system, which is a method of paying the workman so much per piece of work finished, irrespective of the time taken; in other words, no rate per hour, but instead, a rate per piece of work.

This method is very simple to operate. Assuming that a workman is given 44 pieces of work to do, he would be paid at the rate of, say, 2s. per piece completed. Therefore, if he completed all his work in one week, his wages for that week would amount to £4 8s. od. A week may be one of 44 hours, and assuming his day rate is 2s. per hour, he has only earned his ordinary day rate. Should, however, a workman take 33 hours, his piece-work earnings would still be £4 8s. od., because the quantity of work done and not the time taken is the basis. In this latter instance the workman has made "time and a third," i.e. 33 hours at £4 8s. od. equals 2s. 8d. per hour or 2s. plus one-third.

PREMIUM OR BONUS. Later the **DIFFERENTIAL PIECE-WORK** and **PREMIUM OR BONUS** systems were introduced. With these methods the quantity of work done is co-related to the time taken to complete the task, each workman receiving a premium or bonus on the time saved, in addition to his day rate for the actual time worked.

There are a number of methods in use, the chief difference being in the amount or percentage given of the time saved; for instance, the Halsey system gives the workmen 50 per cent of such time. With the Rowan system the workman receives a percentage increase equal to the percentage of time saved.

Assuming that a workman is given 44 hours to complete a job, that his day rate is 2s. per hour, and that he completes

PRIMER OF COSTING

the work in 33 hours, his pay under the Halsey method would be—

Time taken . . .	33 hours at 2/- . . .	£	s.	d.
Time allowed . . .	44 hours	3	6	-
Less time taken . . .	33 hours			
= time saved . . .	11 hours			
∴ 50% of 11 hours saved	= 5½ hours at 2/- . . .		11	-
£3 17 -				

= to 2/4 per hour for job

Under the Rowan system this same worker would receive—

Time taken . . .	33 hours at 2/- . . .	£	s.	d.
		3	6	-
Bonus =	$\frac{\text{Time saved 11 hours} \times 100}{\text{Time allowed 44 hours}}$	= 25%		
∴ 25% on time taken, £3 6s =			16	6
£4 2 6				

= 2/6 per hour for job.

Various other methods of premium bonus are in use, but all of them differ in the amount of bonus that is given the workman on the time he saves.

The Taylor Differential Piece Rate, for instance, is a method under which a premium or bonus is allowed, but where the day rate is not guaranteed as it is under the other methods. There are two piece rates with this system, the lower being in operation up to a standard of performance of 100 per cent, up to which point the worker receives approximately 83 per cent of his daily wage rate; or, up to 99 per cent production he cannot make the equivalent of his daily rate. The moment, however, he touches 100 per cent output, not only does he receive an immediate increment which brings his pay to the equivalent of time and a quarter, but also he is paid at the higher piece rate. The effect of this is to penalize the inefficient worker. To give

a large immediate increase on attaining 100 per cent efficiency and a higher piece rate offers a very strong incentive to the operator who can make himself efficient.

Its effect on the labour cost per piece produced is very marked on account of the great reduction of indirect expense per unit of product.

Doctor Taylor was the first to ignore all records of past performance which concerned either rates or production on the length of time an operation should take. He based his standard times upon accurately made time studies, and as an extra aid to the workman, prepared standard instructions showing how the work should be carried out to attain the times set.

It is interesting to note that Taylor was also the first to make use of a scientific system of paying labour, although Halsey presented the first incentive plan.

From the above the student will see that a great deal of technical detail is involved when considering some of the bonus methods of remunerating labour. There are, however, methods that are very simple in operation, as, for instance, the Contract System, which is used principally in shipyards and really amounts to a method of subcontracting. A foreman, or some man who has the confidence of a number of his fellows, agrees to do certain work for a fixed remuneration, the firm finding materials and the facilities, and the man finding the labour, with whom he makes his own terms of remuneration. This method is fast falling out of use, due to its many unsatisfactory features. Since it is obvious that there is grave danger of sweating by this method, it is not looked upon as desirable. Another defect is that the employer really has no control over the labour although the men are working on his premises.

CO-PARTNERSHIP and PROFIT SHARING are other types of remunerating labour. Strictly defined, neither of these is a method of remunerating labour, but it is convenient to consider them under this heading. The payment of wages

is directly connected with production and, broadly speaking, may be said to be the reward of production. Schemes of co-partnership and of profit sharing are in recognition of a totally different principle, which is, that the success of any undertaking does not depend solely either on the management or the operatives, but on the harmonious relationship between the two. With the exception of a very few outstanding examples, most of these schemes have proved abortive in the long run, and the reasons are obvious. The operative is not paid on the basis of individual output ; no distinction is made between the efficient and the inefficient , profit is affected by factors, outside the control of the worker, whose action and reaction rather tend to discourage him. The reward is too distant for the average worker, who while ready to share profits is not so ready to share losses.

Briefly, the essence of these schemes is that a share of the profits of the undertaking is paid to the workers in addition to their ordinary wages under a formal agreement, not as a right, but as a voluntary gift, tenable at the pleasure of the employer.

The method of arriving at the fund to be distributed varies greatly, a common method being to allow a fixed percentage of the profits made above the average for a term of years past.

CHAPTER VII

ACCOUNTING FOR EXPENSES

It is desired in this and in the two subsequent chapters to deal with the most difficult phase in Cost Accounting, i.e. Accounting for Expenses. In view of the importance of the subject and the necessity of acquiring a thorough understanding of the theory of expense control, it is desirable to review certain principles that have already been covered.

Every disbursement made or expenditure incurred to provide the material, labour, and facilities for manufacturing up to the point of the completion of an article or process must be comprised in the true cost of production, and the technical conception of cost practically rules out the possibility of a "cost" being comprised of one element alone.

In all cases a "cost" is the sum of three groups of components or elements, viz. the purchase price of material, the cost of the hire of labour, and the value of other disbursements made or expenditure incurred in achieving the desired product or result. The elements of cost are, therefore, classified into three main groups and are known as—

1. Labour.
2. Materials.
3. Expenses.

The labour hired may be utilized in two ways: it may be employed in performing work "directly" upon a saleable article or product, or it may be usefully employed in such work as sweeping the shop floor, repairing the plant and machinery, attending to the issue of materials from stores, or in supervising all the workers in a department.

In the case of the former, the labour used in performing work directly upon a saleable article can be measured and correctly allocated to the article, and such labour is classified as "direct" labour, but in regard to the latter it is not possible to charge this labour to any specific article, process, or order on the basis of the actual work done towards its completion, although without such labour as this it is probable that the direct labour could not have been applied with equal efficiency. Such labour is, therefore, classified as "indirect" labour.

In the case of materials there is an exact parallel; certain materials may be worked upon for the specific purpose of changing the form or shape, or combining with other materials in order to produce a saleable product.

Such materials are known as "direct" materials, because the manner in which they are used is such that they can be correctly measured and charged direct to the article, process, or order.

There are, however, certain other materials which cannot be so easily measured and charged direct to the article or order, but which are necessary if the workmen are to complete their tasks. Such materials may include oil, waste, emery paper, small perishable tools, solder, chalk for polishing, belting, and sundry items used for the maintenance of the plant and buildings, etc. Because they cannot be charged direct to each article or order, they are classified as "indirect" materials.

The expenses of a business are also subdivided into two groups: first, there are the expenses that have been specially incurred for specific orders and can, therefore, be charged direct to the specific job, operation, or process, and, secondly, the expenses which have been incurred in the general running of a business, and which can only be dealt with as a general charge over the whole business. The former are known as "direct" expenses, and the latter as "indirect" expenses.

Direct expenses may comprise such items as the cost of any assistance or facilities used for a special order or process; for instance, a portable crane or special machinery hired for a particular job, special travelling and other expenses incurred, heavy charges for freight on materials or parts, special draughting, etc., and all other items which are capable of being charged direct to the order.

Indirect expenses will comprise postage, stationery, telephones, taxes, salaries of office departments and departmental managers, depreciation, insurance premiums, and all cash disbursements and book charges which cannot be directly chargeable to any one process or order.

Establishment Expenses

The subdivisions of the three elements of cost are grouped under two main headings, namely—

- | | |
|--------------------|----------------------|
| (a) Direct labour, | (b) Indirect labour, |
| Direct materials, | Indirect materials, |
| Direct expenses. | Indirect expenses. |

The sum total of group (b) comprises the Establishment Expenses of a business. These are the expenses with which we are now about to deal.

In the case of Direct Labour and Direct Materials, it was shown in the previous chapters that one can measure exactly the cost of those items in relation to the article in production, and deal with each of them at the time they are used or paid for. There is no element of doubt as to the definite cost, or as to whether or not such cost will be wholly used in the particular manufacturing process.

In dealing with indirect expenses, however, the situation becomes very different and assumes more difficult proportions; many of the facilities will be used before the amount of expense so used will become known, or appear in the accounts as a liability.

¶ When labour is employed to make an article or perform a particular operation, various kinds of tools and equipment

must be provided to enable the workmen to complete their tasks. During the period such tools and facilities are being used, various expenses will be incurred, and owing to the nature of those expenses it is not possible for them to be dealt with in our costs in a manner similar to that described for Direct Labour and Direct Materials.

For instance, let us consider the question of wages paid to indirect workers, such as labourers, shop cleaners, and the like. A labourer may be employed in carrying materials from the stores to the workmen's bench or machine for use on production orders. The time taken to perform this work will vary according to the quantity of materials the labourer has to carry and the distance he has to walk; to book his time to the particular job, therefore, would not only require a most elaborate system, but the cost to the business would be such as would render this method impracticable.

With the wages of shop cleaners, however, it is quite impossible to determine the amount of the individual employee's wages that is chargeable to a production order.

In order to overcome these difficulties, all the indirect expenses are grouped together and dealt with by the methods that will now be described.

The correct treatment of the subject in most systems will require that the total Indirect or Establishment Expenses be subdivided so that they can be dealt with in three groups, viz.—

1. Works Expenses.
2. Sales and Distribution Expenses.
3. Administrative Expenses.

This grouping of expenses is necessary. By their division the correct proportion of all the indirect items can be charged to the respective departments, products, or processes, and the actual cost of the Sales and Administrative Departments ascertained separately from the Works Cost or "cost to make."

WORKS EXPENSES. Works expenses include such expenses

as the cost of repairing and keeping in good order all plant buildings and machinery; the salaries of works managers, superintendents, and works clerical staff; the wages of engineers, foremen, labourers, watchmen, etc.; all items of plant supplies; light, heat, and power used by the plant; proportion of rent and taxes, cost of purchasing and handling materials, and a share of the expense incurred in the general and financial administration of the business.

SALES AND DISTRIBUTION EXPENSES. Under this subdivision is grouped all expenses relating to the sale and distribution of a firm's products, salaries of sales manager, selling staffs, and branch offices, commissions, trade discounts (i.e. the discount allowed off catalogue prices), cost of advertising and sales promotion, travelling expenses of salesmen or agents, etc.

ADMINISTRATIVE EXPENSES. Administrative expenses include such items as salaries of general manager, secretary, cost accountant and their respective staffs, legal expenses, bank charges for interest, exchange, cash discount, etc.

PREDETERMINATION OF EXPENSES. Owing to the special nature of the items which comprise the establishment expenses of a business, they are generally dealt with by estimating the total for the year, and at frequent intervals this estimate is checked by comparing the amount of the expenses recovered in costs with the actual expenditure incurred. The necessity for this predetermination of expenses is due to the fact that facilities are used before the amount of the expense so incurred is known, and before it appears in the accounts as a liability.

It must be noted at this point that if a system of Cost Accounting has been in use for a number of years, it will provide all the data necessary for ascertaining the total Establishment Expenses of the business, as the system will have collected the cost of all the various indirect expenses of the plant and other departments. In cases where a costing system is being installed and there are no

previous cost records to provide such information, it becomes necessary to estimate the probable expenses for the ensuing period.

Bearing in mind that the elementary principles of Cost Accounting are being dealt with, it is not proposed to consider at present the numerous advanced methods of treating this subject. The following description is given to explain the elementary principles only. We will commence by adopting what is considered the most simple method to use, i.e. basing our estimate on the expenses as shown in the general accounts, such as the Manufacturing, Trading, and Profit and Loss Accounts of previous years.

Estimating expenses by this method is extremely simple. For the very small workshop, it will generally provide a fairly close estimate, as expenses are usually constant throughout the year. Variations in volume of output do not affect expenses in these cases to the same extent as with larger concerns, as the size of the plant and the small number of machine tools, etc., available will not permit of sufficient increase to materially affect expenses.

In the case of larger concerns, however, this method of estimating expenses will not provide a reliable estimate, as variations in trade or factory output will materially affect the total expenses to a far greater degree than would be the case with small workshops.

With the small workshop, therefore, and in certain cases where a seasonal trade is done, and when it is proved by previous records that the output, sales, and expenses over a period are fairly constant, this method may be adopted with fairly good results.

Having decided upon the method to be used, the work entailed in the treatment of this subject in a costing system will require to be done in the following stages—

(a) *Collection*, which is the collection and transfer of expenses from the general accounts to the cost accounts.

(b) *Allocation*, which is the work of analysing each item

of expense under its respective group, i.e. (1) Works Expense, (2) Sales Expense, and (3) Administrative Expense

(c) *Computation and Recovery*, which is the method by which the expense rate is calculated and recovered in the individual Job or Process Costs.

COLLECTION OF EXPENSES. The simplest method of collecting the total Establishment Expenses is to estimate the normal total for the year by using the figures of previous Manufacturing, Trading, and Profit and Loss Accounts as the basis.

The collection of such expenses is conveniently considered under two headings. First, there will be those items of expenditure which fluctuate according to the volume of production, such as salaries, postage, stationery, indirect labour, indirect materials, charges for power, fuel, lighting, repairs and maintenance of plant, machinery and buildings, works clerical assistance, and sundry expenses of varying kinds, etc. Secondly, there are the constant expenses which will comprise such items as rent, rates and taxes, depreciation, directors' fees, fire insurance, etc. The collection of the items which comprise the constant expenses is a comparatively easy matter as the totals of these will be fairly constant from year to year, and will not be greatly affected by any variation in production or the quantity of work turned out by the plant. It will be seen from these remarks that in collecting the expenses the amounts must be examined in regard to the volume that is anticipated for the coming year. If the amount of trade that is estimated will be greater than that for, say, the previous year, then due allowance must be made for any difference it may cause in the expenses. On the other hand, if the estimate of trade for the next year is less than that shown in the accounts for the previous year, an adjustment will be made to cover this difference. Such adjustments, however, may not be necessary with the majority of the items which constitute the constant expenses of the business.

The items which comprise the variable expenses will present the greatest difficulty as each one must be reviewed and compared with any increase or decrease in the estimate of output, or sales for the ensuing year.

A specimen Expense Allocation Statement is given, Form No. 15, on which has been entered in the "Total" column the expense item as appearing in the specimen accounts given in Chapter I. The expenses have been separated under the heading of "Constant" and "Variable," and the amount inserted in the "Total" column, this being the first step in the process of *predetermining* the expense for the ensuing year. It is also assumed that the volume of sales expected for the year in question will be approximately the same as for the previous year.

In collecting the amounts of each account from the General Accounts, it was necessary to analyse certain of the accounts as the information contained in the Trial Balance was not sufficient for our purpose. The following statement shows the results of the analysis of those accounts which had not been separated in the system of general accounts—

	Analysis	Trial Balance
	£	£
<i>Plant Labour.</i>		150,000
Direct labour	100,000	
Indirect labour	50,000	
<i>Salaries</i>		65,000
Sales Manager.	6,000	
Works Manager	6,000	
Sales Department	11,000	
Works staff	7,000	
General Manager	7,500	
Secretary	6,000	
Office Manager	4,000	
General Office	12,000	
Salesmen	5,500	
<i>Travelling Expenses</i>		23,000
Administrative Department	4,000	
Sales Department	11,500	
Works Manager	1,500	
Salesmen	6,000	

	Analysis	Trial Balance
<i>General Expenses</i>		53,000
Plant expenses	11,500	
Sales expenses	20,500	
Administrative	21,000	

ALLOCATION OF EXPENSES. The work of "allocation" immediately follows that of "Collection." Each of the items which have been collected and entered in the first column of Form No. 15 is examined and apportioned over the Factory, Selling, and Administrative Departments of the business.

Many of the items which appear in the expense allocation statement will not present any difficulty. For instance, depreciation, and repairs, and maintenance to plant and machinery will relate to the works only, as do the travelling expenses of the works manager, Indirect Labour, etc.

Depreciation of buildings will require to be apportioned over both the works and offices on the basis of floor space occupied. Such items as office supplies, electric light, and insurance will be allocated according to the estimated amount consumed by the respective departments.

The basis of allocation of each item has been inserted on Form No. 15.

With regard to royalties, a difficult problem is often encountered. The amount paid may be dealt with either as a direct charge or included amongst the establishment expenses.

The actual basis of allocation and its treatment in the cost accounts, however, may depend upon the size of the business and the nature and amount of the royalties paid. If the royalty is a definite amount per article, it may be treated as a direct charge in costs, but in those cases where the royalty payable is calculated upon goods sold, the necessary adjustments must be made at stocktaking periods if the stocks are priced at works cost.

EXPENSE ALLOCATION STATEMENT

Date	Description	Total	Administrative Expense	Selling Expense	Factory Expense	Basis of Allocation
19..	<i>Constant Expenses—</i>					
	Salaries—					
	Sales Manager	6,000				Direct
	Works Manager	6,000		6,000	6,000	"
	General Manager	7,500	7,500			"
	Secretary	6,000	6,000			"
	Office Manager	4,000	2,500	1,000	500	Apportioned
	Depreciation	17,600	2,000	3,000	12,600	Space occupied
	Insurance	900	100	200	600	"
		<u>£48,000</u>	<u>£18,100</u>	<u>£10,200</u>	<u>£19,700</u>	
	<i>Variable Expenses—</i>					
	Salaries—					
	Sales Department	11,000				Direct
	Works staff	7,000		11,000	7,000	"
	General office	12,000	12,000			"
	Salesmen	5,500		5,500		"
	Indirect labour	50,000			50,000	"
	Travelling expenses.	4,000	4,000			"
	Sales	11,500		11,500	1,500	"
	Works Manager	1,500				"
	Salesmen	6,000		6,000	11,500	"
	General expenses	20,500		20,500		"
	Sales	21,000	21,000			"
	Administrative	3,000	600	1,800	600	Direct or apportioned
	Office supplies	12,000	1,800	2,500	7,700	Space occupied
	Taxes	2,500		2,500		Direct
	Carriage	2,500		200	9,700	Consumption by depts.
	Light and power	10,000	100		1,000	Direct
	Water	6,600		6,600		"
	Commissions	2,500			2,500	"
	Royalties	12,000		12,000		See page 93
	Advertising	1,500	1,500			Direct
	Discounts	700				"
	Bad debts	4,000				"
	Bank interest					"
		<u>£217,300</u>	<u>£45,700</u>	<u>£80,100</u>	<u>£91,500</u>	

Again, the amount may be dealt with as a direct charge to the Cost of Sales Account, or the total royalties may be paid over a period included in the establishment expenses and allocated to the Administrative Expense Account.

In the majority of cases it is preferable to deal with this item by regarding it as a direct charge to the Cost of Sales Account. By such means the amount of royalty is shown separately in the cost accounts, and not merged with the incidental expenses of manufacturing and selling as it would be if either of the other methods were chosen.

For simplicity, however, this item has been included in the Establishment Expenses on the basis that it is calculated as a rate per article manufactured and sold.

Bad Debts is another item which often presents a difficulty. The amount of bad debts incurred may be treated in two ways in the cost accounts. It may be regarded either as a charge to selling expense or as a charge to administrative expense. The choice of method will depend entirely upon the routine in regard to the passing or certifying of inwards orders for credit. If the Selling Department is responsible for this work, the loss is a correct charge to the selling expenses, but in those cases where a separate "Credit" Department exists and is under the charge of either the Secretary or Accountant, the item is a charge to administrative expense.

Care must be taken to differentiate between the amount of bad debts actually written off during the period, and any reserves created for bad debts, as the latter will not be included in the Establishment Expenses of the business.

A study of the Expense Allocation Statement (Form No. 15) will show how the process of allocation is carried out, and a reconciliation of this statement with the Trading and Profit and Loss Accounts on page 4 will also enable the reader to follow very clearly the collection of all the expense items from the General Accounts. This, it will be remembered, is the method we are using in order that we can

predetermine or forecast the expenses which have to be recovered in our costs for the ensuing year

RECONCILIATION

	£	£
Total debit of column Profit and Loss Account		285,000
Less net profit		69,700
		215,300
Add indirect labour		50,000
		<u>£265,300</u>
Total constant expenses	48,000	
Total variable expenses	217,300	
		<u>£265,300</u>

The next step in the allocation is to take the total of the Administrative Expenses and apportion this over the Works and Sales Departments according to the extent it is considered each benefits therefrom. In the case under review, it is assumed that each will benefit equally. The amount has, therefore, been transferred to the "selling" and "works" columns on that basis.

	Admin- istrative	Selling	Works
	£	£	£
Constant expenses	18,100	10,200	19,700
Variable expenses	45,700	80,100	91,500
	<u>£63,800</u>	90,300	111,200
Distribution of administrative expenses		31,900	31,900
Total expenses of Selling and Manu- facturing Departments		<u>£122,200</u>	<u>£143,100</u>

ALLOCATING WORKS EXPENSES TO DEPARTMENTS. With some concerns it is necessary that the works expenses be further allocated to the departments in the works in order to arrive at a departmental rate. In such cases the amount of these expenses will be dealt with by the following method

The Works Expenses, amounting to £143,100, have been ascertained in accordance with the procedure described above, and this figure is entered on a Works Expense Allocation Statement similar to the specimen given (Form No. 16).

In dealing with this further allocation of Works Expenses, it has been necessary to set out in detail the various items which go to make up the total. To assist in the explanation of the subject, there has been entered in the "Description" column of Form No. 16 the names of the more general expense items that are found in actual practice. Therefore, whilst the total of these items agrees with the total Works Expenses, as ascertained above, the names of the individual accounts will not be the same as those appearing in the Trial Balance in Chapter I.

The allocation of expenses to the various works departments will proceed upon similar lines to those described above, each item being apportioned to each department on the correct basis. The basis of allocation has been inserted in the column on the extreme right of the form.

When cost accounts are in use, there is employed a system of Service orders to collect all the Service (or Indirect) expenses of the business. This is described in a later chapter. At the present, however, we are dealing with a concern that is just commencing a system of Cost Accounts, and there is no information of this nature available. We must therefore allocate each item arbitrarily or upon some definite basis.

The process of allocating expenses to departments is usually completed by two stages, as it becomes necessary to adjust certain of the "Service" expense items between two or more of the Service departments in addition to allocating to them a proportion of such items as repairs to buildings, lighting, heating, etc. Expenses must, therefore, first be allocated to both the Service and Producing Departments, and, secondly, after arriving at the total expense of

each Service Department, to apportion them over the respective producing departments.

The expenses have been entered on Form No. 16 with each item allocated to the Service Departments individually, and in total to the producing departments in the plant. This process gives the total expenses of the Service and Producing departments. The next step is to enter these totals on to another Works Expense Allocation Statement (Form No. 17). This statement is ruled similar to Form No. 16, except that the Service Departments are now entered in the description column and the remaining columns headed with the names of each producing department in the plant. On Form No. 16 all these departments were included under the heading of "Producing Departments," the amounts having been entered in the "Total" column. The next process is to apportion each item to all the producing departments. When this work is completed and the columns added, we have arrived at the estimated total expenses for each department in the plant.

The total expenses for the ensuing year, which have to be recovered in both the cost of manufacture and cost of sales, have now been predetermined. This predetermination of expenses has been completed by several stages. First, the expenses were estimated under the headings of "Works," "Selling," and "Administrative"; secondly, the Administrative Expenses were apportioned over the works and sales in order to give a total works and sales expense; thirdly, the works expenses were further allocated to Service Departments and Producing Departments; and, finally, those expenses were apportioned to the individual producing departments in the plant in order to give us a total expense by departments.

Departmental Expense Rates are sometimes required by certain plants as it is necessary to recover expenses on a departmental basis.

COMPUTATION AND RECOVERY OF EXPENSES. With the

smaller concerns it is usual to recover works and sales expenses by adding both these items, and to deal with the expenses as one total, which in this case would be—

		£
Works expenses . . .	143,100	
Sales expenses . . .	122,200	
Total expenses . . .	<u>£265,300</u>	

The recovery of Sales Expenses separately from Works Expenses presents some difficulty with certain industries, and as this comes within the category of advanced costing, it is proposed to deal with Sales Expenses on the more simple basis of recovering them as a percentage of the total cost of manufacture. This subject, however, is described more fully in a later chapter.

There are several methods of recovering Works Expenses, and it remains to decide upon the particular method to use.

These methods may be conveniently grouped under five headings—

- (1) As a percentage on direct wages.
- (2) As a rate per direct labour hour.
- (3) As a percentage on direct wages and direct materials (i.e. prime cost).
- (4) As a departmental rate.
- (5) As a machine rate.

CHAPTER VIII

RECOVERING EXPENSES IN COSTS

THE predetermination of the expenses that will probably be incurred during the ensuing year having been completed, there now remains to decide the method we shall use to recover the expenses in costs.

The computation and recovery of expenses is a difficult subject to deal with, as there are so many factors to be considered. An explanation of the five methods of recovering expenses, as mentioned in the previous chapter will therefore be given first.

Percentage on Direct Wages

With this method the works expenses are recovered as a percentage on the direct labour cost of each job or works order, and on account of its extreme simplicity, this method is, unfortunately, most commonly used.

The total direct labour for the year was ascertained in Chapter VII as amounting to £100,000, and the works expenses as £143,100. The percentage rate on direct wages is arrived at by the use of the following formula—

$$\frac{\text{Works expenses (£143,100)} \times 100}{\text{Direct labour (£100,000)}} = 143\%$$

The amount of works expenses to be charged to each job or works order would, therefore, be found by adding a figure which would be equal to 143 per cent of the amount of direct labour, as follows—

Direct materials	.	.	.	£
Direct labour	.	.	.	175
				200
Prime cost.	.	.	.	£375
Works expenses, 143% on direct labour	.	.	.	286
				286
Total works cost	.	.	.	£661

This method is extremely simple to operate, but the disadvantages more than outweigh any advantages incidental to it. If all the workmen are paid a uniform rate, and if they all work under the same physical conditions, this method will give fairly accurate results, because a worker's earnings, and not the time taken to complete the work, is the basis of calculation. One of the main objections to this method is that no allowance is made for a job which requires the use of expensive machine tools, or for a job which may be all handwork. This is a serious error, because the article or process which requires the use of machinery should have charged to it a greater proportion of the indirect expenses than one which requires the use of little or no machinery.

Direct Labour Hour Method

This method differs from the above in that works expenses are recovered at a rate per direct labour hour on each job, instead of fixing the rate upon the total amount paid in wages. The total number of direct labour hours is ascertained and divided into the total works expenses, the resultant figure being what is known as the Direct Labour Hour Rate.

Assuming that the total of direct labour hours (i.e. excluding the number of hours worked by indirect labour) is 143,100, and the amount of works expenses is £143,100, the rate is ascertained by means of the following formula—

$$\frac{\text{Works expenses (£143,100)}}{\text{Direct labour hours (143,100)}} = \text{£1 per direct labour hour}$$

The amount of works expenses chargeable to each works order under this method will be added as follows—

Direct materials	.	.	.	£	175
Direct labour	.	.	.	.	200
Prime cost.	.	.	.	£	375
Works expenses, say 250 hours					
at £1	.	.	.	.	250
Total works cost	.	.	.	£	<u>625</u>

This method gives more accurate results than the percentage on direct wages, because it has regard to the element of time as between a fast worker and a slow worker. If two men, paid by the piece-work method, are engaged upon similar work, and one completes his job in 20 hours, the other in 30 hours, the quick worker will use less light, power, supervision, etc. The amount of expense charged to the job under this method will, therefore, be more in proportion to the extent to which the machine tools, supervision, etc., have been used. With the percentage on direct labour method the percentage addition would be the same in both cases.

Percentage on Direct Labour and Direct Materials

This method is very similar to the percentage on direct labour method, except that works expenses are recovered as a percentage on the total of both direct labour and direct materials (i.e. on total prime cost.).

Continuing with the figures arrived at in our calculation of works expenses, the rate is figured as follows: The value of materials used in production must be ascertained, and on reference to Chapter III it will be seen that the value of materials sold was £301,000 after allowing for certain indirect materials, and that Direct Labour was shown in Chapter VII as £100,000. The formula is therefore—

Works expenses $\times$ 100			
(Direct labour and direct materials)			
Works expenses	.	.	£143,100
Direct labour	.	£100,000	
Direct materials	.	301,000	
= 35.685% (say, 35.7%)			£401,000

The amount of works expenses to be charged to each job would, therefore, be 35.7 per cent on Prime Cost as follows—

	£	s.	d.
Direct materials	175	—	—
Direct labour	200	—	—
Prime cost	375	—	—
Works expenses (35.7%)	133	17	6
Total works cost	£508	17	6

This is perhaps one of the most inaccurate methods, because works expenses rarely, if ever, have any direct relation to the value of materials used. In order to illustrate this point, the manufacture of chemicals offers a very good example. In a certain chemical mixing process the quantity of raw materials used was absolutely fixed, and any variation of the purchase price on the materials was easily computed. The workmen were paid on a piece-work basis, and the direct labour cost was only 1s. per cwt. The works expenses were extremely heavy, i.e. 7s. 6d. per cwt. Two men in charge of a mixer regularly produced 5 cwt. per hour. The works cost of the process may therefore be stated as follows—

			Per cwt.		
			£	s.	d.
Raw materials	.	.	15	—	
Direct labour	.	.	1		
Works expenses	.	.	7	6	
Works cost			£1	3	6

A time study was made, and it was found that the running time per mixer could be reduced from 60 minutes to 45 minutes, i.e. 25 per cent. Under these new working conditions the raw material and direct labour were as before, but owing to the fact that less time had been taken the works expenses were reduced by 25 per cent, i.e. about 1s. 10d. per cwt. It is apparent that if works expenses were recovered by the percentage on the direct labour and material method, no alteration in the cost would be shown, in spite of the fact that the output was increased by reducing the time taken for the operation. With the direct labour hour method, however, a correct works cost would be shown.

Departmental Rates

The Departmental rate is a method by which works expenses are analysed according to departments, a separate rate being ascertained and used for each department. The

rate may be calculated as a percentage on the amount of direct labour or a rate per direct labour hour. With this method, instead of there being one rate to cover all the works expenses, there is a separate rate for each department. In all other respects the rate is arrived at in accordance with the details given above.

This method has many advantages over those already described, because by varying the rates for each department it is possible to arrive at a more accurate cost. A department using expensive machine tools and appliances should be charged with the cost of maintaining such equipment, and in those departments which do not use tools, or only a small quantity of them, such as an assembly department, etc., the departmental rate will not include any part of the expense incurred by the other department using the expensive machinery.

Machine Rate Method

The machine rate is regarded as one of the best methods of recovering works expenses, whenever conditions justify its application. With this method, the total works expenses are analysed by department similar to the example given in Forms Nos. 16 and 17, and the amount of the department's expenses is then divided by the number of machines or group of machines in that department. This gives the total expense per machine or group of machines. The figure is then divided by the number of hours it is estimated the machine will run throughout the year, the result being a machine hour rate.

The most difficult problem connected with its use is to ascertain the correct amount of the expense incurred by each machine or group of machines, and this can only be done by making a scientific analysis of all the expense items. Many of the items will require to be analysed upon a different basis. The following summary will indicate the principles underlying the analysis.

Items allocated direct to machines.

- Depreciation of plant and machinery.
- Repairs and upkeep of plant and machinery.
- Power consumed
- Oil, waste, and miscellaneous supplies

Items allocated on basis of floor space occupied

- Rent, rates, and taxes.
- Depreciation of buildings.
- Repair and maintenance of buildings
- Insurance on buildings

The items comprising miscellaneous expenses will vary with each industry. It is possible that some of them can be charged direct to the machine or department, but where this is not feasible, the items are allocated upon a more or less arbitrary basis. The items referred to will include—

- Foremen's wages and supervision.
- Watchmen and caretaker's wages
- Shop cleaners and sweepers
- Crane drivers, etc.
- Miscellaneous shop supplies, etc.

The basis of a machine rate is the number of productive hours it is *estimated* each machine or group of machines will run throughout the year, assuming the factory will be working to its full normal capacity, i.e. full ordinary time. It will, therefore, be seen that if the estimate for the year is not achieved, there will be a certain amount of expenses "unabsorbed." In this connection there is usually employed an account known as the "Unabsorbed Machine Rate," to which all the unabsorbed expense is charged at the end of each month. Assuming that the machine hour rates are dealt with on a monthly basis, the estimated figures are divided by twelve to give a monthly quota or standard which should be charged to costs. Any difference above or below this monthly standard is transferred to the Unabsorbed Machine Rate Account.

If the total number of machine hours for the year has been correctly estimated, the Unabsorbed Machine Rate Account will show a zero balance at the end of each year, but as it is rarely, if ever, possible to estimate to such a degree of accuracy, the account will generally show a debit balance. The balance of this account, therefore, will indicate to the manufacturer the extent to which his plant is unproductive, the estimate of the machine hours having been based upon the normal output capacity. Such information enables the management to take the necessary steps in order to secure a greater share of orders, as all variations from the normal will be reflected by the Unabsorbed Machine Rate Account.

Comparison of Methods

The choice of any of the above methods will depend upon the class of trade carried on, the size of plant, etc. As the following figures show, a comparison of the costs given in the above examples is interesting. A calculation of a cost has been given with each method in order to illustrate how the various methods of recovering expenses are operated, but in addition these examples also show how one method differs from the others.

Summary of Individual Costs

Basis of Recovering Expenses	Materials			Labour			Expenses			Total Works Cost		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
(1) Percentage on direct wages	175	—	—	200	—	—	286	—	—	661	—	—
(2) Direct labour hours	175	—	—	200	—	—	250	—	—	625	—	—
(3) Percentage on prime cost	175	—	—	200	—	—	133	17	6	508	17	6

An example of a "Cost" when using a Departmental Rate was not given because, with this method of recovering expenses, we simply analyse our expenses by departments in the plant and then apply any one of the three methods given in the above summary. The resultant cost of a job

would therefore be the same in total as in the examples already given. With regard to the Machine Rate method, a sufficient description has been given in the text to enable one to understand clearly how such a rate is arrived at, but as this is one of the most advanced methods in use, it is dealt with more fully in Advanced Cost Accounting.

In the three examples of a cost given above, the total of Works Expenses varies greatly in each case, and to the extent of £152 2s. 6d. between the Percentage on Direct Wages and Percentage on Prime Cost method. Therefore, in choosing any method for recovering expenses, one must be in the position to determine which method is best suited to the industry to which it is being applied.

With the three examples given, it is very clearly shown that if the nature of the industry is such that very expensive labour is used, the percentage on Direct Wages is the correct choice. On the other hand, if fairly cheap labour is used, say, equally with expensive labour, the Direct Labour hour method, having for its basis the element of time, is more suitable. If expensive machine tools are used in both of these cases, the Percentage on Direct Wages will be unsuitable if there is both machine work and hand work performed on the articles manufactured.

The Percentage on Prime Cost method can only be used in rare cases, as, for instance, where both the purchase price of materials and the labour expended thereon have a direct relationship to each other, and when, by tests with the Percentage on Direct Wage, it is found that either of these methods will give very similar results.

Whenever machinery is used in conjunction with cheap and expensive labour, it is better to use the Machine Rate method. If the labour employed in the plant consists of both the cheap and the expensive type and very little machinery is used, then the Direct Labour hour method will generally give good results.

Recovery of Sales Expenses

The treatment of this item will also be guided by the nature of the industry which is carried on; for instance, if the business is engaged in making only one article, the sales expenses could be dealt with easily by arriving at a rate per article and charging our costs on this basis, but as most firms will be engaged in the manufacture of several articles, the sales expenses may then be expressed as a percentage on the total works cost. The formula for ascertaining such a rate would be—

$$\frac{\text{Estimated total sales expenses for year} \times 100}{\text{Estimated total works cost of goods sold for year}}$$

The estimates given in Chapter VII show the total Sales Expense was £122,200. Assuming that the total “cost to make,” shown in the specimen Trading and Manufacturing Account given in Chapter I is to be used as the estimate of the cost value of the goods *that will be sold* during the ensuing year, the following result is arrived at—

	Total Cost to Make
Materials	£315,000
Direct labour	100,000
Works expenses	143,100
Total “cost to make”	<u>£558,100</u>

Therefore the Sales Expense rate is—

$$\frac{£122,200 \times 100}{£558,100}$$

which equals 21.9 per cent (say 22 per cent).

The addition of an amount to represent Sales Expenses will be effected by adding 22 per cent to the Total Works Cost as follows—

	Total Works Cost			Selling Expenses			Total Cost		
	£	s.	d.	£	s.	d.	£	s.	d.
Cost No 1	661	—	—	145	8	5	806	8	5
Cost No 2	625	—	—	137	10	—	762	10	—
Cost No 3	508	17	6	111	19	—	620	16	6

The variation in the amount of Sales Expenses added to the Works Cost is not so great as the variation in the addition of Works Expenses under the three methods described. Taking Cost No. 1 as a basis, it will be seen that Cost No. 3 is £33 9s. 5d. less and Cost No. 2 £7 18s. 5d. less.

It will be noted that Sales Expenses should only be calculated on the value of goods sold. Any goods manufactured for stock must not have Sales Expenses added to them.

Final Ascertainment of a Cost

The final ascertainment of the cost of a Works Order (i.e. Cost to Make and Cost to Sell) can now be effected by using any of the five methods already described for recovering Works Expenses, and either of the methods referred to for recovering Selling Expenses. Suitable spacing was provided at the top of the Job Cost Ledger Sheet (Form No.5) for summarizing the cost of the job. The amounts for Direct Labour and Direct Materials are inserted from the individual summaries already described in Chapters IV and V, the columns are totalled, and the summary at the head of the sheet is completed.

Theory of Expense Control

Before any entries are made crediting the Expense Control Accounts with the proportion of expenses chargeable to all the completed work, it will be well to refer again to the figures which appear in the Expense Allocation Statements (Forms Nos. 15, 16, and 17).

On referring to the chart (Fig. 1), it will be seen that all expenses *actually* incurred are charged to the cost department at the end of each month, or, in other words, as and when each item is paid for or passed over the ordinary books of account. When fixing the expense rates to be used during the ensuing year, however, all the items of expense for the year were *estimated in advance*, so that we now have

two sets of figures to deal with, namely, the actual and the estimated.

It will be remembered that in Chapter II, page 21, it was stated that by summarizing all the expenses charged to cost, the amount of expenses *recovered* can be compared with those actually incurred ; thus we can see how we are recovering our establishment expenses, a most important point. The Expense Control Accounts must, therefore, be operated in such a manner that this comparison can be easily made.

Before describing the Control entries for the expenses that will be recovered in costs during the current period, it is necessary that the student will not be confused between the expenses so recovered and the estimate of expenses that have already been prepared for the use of Forms Nos. 15, 16, and 17.

The work of collection and allocation of expenses on Forms Nos. 15, 16, and 17 was performed with the object of estimating an expense rate to be used during the ensuing year. This expense rate is, therefore, used as the basis for recovering the expenses in costs. By the use of such a method the expenses will be recovered on the rate which is based on an estimate, whereas the expenses appearing in the General Ledger will be those actually incurred during the current period. We, therefore, have two sets of expense control entries to deal with, namely, the control of expenses recovered in costs (which are based on estimates), and the control of the actual expenses incurred.

These two forms of control are necessary, as it is imperative that we compare the expenses recovered in costs with those actually incurred. The control accounts of expenses recovered in costs will, therefore, be carried out as follows—

Control of Expenses Recovered in Costs

The total works expenses charged to a job or works order will be dealt with in a similar manner to that described for

the control of Direct Labour and Direct Materials. For the purpose of illustration it is assumed that the percentage on Direct Labour method is being used to recover expenses. We have the choice of two methods of charging the proportion of Works Expenses to the control accounts.

One method is to debit Work-in-Progress Account with the proportion of expenses at the same time as we charge the Direct Wages, the opposite entry being a credit to Works Expense Control Account. Alternatively, we can wait until each Works Order is completed and then charge the amount of expenses to the Work-in-Progress Account. The former method is used for the purpose of explanation. Each week an entry is made at the same time as the amount of Direct Wages is charged to the Work-in-Progress Account as follows—

The percentage on Direct Wages has already been calculated and the rate found to be 143 per cent, therefore an amount equal to 143 per cent of the Direct Wages is journalized—

Dr Work-in-Progress Account (Expenses)
Cr. Works Expense Control Account

By charging the Work-in-Progress Account with the proportion of expenses at the same time as Direct Wages are charged, we can see at any time the amount of Works Expenses that is being absorbed by the work while it is in progress.

This process of transferring Works Expenses from the Works Expense Control Account to the Work-in-Progress Account is carried out each week at the same time as the amount of Direct Wages is dealt with.

By this method we will have accounted for all direct materials, direct labour, and works expenses consumed on an order, and charged the respective amounts to a Work-in-Progress Account. The object of a Work-in-Progress Account, however, is to enable us to ascertain at any time the amount of work that is in progress only; there yet

remains, therefore, to credit this account with the value of work completed and passed into the Finished Stores. It must be noted that the sales expenses have not yet been dealt with. This item must not be added to the manufacturing cost, but to the sales cost, which cannot be done until the goods are *sold*.

Crediting Work-in-Progress Account

The figures for the credits to the Work-in-Progress Account are obtained by the following procedure. Immediately a works order is completed, the goods are passed into the finished stores ready for issue against a customer's order.

The works cost of all completed orders must therefore be summarized, that is, the value of materials issued per Stores Requisitions and of Direct Labour per Job Cards will be collected and charged to the Works Order Number in the Job Cost Ledger, together with the proportion of Works Expenses, i.e. 143 per cent on Direct Labour. At frequent intervals the total cost of all the completed Works Orders will be summarized and the values journalized as follows—

<i>Dr.</i> Finished Stores Control Account	£
<i>Cr</i> Work-in-Progress Account	£
Direct Materials	£
Direct Labour	£
Works Expenses	£

A specimen Work-in-Progress Account is given on page 121. In it have been incorporated all the Journal entries which have now been described, and a balance brought down to represent the value of work still in progress at the end of the period.

With many concerns, however, the large number of items that have to be dealt with will necessitate the journal entries being made out at very frequent periods, and in order that all the entries relating to materials, labour,

and expenses can be grouped together, sub-accounts are used for each of these elements of cost.

In such cases, therefore, there would be used the following accounts—

Work-in-Progress Account	Materials Section.
„	„ Labour Section.
„	„ Expense Section.

and a fourth account similar to the illustration given, to which would be transferred the balances of each of the above sub-accounts at the end of each costing period.

Cost of Sales Account

When goods are issued from the Finished Stores for dispatch to customers, the works cost of the article is journalized as follows—

<i>Dr</i> Cost of Sales Account
<i>Cr</i> Finished Stores Control Account

Using a Finished Stores Control Account, we are able to ascertain at any time the value of saleable goods on hand, as was done with raw materials by using a Raw Materials Stores Control Account.

We are now in a position to deal with the control of Sales Expenses. Assuming that these expenses are to be recovered as a percentage on the total Works Cost and charged to the Cost of Sales Account, the amount will easily be calculated and the Journal entry prepared—

<i>Dr</i> Cost of Sales Account
<i>Cr</i> Sales Expense Control Account

A Cost of Sales Account is used to ascertain the amount of profit made on sales each month or other period. When used in connection with a Work-in-Progress Account, it will replace the orthodox Manufacturing Account. These two accounts show in a summarized form the results of both the manufacturing and sales activities of a concern, and they are more useful in this direction than the general form of financial statements usually prepared from the ordinary books of account.

From the specimen Cost of Sales Account given on page 122 it will be seen that the works cost of all goods *sold* for the month or other period is entered on the debit side, together with the amount charged for sales expenses, and on the credit side the total net sales for the period.

The sales value of goods returned by customers and replaced into the finished stores is shown separately as a contra item to the amount of sales appearing on the credit side.

Control of Actual Expenses Incurred

The control entries described above deal with the expenses which have been recovered in costs. The control of the labour and materials items as they pass through the various stages of manufacture are also included. There now remains to describe the control entries necessary to record the actual expenses incurred in order that one of the most important functions of Cost Accounting can be brought into use, namely, the comparison of the actual expenses incurred with those recovered in costs.

The periods at which entries will be made to the various control accounts will vary with each concern, and will depend upon the size of the plant, the amount of detail to be dealt with, and whether the information is needed at frequent periods. For instance, with some industries the detailed costing information may be needed at much more frequent periods than with others. Then the entries to the Control Accounts may be made each day, so that the comparison between the actual expenses incurred and the amount recovered in costs can be effected each week or month. With other concerns a quarterly or half-yearly comparison may be sufficient, although it should be borne in mind that if such a comparison is to be of any use, it should be made frequently and at periods that will permit of any corrective measures being taken in cases where the differences are of such a nature that they should be adjusted

immediately they are known. For the purpose of illustration, however, and to enable the proposition to be kept within simple proportions, it will be assumed that a comparison upon a quarterly basis has to be made.

In the Chart (Fig. 1) it was shown that the Cost Department was charged with the actual expenses incurred and which appear in the General Accounts. We now proceed to journalize these expenses on similar lines to those already described for materials and labour. At the end of each quarter, which it will be remembered is the basis we decided upon for our comparison, the following entry is made—

Dr. Expense Control Account
Cr. General Ledger Adjustment Account.

The above entry will include the total of all the various Expense Accounts in the General Ledger, and immediately this entry is effected, we proceed to allocate the actual expenses so transferred by using an Expense Allocation Statement similar to Forms Nos. 15, 16, and 17. The method of collecting and allocating expenses as described in Chapter VII is now followed. After this work is completed, the results obtained are journalized as follows—

Dr. Works Expense Control Account
Sales Expense Control Account
Administrative Control Account
Cr. Expense Control Account.

The effect of this entry is to close the Expense Control Account by transferring the amount to the Works, Sales, and Administrative Expense Control Accounts.

A Journal entry must now be made to distribute the Administrative Expenses to the Works and Sales Departments, as follows—

Dr. Works Expense Control Account.
Sales Expense Control Account
Cr. Administrative Expense Control Account.

Where the above entries are made to the Works and Sales Expense Control Accounts, there will have already been posted to them a credit entry representing the value

of expenses recovered in costs. Any balance in these accounts, therefore, will represent the difference between the actual expenses for the period and the amount of expenses recovered in costs. A debit balance represents the amount of expenses unabsorbed, whereas a credit balance will show the extent to which expenses were recovered in excess of those actually incurred.

Specimen Cost Control Entries

Having outlined the entries required to explain the theory of cost control, the following problem will be worked and the complete set of control accounts posted in order that a thorough understanding of the subject may be obtained.

PROBLEM. Prepare Journal entries, open the necessary Control Accounts, and post the following information—

		£	£
1	Stock on hand, 1st Jan	Raw materials 60,000 Finished goods 40,000	
			100,000
2	Work in progress, 1st Jan	Materials . 3,196 Labour 2,800 Expenses . 4,004	
			10,000
3	Purchases of raw materials .		350,000
4	Pay roll. Direct labour . . .	87,400	
	Indirect labour . . .	13,600	
			101,100
5	Value of raw materials issued to production		327,618
6	Expenses recovered in costs		
	Works, 143% on direct labour		
	Sales, 22% on total works cost		
7	Value of completed work	Labour 88,500 Materials . 328,500 Expenses . 126,555	
			543,555
8	Works cost of goods sold . . .		550,000
9	Establishment Expense. Administrative	63,800	
	Sales . . .	90,300	
	Works . . .	97,600	
			251,700
10	Apportion administrative expense equally to Sales and Works Departments .		
11	Total sales for period . . .	735,400	
	Less value of goods returned by customers and placed into stock . . .	21,700	
			713,700

JOURNAL ENTRIES

No	Date	Particulars	Dr	Cr
(1)	Mar 31	Raw Material Stores Control A/c To General Ledger Adjustment A/c . Transferring value of purchases for three months ending 31st March	£ 350,000	£ 350,000
(2)	31	Wages Control A/c To General Ledger Adjustment A/c . Transferring amount of wages paid for three months ending 31st March	101,000	101,000
(3)	31	Work-in-Progress A/c To Raw Material Stores A/c Transferring value of materials issued from stores to Work in Progress as per stores requisitions	327,618	327,618
(4)	31	Work-in-Progress A/c . To Wages Control A/c Journalizing amount of direct labour charged to production as per summary of job cards	87,400	87,400
(5)	31	Work-in-Progress A/c . To Works Expense Control A/c . Charging Work-in-Progress A/c with amount of works expenses, being 143% on direct labour	124,982	124,982
(6)	31	Finished Goods Control A/c To Work-in-Progress Materials . Labour . Expenses . Transferring works cost of completed goods and placed into finished stores as per Summary of Works Orders closed.	543,555	328,500 88,500 126,555

JOURNAL ENTRIES—(contd.)

No.	Date	Particulars	Dr	Cr.
(7)	31	Cost of Sales A/c . . . To Finished Goods Control A/c . . . Charging Cost of Sales A/c with value of goods issued for dispatch to customers as per Summary of Stores Requisitions.	£ 550,000	£ 550,000
(8)	31	Cost of Sales A/c . . . To Sales Expense Control A/c . . . Being proportion of sales expense chargeable to Cost of Sales A/c, i.e. 22% on works cost of goods sold	121,000	121,000
(9)	31	Establishment Expense Control A/c . . . To General Ledger Adjustment A/c . . . Transferring expenses for three months ending 31st March	251,700	251,700
(10)	Mar. 31	Administrative Expense Control A/c . . . Sales Expense Control A/c . . . Works Expense Control A/c . . . To Establishment Expense Control . . . Journalizing result of allocation of expenses	63,800 90,300 97,600	251,700
(11)	31	Works Expense Control A/c . . . To Wages Control A/c . . . Transferring amount of indirect wages	13,600	13,600
(12)	31	Sales Expense Control A/c . . . Works Expense Control A/c . . . To Administrative Expense A/c . . . Being apportionment of administrative expenses to Sales and Works Departments as per Expense Allocation Statement.	31,900 31,900	63,800

JOURNAL ENTRIES—(contd.)

No	Date	Particulars	Dr.	Cr.
(13)	31	General Ledger Adjustment A/c Cost of Sales A/c . . . To Cost of Sales A/c . . . Journalizing value of sales less returns for three months ending 31st March	£ 713,700 21,700	£ 735,400
(14)	31	Finished Goods Control A/c Sales Expense Control A/c To Cost of Sales A/c . . . Journalizing value of goods returned by customers, and debiting Stores A/c with works cost of returns and Sales Ex- pense Control A/c with sales expenses	16,170 3,557	19,727

(Note. The difference between the credit to Cost of Sales Account and the total sales value of the goods returned, i.e. £21,700, represents the 10 per cent profit added to the Total "Cost to Sell" when the goods were charged to customers—Total Sales Cost £19,727, 10 per cent = £1,973 = £21,700 selling price.)

STORES CONTROL ACCOUNT (RAW MATERIALS)

Dr.

Cr.

19. Jan Mar 31	To Stock on hand " Purchases	JE 1	£ 60,000 350,000 <u>£410,000</u>	s - - -	d - - -	19. Mar 31	By Materials issued " Balance c/d	JE 3 ✓	£ 327,618 82,382 <u>£410,000</u>	s - - -	d - - -
Mar 31	To Balance b/d	✓	82,382	-	-						

FINISHED GOODS STORES CONTROL ACCOUNT

Dr.

Cr.

19. Jan Mar 31	To Stock on hand " Transfer from Work- in-Progress A/c " Goods returned by customers	JE 6 JE 14	£ 40,000 543,555 16,170 <u>£599,725</u>	s - - - -	d - - - -	19. Mar 31	By Cost of Sales A/c " Balance c/d	JE 7 ✓	£ 550,000 49,725 <u>£599,725</u>	s - - -	d - - -
Mar 31	To Balance b/d	✓	49,725	-	-						

Cy.

Dr.		Cr.	
19..	19..	£	s. d.
Jan. 1	To Work in progress		
	Materials	3,196	—
	Wages	2,800	—
	Expenses	4,004	—
Mar 31	Materials issued	327,618	—
	Direct labour	87,400	—
	Works expenses	124,982	—
		£550,000	—
Mar. 31	To Balance b/d—		
	Materials	2,314	—
	Labour	1,700	—
	Expenses	2,431	—
		£550,000	—
		328,500	—
		88,500	—
		126,555	—
		2,314	—
		1,700	—
		2,431	—
		£550,000	—

Cy.

[illegible]

Dr

GENERAL LEDGER ADJUSTMENT ACCOUNT

Cr.

19.. Mar 31	To Transfer, sales " Balance c/d . .	JE 13 ✓	£ 713,700 99,000 <u>£812,700</u>	s d - - -	19.. Jan. 1 Mar 31	By Balance . " Purchases " Wages " Expenses	✓ JE 1 JE 2 JE 9	£ 110,000 359,000 101,000 251,700 <u>£812,700</u>	s. d. - - - - -
					Mar 31	By Balance b/d . .	✓	99,000	-

Dr.

COST OF SALES ACCOUNT

Cr.

19.. Mar 31	To Works cost of goods sold " Sales expenses . . " Goods returned by customers and re- placed into stock. " Balance being profit carried forward to Profit and Loss A/c	JE 7 JE 8 JE 13 JE	£ 550,000 121,000 21,700 62,427 <u>£755,127</u>	s d - - - - -	19.. Mar 31	By Sales " Works cost of goods returned by cus- tomers. . . .	JE 13 JE 14	£ 735,400 19,727 <u>£755,127</u>	s. d. - - -
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The Cost of Sales Account as given is not intended as a trading account from the accounting point of view. Gross Profit that would be transferred to Profit and Loss is the excess of sales over the cost of goods sold, and that cost would be the works cost. Sales expenses do not enter into the "cost to make" the goods. They constitute a cost of marketing, and from the general accounting point of view the Gross Profit will be shown before there is a charge for these expenses.

(Memorandum Account only)

Dr.	PROFIT AND LOSS ACCOUNT		Cr.
			£
		By Profit brought forward from Cost of SalesA/c	62,427
			-

<i>Dr.</i>		ESTABLISHMENT EXPENSE CONTROL ACCOUNT					<i>Cr.</i>		
19.. Mar. 31	To Expenses .	JE 9	£ 251,700	s —	19.. Mar. 31	By Transfer .	JE 10	£ 251,700	s —

WORKS EXPENSE CONTROL ACCOUNT										Cr.		
Dr.												
19..	To Transfer " Transfer " Transfer	.	JE 10 JE 11 JE 12	£	s	d	19.. Mar. 31	By Transfer to Work-in-Progress A/c " Balance c/d	JE 5 ✓	£	s	d
Mar 31												

SALES EXPENSE CONTROL ACCOUNT

<i>Dr.</i>	<i>Cr.</i>
19.. Mar. 31	
To Transfer . . . JE 10 " Transfer . . . JE 12 " Expenses on goods returned to stock. JE 14	By Transfer to Cost of Sales A/c . . . JE 8 " Balance c/d . . . ✓
	£ 90,300 31,900 <u>3,557</u> £125,757
	£ 121,000 4,757 <u>£125,757</u>
19.. Mar. 31	
To Balance b/d . . . ✓	

ADMINISTRATIVE EXPENSE CONTROL ACCOUNT

Dr.		Cr.					
19.. Mar. 31	To Transfer .	JE 10	£ 63,800 s d — —	19.. Mar 31	By Transfer .	JE 12	£ 63,800 s. d. — —

TRIAL BALANCE

	<i>Dr</i>			<i>Cr</i>		
	£	s.	d.	£	s.	d.
Raw Material Control Account .	82,382	—	—			
Finished Goods Control Account .	49,725	—	—			
Work-in-Progress Account .	6,445	—	—			
General Ledger Adjustment Account				99,000	—	—
Cost of Sales Account				62,427	—	—
Works Expense Control Account .	18,118	—	—			
Sales Expense Control Account .	4,757	—	—			
	<u>£161,427</u>	—	—	<u>£161,427</u>	—	—

CHAPTER IX

ACCOUNTING FOR EXPENSES; SERVICE ORDERS

THE Expense Control Accounts, which were dealt with in Chapters VII and VIII, only control such expenses "in total." Whilst this is necessary, it will readily be seen that the Control Accounts alone are of limited managerial use because they do not show in sufficient detail why or how the money has been spent.

Furthermore, the comparison of the expenses actually incurred with those recovered in costs once each quarter may be sufficient for some concerns, but in the majority of cases this quarterly comparison will not meet the requirements of the larger manufacturing plants. It is therefore necessary that this comparison be made at more frequent periods.

The purpose of this chapter, therefore, is to explain the principles involved in accounting for indirect expenses in detail, and to enable the comparison of actual expenses with those recovered in costs to be made at more frequent intervals than once every three months.

The Indirect Expenses of a business consist of items which arise in two different directions. There are those expenses which will be recorded in the general accounts, comprising such items as Rent, Rates and Taxes, Salaries, Travelling Expenses, Insurance, Royalties, Discounts, Interest on Overdrafts, General Expenses, and Advertising, etc. Expenses of this nature will be recorded in the general accounts, as they represent the expenses that arise directly from the payment of cash. There are also other items of indirect expense which arise solely *within the plant*, such as the issues of sundry materials from stores for use on repairs, maintenance and upkeep of plant and buildings, etc.; sundry supplies for cleaning, such as brooms, mops, soap,

and dusters, etc.; indirect materials for use by the Direct Workers, such as oil, rag, waste, emery paper, small perishable tools, chalk for polishing, and many similar items as required by the different industries; the value of indirect labour expended upon the different kinds of service, such as cleaning, sweeping, general labouring, inspection and viewing; repairs to plant and buildings, erection of new plant and buildings, etc.

The former group of expenses, i.e. those that represent the payment of cash to outside concerns, will be suitably recorded in the system of general accounts, but as regards the many items which comprise the second group, i.e. those expenses which are incurred within the plant, there must be set up a method that will enable a concern to account for each item in detail.

The recording of the expenses which comprise the former group will not present any difficulty to those concerns which have their general accounting system arranged on a proper basis, as the classification or analysis of accounts will provide all the information necessary. With regard to those items which are only paid for at long intervals, such as rent, which may be paid for quarterly, there will be set up in the general accounts a reserve for the amount of rent accrued each month. The total rent accrued each month, therefore, will be easily ascertained, whether it has been paid for during the month or at other periods.

Depreciation is another item that is sometimes inserted in the general accounts only once a year, but if a system of Cost Accounting is in operation, this item, together with all other expenses of a like nature, will be dealt with on a similar basis to that described above for rent, and a reserve set up for the amount to be charged each month.

When a comparison has to be made, on a monthly basis, of the actual expenses against those recovered in costs, the collection of such items will be made possible by the above system of setting up reserves for all accrued items.

With regard to the items which comprise the second group of expenses, a slightly different method has to be used, as they cannot be dealt with simply by the setting up of reserves in the accounts. The charges for this group of items will arise within the plant, as they represent the cost of the indirect work rendered by the Service Departments in the plant to the Producing Departments. The cost of this class of expense must, therefore, be ascertained.

When all the different kinds of materials were purchased, the total value of such purchases was charged to a Raw Material Stores Control Account, because it was not known at the time which kind or what quantities of the materials would be used for indirect work. Likewise, the wages paid were charged to a Wages Control Account, and the direct wages were accounted for by summarizing all the Job Cards and charging the amount to the respective works orders. However, as regards the Indirect Labour, the amount was transferred to the Works Expense Control Account in total; therefore no accounting for this expense has yet been made in detail.

With some concerns it is not possible to ascertain the total amount of wages spent upon indirect work by the use of an analysed form of pay roll (Form No. 8), for the reason that direct workers will sometimes be required to book their time to certain kinds of indirect work. For instance, a machine breakdown will cause the direct worker to lose time on his productive work. It is customary in such a case for the worker to charge his "lost" time to an order on which is collected all the times lost through the breakage of belts and other causes of machine breakdown.

Another instance where the type of pay roll illustrated by Form No. 8 cannot be used, is in those industries where there are many different kinds of indirect work; such a large number of columns would be required to analyse each kind of indirect work that the size of the pay roll would be too cumbersome to handle. A method must,

therefore, be introduced whereby the costs of the various kinds of indirect labour can be ascertained.

Reference to the Works Expense Allocation Statement (Forms Nos. 16, and 17) will assist in following the discussion up to this point. On Form No. 16 there were collected all the expense items that should be charged to the plant, and these were dealt with by allocating them to the different kinds of service. The result of this work gave us an estimate of the probable expenses for each class of service for the ensuing year. The next step in the control of expenses is to account in detail for all the items in order that the actual cost of each kind of indirect work can be compared with the estimates. A description of the method used for collecting the *actual* indirect expenses will now be given in order that the objectives referred to can be achieved namely—

(a) To ascertain the actual cost of all the various indirect expenses incurred during the year.

(b) To provide a complete and detailed check upon the estimated expenses which were recovered in our costs as against those *actually* incurred.

Objective (a) is necessary so that the management can intelligently control the individual items of expense. Objective (b) is essential as a comparison of the estimated expense with the actual must be made in order that future estimates can be prepared with more reliance.

Service Orders

A system of Service Orders is brought into use, so that the cost of each class of “indirect” work can be ascertained by charging it to a separate order, as was done when “direct” work was charged to a Works Order Number to find the cost of each job or article.

Service Orders are sometimes known as Standing Works Orders. The reason for so naming this class of orders is due to their permanence, i.e. they stand from month to

month, and through them the indirect expenses or costs are controlled in detail, both in regard to indirect materials and indirect labour, and also other sundry indirect expenses. It must be borne in mind that a Service or Standing Order bears no relation to a Works Order. The latter is an instruction to manufacture for sale; the former is an instruction for service to be rendered by the works to the works.

In collecting the cost of all the expenses of a plant, provision must be made to ascertain the cost of indirect labour, indirect materials, and indirect expenses. The method used is very similar to that described in Chapter X for Job (or Order) Costing, excepting that, in this instance, we account for all "indirect" items instead of "direct" items.

Capital and Revenue Expenditure

The indirect expenses of a manufacturing business are of two kinds: first, the expenditure of labour and materials in the making and erection of new plant and machinery, tools, buildings, etc., which will ultimately be a charge to the capital accounts in the financial books, because the work so performed increases the value of such assets; secondly, the expenditure relating to the repair, maintenance, and upkeep of such capital assets, and also the cost of other service departments in the works, such as shop cleaning, inspection and viewing, supervision, labouring, lighting, heating, packing, storekeeping, etc.

The number and the names of the items which comprise Service Orders will vary with the nature of the industry and the size of the business to which they relate, but the following specimen list will serve to illustrate how Service Orders can be used as a means of analysing all indirect expenditure in such a manner as will clearly show why and how the money has been spent, thus assisting the management in the control of the business.

Capital Expenditure

Service Order No.	Description
S.O. No. 51	Making and/or erection— New power plant
52	Lighting plant
53	Machine tools
54	Fixtures and fittings Office
55	Fixtures and fittings Plant
56	Buildings
57	Making new loose tools
58	Making patterns

Revenue Expenditure

Service Order No	Description
S O No. 101	Repairs and Maintenance— Power plant
102	Lighting plant
103	Machine tools
104	Fixtures and fittings Office
105	Fixtures and fittings. Plant
106	Buildings
107	Loose tools
108	Patterns

General Shop Expense

Indirect Labour. Intended to give an analysis of all indirect labour, these Service Orders may be arranged to give an analysis either by departments or by the nature of the work performed. With some concerns the departmental analysis may be as follows—

Service Order No	Description
S.O. No 201	Stores and Receiving Departments (Including wages of all assistants other than sal- aried employees)
202	Power Department
203	Repair Department
204	Dispatch Department

General Shop Expense—continued

Service Order No.	Description
S O No. 205	Tool stores
206	General shop labouring
207	Shop cleaners and sweepers
208	Inspection and viewing
209	Supervision
210	Unallocated time
211	Packing Department

Miscellaneous

Service Order No	Description
S O No 301	General purposes To include oil, rags, waste, emery paper, etc , and all such items required by the factory (Raw materials must not be drawn from stock on this Service Order)
302	Welfare and cafeteria expenses To include all expenses in connection with welfare work, sports, etc , but exclusive of general repairs and maintenance of cafeteria buildings, which should be charged to S O 106
303	Complaints Expenditure in regard to rectifying, repairing, or altering of the company's products which have been returned by a customer due to faulty workmanship and/or materials or design Damage in transit, etc
304	Experimental Expenditure incurred in regard to experimental or development work carried out in connection with the company's products

The Service Orders relating to work on capital items (i.e. capital additions) are usually dealt with slightly differently from those given for revenue expenditure , taking as an example S.O. No. 53, it would be the practice to issue an order for each job that has to be done, so that the cost of the work can be noted upon the record that is kept of each piece of machinery. Assume, therefore, that a new

machine tool which has been delivered, such as a radial drill in an engineering shop, or a power-driven sewing machine in a ready-made clothing factory, requires fixing in position. The order for its erection (bearing the reference "S.O. No. 53/1") would be issued to the Plant Maintenance Department or Works Engineers. The S.O. No. 53 indicates the nature of work to be performed, and the "stroke number 1" the separate account to which the cost is to be charged.

All materials issued from stores, such as cement, angle iron, holding-down bolts, etc., and the time of the men engaged upon the work would be booked to this account number in just the same way as explained when dealing with the ordinary works or production orders. When the next piece of machinery is delivered, the Service Order number issued would be S.O. No. 53/2, and the work entailed in connection therewith charged to the sub-account No. 2. By this means it is possible to ascertain the cost of the work done on each piece of new machinery.

Similarly, the work in connection with the repairing, maintenance, and upkeep of plant, machinery, and buildings is analysed to show the expenditure incurred on behalf of the individual machine tool or building, etc.

The numbers 201 to 211 chiefly relate to indirect labour, no materials being booked to these accounts, whereas Accounts Nos. 301 to 304 will have charged to them materials used in addition to labour. Account No. 210 provides very important information regarding the time that is lost by the direct workers in changing over from one job to another or for various other reasons. In all manufacturing concerns there will always be stoppages and delays due to many causes, some of which are unavoidable, and in order to assist the management in keeping this "unallocated" time at a minimum, there are usually a number of sub-accounts to the main Service Order. For instance, time will be lost in reporting to the foreman between jobs, in waiting for a fresh order to be issued, in waiting for materials, in

“washing up,” or in any other way by which the workmen are kept away from their “productive” work.

In those industries, therefore, where lost time is due to many reasons, the Service Orders are arranged to show the cause, and such a S.O. No. 210 would have sub-accounts similar to the following—

- S.O. No. 210/1. Belt broken.
- S.O. No. 210/2. Waiting for materials.
- S.O. No. 210/3. Waiting for tools.
- S.O. No. 210/4. No work.
- S.O. No. 210/5. Machine breakdown.
- S.O. No. 210/6. Power breakdown.

Accounting for Indirect Materials

Whenever materials are required in connection with the work to be done on a Service Order, a stores requisition is used, but to differentiate between the requisitions issued against a works order, a different coloured form is necessary. In some cases, however, a special requisition is printed, the chief alteration being at the top of the form (see Form No. 4), the symbol “S.O.” being quoted in place of “W.O.” The use of different coloured forms will not only facilitate the work in the Cost Department, but upon their presentation to the storekeeper he can see at a glance that the materials required are for use on indirect work, and can take the necessary steps to check the requisition before issuing the goods.

The quantity of materials issued is noted on the Bin Card, and the requisition then sent to the stock record clerk in the cost department, who deals with it in exactly the same manner as was explained for summarizing the materials issued on works orders in Chapter IV.

Accounting for Indirect Labour

The recording of the indirect workers’ time is effected in a manner similar to that described in Chapters V and

VI for direct labour, excepting that the Job Cards will be of a distinctive colour, and that the Service Order number is quoted in place of the Works Order number. A Job Card ruled similarly to the specimen Form No. 18 is

Form No 18

SERVICE ORDERS—JOB CARD

WAGE ANALYSIS

Job Card No.	Job Name	Rate	Time	Amount
200	EX	14½	10 7	
18	NT	7	5 1	
1300	RT	11½	8 ½	
168	RP	8½	6 2	
50	NP	11	8	
TOTALS				52½ 1 18 2

Job Card 1: EXPERIMENTAL (LIGHT BLUE)

Workman's No. 26
 Job No. 200 EX
 Work ending Aug 28th
 Name Gladhill-Brook
 On 7 01 F Off 11 50 SA
 Rate 14½

Job Card 2: NEW TOOLS (GREY)

Workman's No. 26
 Job No. 18 NT
 Work ending Aug 28th
 Name Gladhill-Brook
 On 7 01 M Off 2 50 E
 Rate 7

Job Card 3: REPAIR TOOLS (BUFF)

Workman's No. 26
 Job No. 1300 RT
 Work ending Aug 28th
 Name Gladhill-Brook
 On 2 50 E Off 4 30 Z
 Rate 11½

Job Card 4: REPAIR PLANT (ORANGE)

Workman's No. 26
 Job No. 168 RP
 Work ending Aug 28th
 Name Gladhill-Brook
 On 5 01 Z Off 4 04 E
 Rate 8½

Job Card 5: NEW PLANT (DARK BLUE)

Workman's No. 26
 Job No. 50 NP
 Work ending Aug 28th
 Name Gladhill-Brook
 On 4 06 E Off 5 21 Z
 Rate 11

generally used, because the nature of the work to be performed is such that the workmen can seldom be paid by the piece-work or bonus methods, but only upon the day rate method. No particulars, therefore, are necessary in regard to piece-work or bonus earnings. Separate cards are generally used for each service order to facilitate the collection of the labour costs.

It will now be seen that the card racks will not only

contain Job Cards relating to works orders in hand and in progress, but also those relating to service orders.

Control Accounts for Service Orders

Having ascertained by the above method the amount of indirect labour and the value of materials issued on each service order, the details can now be summarized to provide the figures for charging each Service Order, and at the same time prepare the Journal entries in connection with the Materials and Labour Control Accounts.

The charging of materials and labour to each of the Service Orders in the Job Cost Ledger will be effected in just the same manner as for ordinary works orders, the stores requisitions and Job Cards being either posted direct to the individual accounts or summarized on collecting sheets.

The total value of materials issued for the week or other period is then journalized as follows—

Dr. Service Orders.

Cr. Stores Control Account (Raw Materials).

The total amount of indirect labour will likewise be journalized as a debit to the respective service orders, but, as regards the credit entry, a slight variation in the routine of cost control, as described in Chapter VIII, becomes necessary. When dealing with the control entries in Chapter VIII, a concern that had just installed a system of Cost Accounting was used as an example. No system of service orders had been in use prior to the installation of the system, and the cost control entries, therefore, had to be completed in a manner that would enable the concern to control the actual expenses in total. There is now, however, a system of service orders in operation. The indirect labour can be controlled in detail, and the Journal entry No. 11, which was given in the specimen control entries in Chapter VIII, will be omitted from all future control entries. In its place, the following entry is made each month—

Dr. Service Orders.
Cr Wages Control Account.

With a system of service orders in operation, the amounts of indirect labour are accounted for each week or month in a manner similar to that explained for Direct Labour (see Journal entry No. 4, Chapter VIII), excepting that the amount is charged direct to Service Orders and not to Work-in-Progress Account.

After posting the above Journal entry in the Cost Ledger, the Wages Control Account for the week or other period under review will show a zero balance. Bearing in mind that we have already checked the times shown on the Job Cards with the Gate Cards of each man when calculating the total pay for the week, any differences would have been dealt with at the time and the records adjusted accordingly. We have now completely effected the reconciliation *in detail* of the moneys paid in wages with the general accounts, and at the same time accounted in detail for both direct and indirect labour. Similarly, the balance now remaining in the Stores Control account will represent the value of the raw material stock on hand, as actual quantities in stock have been physically checked by taking a fixed number of bins each day and comparing the totals shown on the Stock Record Card. We have therefore also effected reconciliation with the general accounts for this item, and at the same time accounted in detail for both direct and indirect materials consumed in production or on service orders.

Furthermore, by summarizing the totals charged to each Service Order, we can now prepare a statement of the actual indirect expenses, so accounting for all moneys spent upon indirect work.

We have, in fact, carried out all the operations previously described as necessary in the sphere of cost finding and cost control.

CHAPTER X

METHODS OF COST FINDING : JOB (OR ORDER) COSTING SYSTEMS

Job (or Order) Costing Systems

THE principles of Job Costing can be so usefully applied in such a variety of trades, that it is impossible in an elementary work of this nature to give a detailed description of the actual methods or routine that would be used under many conditions.

It has been seen from the previous chapters that the principles of costing are such that they can be applied to *any* manufacturing business. The actual method of applying these principles will depend entirely on the nature and size of the business. The routine already described was given by way of illustration only, and must not be accepted as the only method that can be used. A system of cost accountancy must be devised to fit the business, not the business to the system.

The basis of the job costing method is the costing of an individual job or piece of work. The job may be an order for a large quantity of articles or for one only, as mentioned in Chapter II, when it was explained that a works order may be issued in the ready-made clothing business for one or for a batch of suits.

In the engineering trades the job may cover the manufacture of 5,000 connecting rods or of 1 fly-wheel cast to a special pattern; in the cabinet making industry it may be for 1,000 radio cabinets or for 1 special office desk; in the rubber trades it may cover 1,000 gross of washers or 10 gross of rubber thigh boots. Whatever the quantity may be, the basic principle remains, i.e. the ascertainment of the cost of the job. In most factories the job is covered by the works order, the production order, or the service order, whereas with builders it is by the "contract."

With the smaller size of firm the costing of a job is a comparatively easy matter if the methods as described in the previous chapters are closely followed, but with large concerns, and especially those which manufacture on the mass production principle, the method generally becomes slightly more involved on account of the large quantities of articles or parts which have to be made.

Sub-Orders

In such cases the job will resolve itself into an order for a "part" or a particular "operation" that is to be performed in one department of the works instead of for the complete articles. Assuming, for instance, that 2,000 electric motors have to be made, the job would still be the 2,000 motors, but to facilitate the collection of the many items which will go to make up the cost of the complete order, the article to be made is divided into component parts, and a separate order issued for each part. In the case referred to, the order for the 2,000 motors would be, say, W.O. No. 7250. The names of each part of the complete motor are then listed, and the necessary quantity of each part, to make up 2,000 motors is ascertained, and sub-orders issued for each part, the first bearing the number W.O. No. 7250/1, the second W.O. No. 7250/2, the third W.O. No. 7250/3, etc. In addition to the sub-orders for the manufacture of each part, orders will also be issued for assembling the parts into complete machines. The assembly orders will be of two kinds: first, there is the "sub-assembly," i.e. the assembly of several parts into a complete unit, and, secondly, the "final assembly" of these units into a complete motor.

With the manufacture of electric motors, a sub-order would cover the assembly of the various parts which go to make the brush gear, another sub-order would cover the assembly of the commutator, etc. The final assembly order would cover the assembly of the parts manufactured on the

sub-assembly orders, such as armatures, fields, coils, base plates, etc., into the complete machine. In the case of electric motors, however, a further sub-order will be required to cover the testing of each machine.

By splitting up the main order into orders for the natural parts of an article or its appropriate divisions for manufacturing purposes, and issuing a sub-order to cover each part or operation, it is possible to ascertain the works cost of each part by charging all the materials and labour consumed to the respective orders. Furthermore, by summarizing the total cost of each sub-order, we not only arrive at the final cost of making the 2,000 electric motors, but we can tabulate our summary in such a manner as will clearly show the extent to which the various elements have entered into the cost of the final product.

Accounting for Materials

The routine necessary to record the value of materials consumed in production with the Job Costing method has been described in Chapters III and IV, the Job Costing method of Cost Finding having been taken as an example when explaining the use of Stores Requisitions and the summarizing of the material costs therefrom.

In Chapter IV it was stated that with well organized stores, the storekeeper is never allowed to issue any materials unless an order in writing, signed by a responsible official, is presented to him. It now remains to describe the principles underlying the various methods of issuing Stores Requisitions.

The basis of any Job Costing system is to "cost the job." We must, therefore, arrange the system in such a manner that as and when Stores Requisitions are issued, they will be connected with the particular Works Order on which the materials are to be used. There are two matters that must be accommodated in this respect. First, the Stores Requisitions must only be issued against a Works Order.

Secondly, the Stores Requisition must bear the reference number of the Works Order.

The former is necessary to control the issues of Stores Requisitions, and to guarantee that materials are issued from stores for use on authorized work only. The latter is necessary to notify the Cost Department of the particular order which has to be charged with the value of materials issued.

With some concerns the foreman of each department in the plant will issue requisitions on the stores for any materials required. This method works satisfactorily with the smaller concerns, but not so efficiently with the larger size plant. To be effective it entails a considerable amount of checking by the Cost Department and the storekeeper; otherwise, a very elaborate system must be introduced in order to avoid over-issues of materials. With such elaboration, however, it will rarely be possible to prevent the over-issue or unauthorized withdrawal of materials, as this will not become apparent until *after* the material has been obtained. To avoid difficulties in this direction, therefore, the requisitions should be issued by the department in the plant which is responsible for the planning or routing of the work through the various producing departments.

With some concerns it is the practice for the Planning Department to issue the Stores Requisitions for Direct Material only, and to allow the departmental foreman to issue requisitions for Indirect Materials required for use on Service Orders. In such cases the Stores Requisitions are printed on coloured paper in order to distinguish between those used for Direct Materials and those for Indirect Materials.

As the Works Orders are issued to the plant, the Planning Department will "plan" the work and issue the necessary detailed instruction to each of the producing departments concerned with the manufacture of the product. Stores Requisitions will also be made out for the materials

required and the different Works Order numbers quoted thereon.

The issue of the materials then follows in accordance with the principles already explained in Chapter IV. The storekeeper initials the Stores Requisitions to indicate that they have been filled and sends them to the Cost Department.

Stores Credit Notes

Materials issued to the plant for manufacturing purposes will sometimes consist of items that cannot be conveniently measured into the exact quantity that will be required for a particular operation or process. In such cases it may be the practice to issue an item of material in bulk, such as a reel of copper wire in an electrical repair shop. On completion of the work, the balance remaining is returned to the stores.

The issue of the bulk supply is made against a Stores Requisition, the total quantity being credited to stock on both the Bin Card and Stock Record Card. Upon the return of the balance, the storekeeper weighs or counts the quantity and makes out a "Stores Credit Note," which then forms the medium for crediting the job and debiting the stores. Stores Credit Notes are, therefore, entered upon the Bin Card and Stock Record Card as a "receipt," but as a "credit" to the Works Order Number, as shown on the Credit Note, and from which the materials were returned.

A specimen of a Stores Credit Note is given (Form No. 19).

Rejection of Spoilt Work

With most manufacturing concerns it frequently happens that, due to many causes, materials will be spoilt during Manufacture. When this occurs, the particular Works Order Number must be credited with the value of the spoilt work. A "Rejection Note" is sometimes used. It is ruled similarly to the Stores Credit Note, but space has

to be provided in order that the reason for rejection can be stated.

These forms follow a slightly different routine from the Stores Credit Note as regards the treatment in the cost records.

Materials rejected as defective cannot be put back into stock, but must be placed on one side until the correct disposition is decided upon. If the material is defective, it will usually be returned to the suppliers for credit. If, on the other hand, the materials were spoilt by the workmen whilst working on them in the plant, the material, less its scrap value, is a complete loss to the concern, and the cost will then be transferred to the Service Order, which is brought into use to collect the cost of all such spoilt work.

The entries to be made by the Costing Department, therefore, will be a credit to the Works Order Number and a debit to a Service Order. If the material is to be returned to the suppliers for credit, the debit will be made to Accounts Payable (Suppliers' Account).

Summarizing Material Costs

All the Stores Requisitions issued against a Works Order are collected together, as are also any Stores Credit Notes or Rejection Notes, and the values of the materials used then summarized, as was explained in Chapters III and IV.

Accounting for Labour

The collection of the labour costs for each Works Order will follow on lines similar to those explained for materials, but in this instance the Job Card will bear the number of the Works Order on which the workers are engaged.

The method used for booking time to jobs will depend upon the nature of the work performed, and the system of wage payment in use, i.e. piece-work, or premium bonus methods, etc. There are numerous methods of booking time to jobs, each having its special application, but the most common method, used by the average size concern,

is to provide one Job Card for each Works Order on which a worker is engaged. A specimen of such a card was given in Chapter V, Form No 9, and the routine also fully described. The specimen cards, Forms Nos. 7 and 9, clearly indicate the method employed by each worker when registering his "in" and "out" times on the Gate Card (Form No 7), and the start and finish of each job on separate Job Cards.

As each job is finished the Job Card is sent to the Cost Department, where it is extended, checked, and temporarily filed either by clock number or worker's name. At the end of the pay week the Gate Cards are collected (being replaced with new ones), and the "in" and "out" times extended and totalled. The back of the card is ruled, so that all the Job Cards can be summarized thereon, and the times booked to the various jobs agreed with the total as shown on the Gate Card.

Summarizing Labour Costs

All the Job Cards issued against a Works Order will be collected together by the Cost Department after the extending and checking of the Gate Cards has been completed.

The final compilation of the labour cost of a job may be deferred until all the work on the particular order is completed. If this is done, the Job Cards, when received by the Cost Department, will be sorted and filed according to job number. When the job is completed, all the cards can be taken from the file and summarized by the aid of an adding and listing machine. Should it be the practice to summarize the Labour Cost each week, the Job Cards will be dealt with exactly as above, and the weekly amounts entered on a Final Cost Summary.

Accounting for Establishment Expenses

The recovery of Establishment Expenses in a system of Job Costing should not present much difficulty if the

general principles, as explained in Chapters VII and VIII, are carried out. However, care must be taken when selecting the actual method of recovering expenses, as the use of wrong methods in this direction will destroy all possibility of accuracy in the final results of the system. Examples of the different results produced by each of the methods when applied to the same job, were given in Chapter VIII, and they serve to indicate the conditions under which each method can best be applied.

Having decided upon the method to be used, the amount recovered in the individual Job Costs will be inserted in the Cost Summary, the amount summarized, and the total journalized to the Work-in-Progress Account. If the products are made for stock, the debit entry will be to the Finished Goods Store Control Account; if for sale, to the Cost of Sales Account. With some methods of costing, however, it is the practice to pass all products to the finished stores, the Sales Department requisitioning the items for dispatch. The entries to the Control Accounts follow accordingly.

Final Summary of Job Costs

A Cost Summary is a form on which the detailed amounts of direct labour, direct materials, direct charges, and the proportion of expenses are finally summarized in order that the final or total cost of a job, order, or series of operations can be recorded and held available for future reference.

The method that will be used for summarizing the individual Job Costs will depend upon the volume of the business and the amount of information required by the management. In some cases the summary of a complete cost can conveniently be shown at the top of the Cost Account, which is contained in the Job Cost Ledger, whereas with some industries it may be necessary to use special forms for this purpose. For instance, those firms which continually manufacture stock lines in either small

or large quantities will generally require their cost statistics in a form that will allow for easy reference. In such cases, a card record system, arranged to show the total and detailed costs of a complete order and the average cost of each article, is often used.

In factories where the Works Order has been split up into sub-orders, a special form of Cost Summary is necessary. The object of these special forms will be, first, to summarize on one sheet the detailed material, labour, and expense items of each component, and, secondly, to arrive at the final cost of the whole order by summarizing the cost of each sub-order on to a final cost summary sheet. A specimen of the Cost Summary Sheet which is contained in a Job Cost Ledger is given (Form No. 20). It will be noted that the Ledger sheets which contain details of the cost of a job are not ruled with debit and credit columns like the Ledger, which contained the various Cost Control Accounts, but that the space is more usefully occupied for the analysis of the various items.

The specimen given (Form No. 21) is ruled for summarizing the details of costs which have been previously listed on a material or labour collecting sheet, usually inserted in front of the collecting sheets in the Ledger.

A comparison of the two forms of Cost Summaries, Forms Nos. 20 and 21, will clearly show the principles of each kind. The most important item in Form No. 20 is the labour cost, and more space is allotted to it for analysis purposes. With the type of Cost Summary illustrated by Form No. 21, each element of cost is equally important, and space is also provided for the listing of the separate parts that go to make the complete article. This form is specially arranged to summarize the cost of the component parts, and would be a suitable summary for use in costing the manufacture of electric motors, referred to when describing the system of Works Orders earlier in the chapter.

As a further example, many firms continually manu-

facture stock lines in either small or large quantities, such as in the ready-made clothing business, and where small electric motors are made for stock. In these cases the cost summary is required in a form that will allow of easy access. An example of such a record is given (Form No. 22). This type of summary is contained on an 8 in. $\times$ 5 in. card, ruled to show both the total and detailed costs of the complete order and the average cost of each article. Other types of cost summaries are obviously used, and the above examples are simply given to illustrate the different principles which are employed according to the nature of the industry carried on.

The general flow of cost procedure is set out in the chart (Fig. 2) which appears in Chapter II. This should be studied in conjunction with the description contained in this chapter.

Comparative and Analytical Statements

The completion of the function of Cost Control and Cost Finding produces many statistics which are of great importance to the general management of a business. The preparation of Comparative Statements, therefore, forms a most important part of a cost accountant's duties. By the production of these statements the cost accountant is able to interpret the results of a concern's activities, indicate trends, etc., and so convey this information to the management in a manner that is easily and quickly understood.

Comparative Statements must be prepared in such a manner that the information they are intended to give shall immediately be obvious upon glancing at the form. In other words, statements must be served up in a pre-digested form, and should not require a long and close study before one can discover what the figures represent or what information it is intended to convey.

Examples of cost summaries have been given above. The purpose of these summaries is twofold. First, it is

essential to show, in a concise and easily read form, the results in terms of cost of the manufacturing activities in the plant, and of the share of management and selling expenses that are correctly chargeable to each order, process, or product. Secondly, they form a basis for the preparation of certain comparative statements. Such summaries may be used whenever it is desired to compare the cost to make and the cost to sell, etc., with the selling price of the article on order, but if we study these summaries more closely, we will observe that a great deal of information can be obtained from them. For instance, the total cost can be analysed to show the extent to which labour has entered into the cost of the product as compared with materials or expenses. Labour can also be further analysed to show the class or type of help used in the manufacture of certain products as against others.

Materials can also be analysed to show the extent to which cheap and expensive materials have entered into the different products.

With regard to factory and selling expenses, etc., either the proportion of these to the complete cost can be ascertained, or the fluctuation of expenses absorbed by the cost of similar articles over a period can be found.

Fluctuations in the cost of labour, materials, and expenses, over long periods, form an important subject for analysis and comparison, and a knowledge of the basis upon which such comparative statements are prepared is desirable.

Labour statistics form, perhaps, the most general subject in regard to comparisons. These statements usually take the form of analysing the various types of labour employed in the plant and comparing these figures with past periods. It is not sufficient, however, to give the total wages paid by, say, trades or departments for the current period, and then to show the figures for the same period in the previous year. Wages will sometimes fluctuate by substantial amounts, but one must take into consideration the

fluctuation of output and of the number of persons employed, etc., otherwise the results may be misleading.

The following example of a statement will serve to illustrate the type of information that is sometimes given in regard to the number of employees and the wages paid, compared with similar figures of the previous year.

COMPARATIVE STATEMENT OF AVERAGE NUMBER EMPLOYEES
AND WAGES PAID

WEEK ENDING 5TH JANUARY, 1940 AND 1941

DEPARTMENT	1940				1941					
	Average Number Em- ployed	Total Pay Roll		Average Number Em- ployed	Average Weekly Wage	Total Pay Roll		Average Weekly Wage		
		£	s	d.	s.		£	s	d.	s.
<i>Producing Departments</i>										
Turning	47	135	7	2	57 60	49	140	10	2	57 35
Milling	32	87	16	10	54 90	37	102	9	10	55 40
Drilling	27	57	12	11	42 70	28	60	6	10	43 10
Planning	19	35	14	5	37 60	18	32	15	2	36 40
Coil winding	39	49	14	6	25 50	41	52	1	5	25 40
Armature winding	26	38	4	5	20 40	24	34	13	7	28 90
Painting	14	15	1	—	21 50	12	12	9	—	20 75
Assembly	21	34	1	5	32 45	20	33	2	—	33 10
Test	17	39	15	7	46 80	19	42	9	6	47 20
Etc										
Total	242	493	8	3	40 77	248	£ 510	17	6	41 36
<i>Service Departments</i>										
Power	7	17	8	2	49 75	7	17	18	5	51 20
Repair	11	20	12	6	37 50	10	18	12	7	37 25
Stores	5	10	6	—	41 20	5	10	10	7	42 10
Receiving	3	5	3	10	34 60	3	5	3	—	34 30
Tool room	10	25	6	—	50 60	11	27	14	5	50 40
Tool stores	3	6	6	7	42 20	4	8	7	2	41 80
Heating	4	6	10	10	32 70	4	6	12	5	33 10
Welfare	7	10	19	10	31 40	7	10	15	2	30 75
Etc.										
Total	50	102	13	9	41 07	51	105	13	9	41 44
Grand Total	292	596	2	—	40 83	299	616	11	3	41 38

It will be noted that the statement shows the *average* number of employees, not the total number. The use of the average in this instance is preferable to totals, as it shows more clearly the variation in the pay roll. If we give totals instead of averages, it becomes necessary to study

the statement more closely in order to determine the net fluctuations in labour for the period in question.

A further point, clearly indicated in the statement, is that by using averages in this particular record, one can see very easily any change in the basic rate of pay, i.e. if employees are being paid more per week as compared with the previous year.

Averages must be used with a great deal of discretion, because very misleading results or trends can be given by their wrong use. Averages should, therefore, be avoided as far as possible.

With regard to the kind of statements prepared, covering materials, these will naturally differ according to the size of the business and the class of trade carried on. The two statements given, one of materials delivered to a foundry (page 153), and the other of the output (page 154), will be sufficient to indicate the general principles underlying such statements.

Statements similar to those mentioned above may also be prepared, covering the purchases of raw materials and analysed to show the values by classes or kinds of materials, or of materials used in production, material spoiled, scrap, or defective work, etc. The kind of information it is intended to convey will determine the manner in which the figures will be assembled.

Statements of factory output analysed to give operations and processes, etc., as well as the different articles made, will usually form another series of figures of great benefit to the plant manager or production engineer. Statements of this kind will usually give statistics which are essentially "technical" in so far as production is concerned, whereas similar statements, prepared for the information of the general manager and commercial executives, will usually give the value of articles in place of the total and average units of operations or processes, etc. A comprehensive knowledge of cost accounting in all its details is necessary

before one can thoroughly understand the essentials of these statements, and no advantage will be gained in producing specimens at this stage.

Many other kinds of Comparative Statements are prepared by manufacturing concerns from the figures contained in the general accounts. These will usually take the form of summarizing the figures in the manufacturing, trading, and profit and loss accounts and balance sheets, and comparing them with the similar periods of previous years.

It is important that the object in preparing such statements must always be kept in mind. Statements made up of figures that do not convey their story are not only useless, but if great care is not exercised in their presentation, very serious results may follow by the wrong impression being given to executives.

STATEMENT OF METAL DELIVERED TO FOUNDRY

FOR THE YEAR ENDING 31ST DECEMBER, 19..

METAL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct	Nov	Dec.	Total
Turnings	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Zinc	7,560	6,291	6,645	6,537	7,321	8,519	7,912	7,415	5,678	7,664	7,807	6,952	86,301
Tin	2,740	2,826	3,113	3,820	2,954	2,680	3,251	3,602	3,110	2,850	2,489	2,122	35,557
Copper	1,590	1,725	1,816	1,872	1,795	1,542	1,497	1,627	1,334	1,186	1,268	1,107	18,359
Washings	9,240	10,321	8,640	8,997	9,101	9,075	9,118	7,099	8,154	8,656	9,341	9,201	106,943
Bad castings	3,620	4,160	4,067	3,965	3,988	3,205	4,185	3,904	3,991	4,205	4,417	4,821	48,528
Scrap	4,110	3,353	3,948	4,079	5,001	3,720	3,901	4,108	3,668	4,201	4,195	4,089	48,373
Phosphor tin	1,072	2,057	2,119	1,975	1,984	2,541	1,607	2,105	1,303	1,542	1,298	4,161	23,764
Copper scrap	201	16	172	37	301	102	71	86	102	91	86	74	1,302
Copper wire	76	42	17		102	117			61	102	191	42	550
Antimony	16	21	14								61		298
Nickel	11	16	21	14	17		51				42	26	93
Scrap sheets				102	906	702	411	827	101	108	407	598	220
Filings	802	721	402	628	906								6,512
TOTAL	31,038	31,549	30,974	32,026	33,470	32,203	32,004	30,773	27,502	30,605	31,602	33,193	376,939 ¹

¹ See Reconciliation on page 155

STATEMENT OF FINISHED CASTINGS DELIVERED

FOR THE YEAR ENDING 31ST DECEMBER, 19..

Mixture	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
No. 2 .	4,712	4,276	5,071	5,456	5,072	4,854	4,587	4,602	4,741	5,128	5,281	5,107	58,887
No. 5 .	6,070	7,144	6,842	6,418	7,204	6,815	6,940	7,411	6,259	6,921	6,022	5,107	79,153
No. 6 .	4,900	3,275	3,778	3,915	4,174	3,684	3,874	4,078	4,911	3,127	3,680	3,545	46,941
No. 8 .	2,075	2,112	2,201	1,894	1,881	2,103	1,955	1,852	2,008	1,579	1,449	1,928	23,067
No. 9 .	8,044	9,017	7,650	7,841	8,116	7,840	7,667	7,801	7,340	7,209	7,184	3,663	89,372
No. 11 .	5,271	4,845	4,108	5,067	3,551	1,403	1,061	1,233	961	307	628	4,512	32,947
No. 12 .	371				1,772	1,280	1,495				146		5,064
	<u>31,443</u>	<u>30,669</u>	<u>29,650</u>	<u>30,591</u>	<u>31,770</u>	<u>27,979</u>	<u>27,579</u>	<u>27,007</u>	<u>26,220</u>	<u>24,271</u>	<u>24,390</u>	<u>23,862</u>	<u>335,431</u>

RECONCILIATION

Deliveries of Raw Material

Inventory—31st December, 19..	Lb.	
Deliveries during year	8,372	
	<u>376,939</u>	
Less Inventory—31st December, 19..	385,311	
	<u>21,454</u>	

Deliveries of Finished Castings

Inventory—31st December, 19..	Lb.	
Deliveries of finished castings for year 19..	19,476	
	<u>335,431</u>	
Inventory—31st December, 19..	354,907	
	<u>11,204</u>	
Gross output for year	343,703	
Shrinkage (= 5 54%)	<u>20,154</u>	
	<u>363,857</u>	

CHAPTER XI

METHODS OF COST FINDING: PROCESS COSTING

THE process method of costing is much simpler, and in the majority of cases does not entail the same amount of detailed routine or number of forms as are required with the job costing method. The process method is used in all cases where one article of a batch loses its identity and becomes a part of a larger volume of production. The method is used in the manufacture of chemicals, paint, varnish and oils, paper, cloth, foodstuffs; in the production of electricity and most kinds of metals; and in the working of coal mines, slate quarries, and the like. Process costing is also used by firms engaged in the manufacture of one article whenever the parts of the article can each be made in one department.

The object is to ascertain the cost of each variety of operation. A Process Cost Account is employed for each operation or process, and is debited with the value of all materials and labour used, together with the correct proportion of indirect expenses for each process. Any by-product arising from each operation is credited to the Process Cost Account, and the balance represents the cost of the final quantity produced.

In a plant manufacturing a standard article, the general practice is to work to a recognized formula or definite Works Order, and the method of procedure is similar to that described for Job Costing. Such formula, or Works Order, serves as instruction to the various production departments throughout the factory. The Works Order should contain full particulars of the materials required, quantities, weights, etc., and a copy would be handed to the Cost Department. This copy acts as the basis for

charging the various processes with the materials and also gives the necessary details for ascertaining the cost.

An example of a standard formula, suitable for the manufacture of paint, is given (Form No. 23). It will be noted that a description of the paint to be made is given at the top of the form, and immediately below this information, space is provided to contain details of the quantities and kinds of materials to be used. The quantity of each item of materials that must be used for each mix is also shown, together with the necessary instructions as to the processes which have to be carried out, and any special notation regarding the tinting or colouring of the paint. At the foot of the form, the method of packing is described, and the quantities of each size of container to be filled is noted.

With the above information in the possession of the workmen, they are able to proceed with the manufacture of the paint, the Standard formula serving the same purpose as a system of Works Orders. In the case of process costing, a formula is simply another name for Works Orders.

Accounting for Materials

With a system of process costing it is not always necessary or advisable to issue materials in small quantities by means of a Stores Requisition, as is the case with job costing. They are usually delivered in bulk to the various manufacturing departments against the issue of a definite formula or production order. Exception would, however, be made in the case of bulky or heavy materials and where it might be inconvenient for a department to receive more than a given quantity at one time, owing to lack of space for storage.

As manufacturing proceeds through the various production shops or processes, and the materials, having been worked on, are transferred from one department or process to another, the process accounts in the Cost Ledger should

be written up, ruled off, and the balance "carried forward" and charged to the department receiving the article (or material) for the next operation or process. (See the specimen accounts which follow.)

The routine of issuing the materials from stores against the Works Order, or formula, will provide the necessary data for crediting the Stores Control Account and charging the respective process accounts. If materials are found to be faulty, they would be returned to the stores, and the process or department concerned would receive credit in the usual way, i.e. through the medium of a Rejection Note or Stores Credit Note.

The issue of materials for use on a Standard Formula will not always be effected by the use of a Stores Requisition, as it is often more convenient for the workmen to present the Standard Formula to the storekeeper, who then issues the materials required. In such cases, the back of the formula (Form No. 23) will be ruled to accommodate entries covering each issue of materials, and on completion of the manufacturing processes, the formula is returned to the Cost Department, which is then able to compile the cost from the full information contained on the form. Systems operated on this principle are very economical in practice, as it eliminates all the work involved in the extending, checking, and summarizing of the separate Stores Requisitions.

Accounting for Labour

The routine followed when Process Costing is employed is very similar in principle to that described for Job Costing, excepting that, in this instance, the method will usually lend itself to a more simple routine.

It may happen that the workpeople in each department are continuously engaged on one process, and the charging of the direct labour to each process will present little or no difficulty. To give the desired information, the department

pay roll can be ruled and arranged similarly to the specimen pay roll of a Process System of Costing used in the manufacture of shoe polish, given in the description which follows.

On the other hand, where the course of manufacturing necessitates two or more operations being carried on in the same department, or where a workman is working in one department and then another, it is essential that daily or weekly time sheets be put into operation to obtain the analysis desired. These time sheets are ruled to suit the requirements of the business, and in the description of a system that follows, a specimen time sheet is given.

The starting and finishing times expended on each process are entered on the time sheet by the employee, or, in some plants, the method is to clock "on" and "off" by using a mechanical time recorder. At the end of a given period, either daily or weekly, the time sheets are passed to the pay roll department, where they are checked and compared with the workers' Gate Cards, and the pay roll made out from the information and records so obtained. The necessary credit entry required for the Wages Control Account is taken from the totals of the pay roll and the corresponding debit to the individual process accounts created.

Accounting for Expenses

The principle involved in the collection and allocation of expenses is similar to that employed for the Job Costing method, excepting that all expenses will usually be allocated on a departmental basis. Should there be more than one process carried out in any one department, a further division of the total departmental expenses should be made, each definite process being charged with its proper share of expenses. These expenses would be journalized as a credit to the department's expense control account and debited to the process cost accounts in such departments.

Process Cost Summaries

As the materials pass through the various stages of making into the finished article, they will increase in value, i.e. further material, labour, and expense will have been added to them, and upon the article reaching its final stage and being ready for sale, the various process costs are summarized and the final cost obtained.

Principles of Process Costing

In order to illustrate the basic principle underlying the process method of costing, a specimen set of accounts is given (Form No. 24), from which it will be noted that the materials issued are charged to process No. 1, and that the direct labour expended upon this process is also charged, together with its proportion of indirect expenses. In the example, the basis of charging expenses is the percentage of direct labour method.

The materials were placed into manufacture on 3rd June, and the first process completed on 4th June. The total cost of the first process is shown to be 57·8d. per lb., as evaporation reduced the weight from 2,000 lb. to 1,500 lb.

The total cost of process No. 1 is transferred to Process Account No. 2, and the value of materials issued, wages, and expenses required for process No. 2 is then added. After transferring the by-products from this process, the actual weight of the product at this stage of completion is transferred to Process Account No. 3. The balance remaining, namely, 100 lb. is the loss in weight due to evaporation. The progressive cost at this stage is shown to be 83·69d. per lb., the second process of manufacture having increased the cost by 25·89d. per lb.

Process Account No. 3 shows that to the balance brought forward there have been added material and labour, etc., required in the third process, that another quantity of materials was thrown off as a by-product, and that the net

PROCESS No 1

PROCESS COST ACCOUNT

Dr.				Cr.						
19 June 3	To Materials " Direct labour " Indirect expenses at 75% on labour	Lb 2,000	£ 300 35 26 £361	19 June 4	s. - - 5 5	d - - - -	By Balance carried forward to Account No. 2 " Loss in weight	Lb 1,500 500 2,000 £361	s 5 5 5	d - - -

Cost of Process No 1 = $\frac{£361 \ 5s}{1500 \text{ lb}} = 57 \ 8d \text{ per lb}$

PROCESS No 2

PROCESS COST ACCOUNT

Dr.				Cr.							
19.. June 4	To Balance from Account No 1	Lb	£	s.	d	19 June 7	By Transfer to By-product A/c at rod per lb	Lb	£	s	d
	" Materials	1,500	361	5	-		" Transfer to Process No. 3	400	16	13	4
	" Direct labour	300	30	-	-		" Loss in weight	1,300	453	6	8
	" Expenses (75%)		45	-	-			100			
			33	15	-						
			£470	-	-			1,800	£470	-	-

Progressive Cost at Process No. 2 = $\frac{£453 \ 6s \ 8d}{1300 \text{ lb}} = 83 \ 69d \text{ per lb}$

PROCESS COST ACCOUNT

Dr.		Cr.									
19. June 7	To Balance from Account No 2	Lb	£	s	d	19. June 9	By Transfer to By-products A/c at 17½d per lb	Lb	£	s	d
	" Materials	1,300	453	6	8			200	14	11	8
	" Direct labour	500	100	-	-			1,600	670	-	-
	" Expenses (75%)		75	-	-						
			56	5	-						
		1,800	£684	11	8			1,800	£684	11	8

Final cost of product = $\frac{£670}{1600} = 100 \text{ 5d per lb}$

BY-PRODUCTS ACCOUNT

Dr.		Cr.									
19. June 7	To By-products forward from Process No. 2	Lb.	£	s	d	19		Lb	£	s	d.
	" By-products forward from Process No. 3	400	16	13	4						
9		200	14	11	8						
		600	£31	5	-						

Average cost of by-products = $\frac{£31 \text{ 5s}}{600 \text{ lb}} = 12 \text{ 5d. per lb}$

balance, i.e. 1,600 lb., represents the completed product, which shows a final cost of 100·5d. per lb.

The value of the by-products was transferred to a separate account, and the final result of this account shows that the average cost of the by-products is 12·5d. per lb.

As will be seen from the above description, the operation of a system of process costs can be very simple. On the other hand, certain industries are of such a nature that they will require a very complicated method on account of the many and various kinds of by-products which arise during the course of manufacture.

Steam Raising Process Costs

It was mentioned in an earlier lesson that in many instances one might find both the Job Costing and Process Costing methods in use in the same plant. The following example (Form No. 25) of a Steam Raising Account will illustrate this point, as such an account may be used in a plant which is also employing the Job Costing method.

The costing of certain of the indirect expenses of a plant by using a system of service orders will often embrace the separate costing of the power supply, when the concern generates its own electrical energy. In such cases the cost of steam raising will form part of the Service Order costs.

With most factories steam is used for various purposes, such as for heating, drying, baking, etc., in addition to being used for motive power. The method of process costing is, therefore, employed to ascertain the cost of steam, because the expenditure must be analysed in order that the cost for each service can be discovered and a check placed upon any waste.

The expenditure in coal, water, oil, waste, miscellaneous stores items, and labour, is directly allocated to a Steam Raising Account, and the final cost per 1,000 lb. of steam produced or per 1,000 lb. of water evaporated is figured. Form No. 25 is a specimen of a Steam Raising Account,

STEAM RAISING ACCOUNT for month ending..... 19.....

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from which it will be noted that the difference between the quantity of steam raised and the quantity used represents the wastage or loss for the period.

The object of a Steam Raising Account is not only to ascertain the cost of steam raising, but also to provide the basis for distributing the cost to the various departments or processes of manufacture. The cost of steam has to be absorbed by the departments using the service. At the foot of the example (Form No. 25) there is inserted the distribution of the cost to Drying, Power, Heating, etc. The losses for the month would, in this case, be transferred to a General Plant Expense Account, and apportioned over the whole plant departments, together with other losses of a similar nature.

By-Products and Scrap in Process Costing

Reference has been made to by-products in the above description of Process Costing, and, to avoid confusion between the meaning of the terms By-products and Scrap, it should be noted that scrap is a wastage that arises during the manufacture or the processing of materials to produce a saleable product. Scrap will also arise through defective workmanship or defective materials. To distinguish this kind of "scrap" from that which arises through wastage, it is generally referred to as "defective work" or "spoilt work." The term "scrap," therefore, has reference to the material wastage that arises during manufacture.

In the engineering industry a great deal of SCRAP will arise in the various machining operations. When a piece of metal is placed on a lathe or milling machine, it is worked into the desired shape by cutting or milling away the parts of the metal not required; this metal is scrap, and is sometimes referred to as "turnings." Scrap metal has a scrap value, and its market price will fluctuate according to the quantity available, or to the demand for such scrap on the open market.

In the case of DEFECTIVE WORK, it is sometimes possible to re-work or repair the defective part or article to render it saleable. On the other hand, if the defects are such that this cannot be done, the cost of the labour and the value of the material in the defective article, less the scrap value of the material, is a loss to the concern.

Defective or spoilt work, however, will not arise in a system of Process Costing to the same extent as it will in Job Costing.

BY-PRODUCTS arise in most of the continuous process industries. A manufacturing process may proceed up to a certain stage, when the liquid, solid, or gas which is being dealt with becomes divided or formed into two or more distinct products. The distillation of coal offers a very good example. Coal is put into airtight ovens, heated, and the gases driven off, leaving a solid matter composed of carbon, ash, sulphur, and phosphorus, and known as coke. The gases driven off are taken into coolers and condensed, and the primary by-products extracted from the volatile matter. We, therefore, have the main products, i.e. coke and gas, and the primary by-products, which are tar, ammonia, and benzol. After the gases are drawn from the ovens by the exhauster, the tar is condensed, leaving the ammonia and benzol to be extracted at a proper temperature in the saturators and scrubbers respectively.

Reference has been made to *primary* by-products to indicate that, by passing these through additional processes, further by-products are obtained. Such products as tar and benzol can be subjected to further distillation for the recovery of valuable by-products such as naphthalene, creosote, green oil, anthracite, and pitch, etc.

The packing industry offers another good example where by-products arise. Livestock is killed to produce foods for human consumption. In this process many by-products arise, such as hides, oil, tallow, fertilizer, wool, etc.

The apportionment of the expenditure incurred between

the main product and the by-product presents one of the greatest difficulties in connection with Process Costing. Up to the point where the main products separate from the by-products, no difficulty exists in recording the cost of the process as the total expenditure is chargeable to the process or one product. Immediately a separation takes place, however, it is necessary to apportion the cost over the two or more products.

It is only in very exceptional cases that the expenditure relating to a by-product can be definitely measured or allocated to it; consequently, logical apportionment must be resorted to in the majority of cases.

The basis of apportionment may be the sales or market price of the main product and by-product, the yield or arbitrary values assigned to the products at the time the separation occurs.

The choice of the basis will generally be determined by the value of the by-products, as it is not desirable that a considerable amount of clerical work be undertaken when a by-product can only be disposed of at, say, a few shillings per ton. On the other hand, the by-products may have a fairly high market value, and in such cases a more accurate but reasonable apportionment should be made.

CHAPTER XII

METHODS OF COST FINDING: PROCESS COSTING (*contd.*)

THE general principles of Process Costing were explained in the preceding chapter. A more detailed description of the routine to be followed will now be given.

The object being to ascertain the cost of each process, it is necessary to consider the manufacture of a specific product in order that a definite classification of accounts and costing routine can be used as a basis for the description. Assume, therefore, an ordinary sized plant, comprising, say, ten departments, four of which are manufacturing or producing departments, and the remaining six "expense" or service departments.

Further, assume that the plant is making a liquid paste shoe polish, filled in tin boxes, packed in cartons of standard size, and sold in packages containing one gross cartons.

The procedure in manufacturing may be as follows—

1. Tinplate printing.
2. Tin box making.
3. "Liquid" paste making and filling tins.
4. Card box making, labelling, and packing.

And the departmentalization of the plant would therefore be—

Manufacturing Departments.

1. Tinplate Printing: Printing lids.
2. Tinplate Printing: Stoving lids.
3. Tin Box Making: Stamping out lids and bodies.
4. Tin Box Making: Lipping and beading lids and bodies.
5. Liquid Paste Making: Making paste and filling tins.
6. Card Box Making: Card box making and labelling and packing.

Service Departments.

- (a) Welfare.
- (b) Repair.
- (c) Laboratory
- (d) General Labour.
- (e) Steam.
- (f) Raw Material Stores.
- (g) Finished Goods Stores.
- (h) Power House.
- (i) Fire Brigade.
- (j) Transport.
- (k) Dispatch.

We will further assume that a production order is issued covering the manufacture of 622 gross of the "liquid" shoe polish in tin boxes and packed in cardboard boxes complete. The operations or processes of manufacture will be as follows—

The sheets of tinplate pass through a printing machine, and each colour as printed entails a further operation or process, viz. stoving (a technical term used for drying). The sheets, upon leaving the printing machine, are placed into racks and put in a hot air oven and dried. This is necessary before further colours are printed thereon. It will be gathered, therefore, that there are two processes, viz. printing and/or varnishing and stoving, and the process accounts will be worked out accordingly.

Accounting for Materials

The routine issue of materials from stores is effected by the use of a standard formula, which provides the necessary data for crediting the Stores Control Account and charging the respective Process Cost Accounts. Materials found to be faulty are returned to the stores, the process concerned receiving credit in the usual way, i.e. through the medium of a rejection note.

Form No. 26

TIME SHEET

Name

Clock No .

Trade

Week Ending

19

	DEPT 1			DEPT 2			DEPT. 3			DEPT. 4			Daily Total
	On	Off	T	On	Off	T	On	Off	T	On	Off	T	
M.													
Tu.													
W.													
Th.													
F.													
S.													

Approved by

.....
Foreman.

Accounting for Labour

As most of the employees are continuously engaged upon one or more processes, the necessary allocation of Direct Labour to the various processes is obtained direct from the pay roll. There are a few cases in this industry where a workman works in one department and then in another, and a weekly time sheet is put into use to obtain the analysis desired. These time sheets are ruled to suit the requirements of the business. A specimen is given (Form No. 26) simply to indicate the principles involved, and to show how such a form would be designed for use in the plant manufacturing shoe polish. It will be noted, however, that most of the direct labour in a shoe polish plant is analysed directly on the pay roll, since, in the majority of cases, the workmen would be continuously engaged upon one process. The use of a time sheet would be confined chiefly to the indirect workers. An analysed form of pay roll is not advisable in those cases where the number of service departments is large, as too many columns would be required, making a very wide and cumbersome pay roll.

A specimen ruling of a pay roll (Form No. 27) is given to illustrate the method of analysing the wages to the various processes in the manufacture of shoe polish. A separate column is given for each of the manufacturing departments in order that the wages of the workers who are continuously engaged upon a standard operation or process can be extended into the departmental column direct. To those workers who are working first in one department and then in another will be issued a time sheet to provide the means of analysing their times. The respective amounts will be allocated accordingly.

With regard to the indirect workers, some of these will be continuously engaged upon a definite service, and their times will be allocated similarly to direct workers. Those workers who are spending their time upon various forms of

service will use a time sheet, and will be dealt with as explained above.

A separate column for each of the service departments has not been provided on the illustration of a pay roll (Form No. 27). If a column were given for each of the eleven departments it would make the pay roll too cumbersome. Instead, one column only is used, and all the times are entered therein, the analysis being made by means of the time sheets. At the end of each week the time sheets are collected, and an analysis made by entering the various items on to an analysis sheet with separate columns for each of the service departments. The total of this analysis must agree with the total of the service department column on the pay roll.

Accounting for Expenses

The treatment of expenses will follow on the principle explained in the preceding chapters, and an Expense Allocation Statement will be prepared. With most industries of this nature a monthly cost statement is generally found to be sufficient, as the production will proceed each week on a uniform basis. The expense allocation statement is, therefore, prepared at the end of each month, and the total of each expense collected and allocated to the service and producing departments, similarly to the examples given on Forms Nos. 16 and 17.

The proper share of expenses is charged to each process, and the Process Accounts for the Tinplate Printing Department, which cover the printing of the lids, will appear in accordance with the specimen accounts (Forms Nos. 28 and 29).

The printed sheets of tinplates are next sent into the Tin Box Department, where the operation of stamping out and making the tins is performed. As will be observed from the Process Accounts (Forms Nos. 30 and 31), further materials are issued to the Tin Box Department, viz. tinplate

Form No. 28

PROCESS COST ACCOUNT		PROCESS No. 1	
TINPLATE PRINTING DEPARTMENT		Printing Lids	Order No. 84

Dr.		Cr.	
19. July 31		19 July 31	
To Materials		By Balance earned forward to Process	
40 boxes of tinplate at £11 3s per box	£	No. 2	£
" Inks and varnishes	4 50		6 35
" Direct labour	10		
" Direct charges	100		
" Direct expenses	50		
" Indirect expenses	15		
	10		
	£635		£635

Form No. 29

PROCESS COST ACCOUNT		PROCESS No. 2	
TINPLATE PRINTING DEPARTMENT		Stoving Lids	Order No. 84

Dr.		Cr.	
19. July 31		19 July 31	
To Process No. 1 brought forward		By Balance earned forward to Account	
" Direct labour	£	No. 3	£
" Direct expenses	635		7 10
	50		
	25		
	£710		£710

Form No. 30

PROCESS COST ACCOUNT
TIN BOX DEPARTMENT

PROCESS No. 3

Stamping Out
Lids and Bodies

Order No 84

*Dr.**Cr.*

To Process No 2 brought forward
" Direct materials 44½ boxes template
" Direct labour
" Direct charges
" Direct expenses

19
July 31

By Scrap to Account No 7, template cutting, 750 lb at 7 2d.
" Balance carried forward to Account No 4

£	s	d
710	-	-
556	-	-
20	-	-
15	-	-
25	-	-
£ 1,326	-	-

£	s	d
22	10	-
1,303	10	-
£ 1,326	-	-

Form No 31

PROCESS COST ACCOUNT

TIN BOX DEPARTMENT

PROCESS No 4

Lipping and
Beading Lids
and Bodies

Order No 84

*Dr.**Cr.*

To Process No 3 brought forward
" Direct labour
" Direct charges
" Direct expenses

19
July 31

By Balance carried forward to Account No 5

£	s	d
1,303	10	-
30	-	-
12	10	-
5	-	-
£ 1,351	-	-

£	s	d
1,351	-	-
£ 1,351	-	-

required for stamping out the "bodies" of the tins (the "lids" only being printed). There are two processes effected in this department, viz. (1) stamping out, and (2) lipping and beading. The accounts will appear as in Form No. 30.

It will now be realized that the tin boxes are complete and ready to be filled with "liquid paste" and packed. The empty tins are, therefore, delivered to the Paste Department. The processes performed in this department are making paste and filling and lidding tins. The Process Cost Account will appear as in Form No. 32.

From this department the filled tins are sent to the Card Box Department, where they are packed in cartons, labelled and completed for dispatch; the Process Account is shown in Form No. 33.

MEMORANDUM.

112 sheets = 1 box of tinplate.

40 boxes stamped out for lids, each sheet of which produces 20 lids.

∴ 40 boxes of tinplate = 622.22 gross lids.

44½ boxes stamped out for bodies, each sheet of which produces 18 bodies.

∴ 44½ boxes of tinplate = 623.00 gross bodies.

For costing purposes, 622 gross of completed articles.

There is no hard and fast rule in process costing so far as actual routine or the ruling of forms is concerned. The foregoing description, however, is sufficient to indicate the general principles of the process system of costing.

The above accounts illustrate the general principles of the Process Method of Costing. It will be seen that, as the manufacture proceeds, the Cost Accounts are accumulating the cost of each process, and that as the product passes from one department or process to another, the cost, up to the point where the transfer takes place, is transferred to the account of the department receiving the product.

Form No. 32

PROCESS COST ACCOUNT

LIQUID PASTE MAKING DEPARTMENT

(FILLING AND LIDDING TINS)

PROCESS No. 5

Making Paste
and
Filling Tins

Order No. 84

Dr.

Cr.

19 July 31	£	s.	d.	19 July 31	By Balance carried forward to Account No 6.	£	s.	d.
To Process No 4 brought forward.	1,351	-	-					
" Materials	50	-	-					
" Direct labour	127	10	-					
" Direct charges	72	10	-					
" Direct expenses	25	-	-					
	£ 1,626	-	-			£ 1,626	-	-

Form No 33

PROCESS COST ACCOUNT

CARD BOX MAKING

(CARD BOX MAKING AND LABELLING AND PACKING)

PROCESS No 6

Card Box
Making

Order No 84

Dr.

Cr.

19 July 31	£	s.	d.	19 July 31	By Scrap to Account No. 7 . " Balance, being factory cost of product	£	s.	d.
To Process No. 5 brought forward	1,626	-	-					
" Materials	150	-	-					
" Direct labour	122	10	-					
" Direct charges	37	10	-					
" Direct expenses	30	-	-					
" Indirect expenses	20	-	-					
	£ 1,986	-	-			£ 1,986	-	-

Process Account No. 1 has collected all the items that relate to the work of stamping out and printing the lids, these two operations being performed on the one machine. The total of this cost is transferred to Process Account No. 2. The lids will then be stoved and the expenditure incurred in this department charged to the No. 2 Account.

Upon the product arriving in Department No. 3, further materials are issued and charged to the account, etc. During the process of stamping out the lids and bodies, a quantity of scrap metal is made. Scrap is not a by-product, but simply a wastage of materials, and the value of this scrap is, therefore, credited to the department and charged to a "Scrap Account" in the Cost Department Ledgers. This scrap is accumulated over a period and sold to a scrap dealer at the current market price.

The basis for crediting a process with scrap is either at the market price on the day of the transfer, or the average of market prices for the previous month, etc. Scrap also arises in Department No. 6, there being a waste from the cutting and making of the card boxes.

Having ascertained the cost of manufacturing the shoe polish and the tin and card containers, etc., in each department, the costs of the various processes can be summarized in order that a comparison of the results of each process can be made. Such a summary would be made up in a manner similar to that shown in Form No. 35.

The extent to which one will compile any statistics relating to each process will naturally depend upon the nature of the products being made. In manufacturing shoe polish, the analysis of the departmental costs, shown in Form No. 35, would be useful, as these costs form a basis of comparing the individual costs of one period with another.

Work-in-Progress

With some industries there will always be a certain quantity of the product that will be only partly manufactured

PROCESS COST SUMMARY

DEPARTMENT	Process	Labour		Process Materials		Direct Charges		Direct Expenses		Indirect Expenses		Total	
		£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.
Printing	No 1	100	—	460	—	50	—	15	—	10	—	635	—
	" 2	50	—	—	—	—	—	25	—	—	—	75	—
Tin box making	" 3	20	—	556	—	15	—	25	—	—	—	616	—
	" 4	30	—	—	—	12 10	—	5	—	—	—	47 10	—
Liquid paste making (filling and lidding tins)	" 5	127 10	—	50	—	72 10	—	25	—	—	—	275	—
Card box making (labelling and packing)	" 6	122 10	—	150	—	37 10	—	30	—	20	—	360	—
		450	—	1,216	—	187 10	—	125	—	30	—	2,008 10	—
Less Scrap Account No 7													
Process No 3													
Process No. 6				47 10	—							47 10	—
		£450	—	£1,168 10	—	£187 10	—	£125	—	£30	—	£1,961	—

at the time the Process Cost Account is made up. This partly finished product is known as Work in Progress, and in the case of a Cost Account being prepared, say, at the end of a month, the value of the carry over or work in progress must be credited to the Process. This valuation may take the form of a stocktaking, and the unfinished work may be listed and priced at an estimated figure. On the other hand, where a system of Process Costing has been in use for some time, the actual costs of the products in question will be available, and an average actual cost will often be used.

The simple form of Process Costing described above will not present much difficulty in actual operation, as the process of manufacture is not complicated, there being only one product made. Each process is separate, and the items that constitute the cost of each of these processes can easily be ascertained and charged to the accounts. The work of valuing the inventory at the time the Process Accounts are made up, will not, therefore, be difficult. As a matter of fact, the plant in which this particular method is used has a proper system for the control of production, and the production orders that are issued cover a quantity that can be completed in an eight-hour day. A carry over of unfinished work from one day to another is, therefore, eliminated.

The intimate relation between the work of Cost Accountancy and Plant Management was referred to in the previous chapters. The above illustration will serve to emphasize the importance of this matter. Had proper co-ordination been ignored, the system of costing the manufacture of shoe polish would have been made more difficult by the fact that a stocktaking would be necessary before the Cost Accounts could be completed, and the costs would have been rendered inaccurate by the introduction of an estimated figure for work in progress.

TEST QUESTIONS

CHAPTER I

1. Define the following terms—
 - (a) Sales Expenses.
 - (b) Total Cost
 - (c) Administrative Expense
 - (d) Prime Cost
 - (e) Establishment Expense
2. What are the Elements of Cost?
3. Describe in your own words—
 - (a) The objects and advantages of Cost Accounting
 - (b) The difference between Cost Accounting and ordinary book-keeping and accounts
4. What are the main functions of a business from a Cost Accounting point of view
5. What is meant by "Methods of Cost Finding"? Give a list of the various methods and describe each method.
6. Define—
 - (a) Cost Finding
 - (b) Cost Control
 - (c) Cost Estimating.
 - (d) Works Expense
7. Prepare a chart showing the components of Total Cost and Selling Price

CHAPTER II

1. Illustrate by means of a chart "How a Costing System Works."
2. Describe in your own words the function of Cost Control
3. What is the difference between "Stock Orders," "Works Orders," and "Standing Orders"?
4. Explain how the function of Cost Finding is performed
5. Write a very brief article on the subject "How a costing system fulfils the requirements of modern industry"

CHAPTER III

1. It is stated in Chapter III that a manufacturer may consume, or use, a greater quantity of materials than is actually sold to his customers. Why is this and how does a system of costing take care of the difference?
2. What is a Stock Record Card and what purpose does it serve?
3. Outline briefly the principles of Stores Control
4. What is a Bin Card and what purpose does it serve?
5. Explain the purpose of a Stores Control Account and a Work-in-Progress Account.

6. (a) Sketch each of the following forms—

- (i) Bin Card
- (ii) Stores Control Account
- (iii) Stock Record Card
- (iv) Goods Received Book.

(b) And enter the following items—

- (i) Received 7 barrels (each containing 100 lb) of $1\frac{1}{2}$ in nails @ 3d per lb and 300 gross $\frac{1}{2}$ in brass screws @ 4s 6d per gross, and 500 gross 1 in iron set screws @ 8s per gross
- (ii) Received from the Brown Iron Foundry 4720 lb castings @ $4\frac{1}{4}$ d per lb
- (iii) Issued from stock on Requisition No 1796, 27th June, 250 lb $1\frac{1}{2}$ in nails @ 3d per lb and 100 gross 1 in set screws @ 8s gross
- (iv) Received 3 cases of hardware from Jones & Co. each containing 5 gross 4 in hinges @ 3s per dozen
- (v) Issued from stock—

June 29	Reqn 5666	1250 lb castings to Works Order
		968
July 3	„ 5969	50 gross brass screws $\frac{1}{2}$ in W O
		989
„ 7	„ 6015	5 gross 1 in iron set screws, W O 996
„ 8	„ 6214	1150 lb castings, W O 1037
„ 8	„ 6380	7 doz hinges 4 in, W O 989
„ 9	„ 6410	27 gross 1 in iron set screws, W O 1041

CHAPTER IV

1 Define—

- (a) Indirect Materials
- (b) Direct Materials

2. What advantage is derived by the use of a system of Perpetual Inventories?

3. What is a Stores Requisition and what purpose does it serve?

4. Describe the various methods of charging the value of materials issued from stores to Works or Production Orders and give your own views as to the merits of each method

5 Make the necessary entries to deal with the following differences which have been discovered whilst checking the actual quantities of materials in stock against the quantities shown on the various stores records

Bin No	Description	Quantity in Stock	Quantity on Bin Card	Quantity shown on Stock Record Card	Purchase Price
172	$\frac{1}{2}$ in brass screws	189 $\frac{1}{2}$ gross	188 $\frac{1}{2}$ gross	198 $\frac{1}{2}$ gross	4s 6d gross
563	Castings	965 lb	967 lb	961 lb	$4\frac{1}{4}$ d lb
866	4 in hinges	3 gross 5 doz	3 gross 6 doz	3 gross 6 doz	3s doz.
1075	1 in iron set screws	23 gross	22 gross	22 gross 11 doz	8s doz

6. Describe fully a method by which a storekeeper is able to replenish his stocks.

7. Describe in your own words two methods of charging the value of materials issued from stock to individual production orders and state the advantages and disadvantages of each method

CHAPTER V

1. How many separate records are used to record and control all moneys spent in wages? Describe them

2. Define—

(a) Indirect Labour

(b) Direct Labour.

3. Describe fully the various methods of recording attendance at the factory and state the method you prefer and why.

4. Give a ruling of a pay roll and describe fully the routine in connection therewith

5. What is the primary object of using a pay roll?

6. Describe a method of checking Job Cards with Gate Cards.

7. What purpose is served by the following records—

(a) Record of Bonus Earnings?

(b) Employees Weekly Pay Record?

CHAPTER VI

1. If each worker in a factory is provided with continuity of work, all the Job Cards for the week, when added together, will agree with the Gate Card. What conditions will arise in practice that may prevent this absolute agreement between the two records and what method would you use to record the differences?

2. Calculate the amount earned on the following job, by each of the following methods of remunerating labour—

(a) Halsey system

(b) Rowan system

Job No. 7629

Worker's name. T Thomas, Rate 3s 6d per hour

Time allowed 30 hours, 45 minutes.

Time taken. Commenced job, 6th March, 8.00 a.m.

Finished job, 8th March, 4.00 p.m.

The factory operates from 8.00 a.m. to 5.00 p.m. with one hour for lunch.

3. If the worker T Thomas, in Question No. 2, was paid at a piecework rate of 4s 8d. per article, and he completed 40 pieces in the time stated, what has he earned over his day rate?

4. Describe the following methods of remunerating labour and give one or more examples of industries or trades where these methods would be best suited

(a) Day Rate.

(b) Piece-Work

5. Write a very brief article on Co-partnership and Profit Sharing as a method of remunerating labour and state what you consider are the advantages and disadvantages of these methods.

- 6 State the advantages of using mechanical time recorders.
- 7 Describe briefly a routine covering the engagement of workers and continue with your system up to the compilation of the pay-roll and the reconciliation of the Gate Cards and Job Cards

CHAPTER VII

- 1 Define the term "Cost."
- 2 State the headings under which Establishment Expenses are usually subdivided and give examples of the items that would be included under each heading
- 3 Describe a method of estimating expenses for a small and a large concern
- 4 From the following information prepare a complete set of statements to collect and allocate the expenses State the basis of allocation against each item

The plant of the XYZ Company consists of the following production and service departments—

Production Departments

- No 1, Machine Shop
- No 2, Sheet Metal Shop.
- No 3, Woodworking Dept
- No 4, Finishing Dept

Service Departments:

- (a) Repair Dept
- (b) Tool Stores
- (c) Raw Material Stores
- (d) Welfare Dept
- (e) Inspection Dept
- (f) Cleaning and general labouring
- (g) Packing and Dispatch.

The area of the plant is 375,000 sq. ft. and the space occupied by each department is as follows—

Producing Departments:

- 1. 52,500 sq ft.
- 2. 57,500 " "
- 3 95,000 " "
- 4. 51,000 " "

Service Departments:

- (a) 12,000 " "
- (b) 18,000 " "
- (c) 36,500 " "
- (d) 10,000 " "
- (e) 13,500 " "
- (f) 29,000 " "

The value of plant and equipment, etc., located in each department is—

Producing Departments—

1. £42,000
2. £47,000
3. £51,000
4. £24,500

Service Departments

- (a) £17,500
- (b) £10,000
- (c) £7,500
- (d) £9,000

TRIAL BALANCE

	£	
Land and Buildings.	60,000	
Plant and Equipment	208,500	
Direct Wages	10,000	
Indirect Wages	2,500	
Stock on hand, 1st January	150,000	
Bank balance	5,000	
Purchases	80,000	
Sundry Debtors	7,400	
Salaries—Administrative	8,000	
Sales Depts.	7,000	
Plant Offices	5,000	
Salesmen	10,000	
Commissions	750	
Advertising	400	
Welfare Expenses	1,180	
Laboratory Expenses	1,500	
Fuel	2,420	
Taxes	500	
Stationery	900	
Water	800	
Depreciation—Plant and Equipment	11,300	
Buildings	2,400	
Office Buildings	1,000	
Travelling Expenses	2,300	
Carriage	650	
Bank Charges and Interest	600	
Reserve for Bad Debts		800
Discounts		500
Sundry Creditors		14,400
Capital		210,920
Sales		353,480
	<u>£580,100</u>	<u>£580,100</u>

CHAPTER VIII

1. Calculate expense rates from the following data—

		£	s.	d.
(a) Works Expenses	.	51,953	17	6
Direct Labour Hours	.	341,566		
(b) Direct Labour	.	83,043	7	0
Works Expenses	.	135,148	10	0
Direct Materials	.	38,553	3	6
(c) Direct Labour	.	153,288	16	0
Works Expenses	.	102,642	5	0

2 Describe any special conditions that you consider are necessary in a factory before each of the following methods of recovering expenses could be used

- Percentage on Prime Cost.
- Machine Rate
- Direct Labour Hour Method
- Percentage on Direct Labour
- Departmental Rate

3 Define "Departmental Rate" and describe briefly how it is computed and recovered in costs

4. What is a "Cost of Sales Account" and what purpose does it serve?

5 The A B C Company manufacture a car radio of standard size and selling price The total made during the year is 116,376 and 106,509 were sold The total expense of the sales departments is £133,136 5s and the total works cost of making was £992,105 8s. Calculate the Sales Expense rate

6 Assuming that the company mentioned in Question No. 5 pays a royalty of 15s per machine, manufactured and sold, how would you deal with such an item in your costs? Give reasons with your answer

7. Describe briefly and in your own words the theory of expense control

8 Which of the five methods of recovering expenses in costs do you consider is the most inaccurate? Give reasons with your answer

CHAPTER IX

1. Define "Capital" and "Revenue" expenditure.

2 It has been explained in Chapter IX that expenses are controlled in total and in detail. Why is this necessary?

3. What are Service Orders and what purpose do they serve?

4. Give a brief description of two methods of analysing the total wages paid each week under the headings of direct and indirect.

5. Give four examples of Service Orders—

(a) Which should not have charged to them materials issued from stores

(b) Which should only have labour charged to them

6 In what manner does the routine for recording indirect workers' time to Service Orders differ from that used for the recording of direct workers' time to production orders?

7 It may be said that the indirect expenses of a business arise in two different directions. Describe these and give a few examples under each heading.

CHAPTER X

1 What is a unit of measurement? Give examples for use in connection with a system of job costing in four different industries.

2 Prepare specimen journal entries to record the following items in your costs records

- (a) Materials found defective, £37 10s. 6d.
- (b) Surplus materials returned to Stores, £94 16s.
- (c) Materials spoilt during manufacture, £538 19s 11d.
- (d) Rejected materials—not up to the standard ordered, £182 10s 5d.

3 Give a full description of a method of booking time to jobs and explain how the records are checked and reconciled with the gate cards

4 Describe fully a method of recording the values of materials issued from stores for use in connection with job costing and state how the issues are regulated and controlled

5. It frequently happens that materials will be spoilt during manufacture. How would you take care of the value of all spoilt work in a system of job costing?

6 Explain briefly a method of recovering Establishment Expenses in a system of job costing

7. What is a cost summary and what purpose does it serve? Illustrate your answer with a specimen form

8. Describe briefly some of the essential features of Comparative and Analytical Cost Statements

CHAPTER XI

1 Explain briefly the principles of process costing and state how it differs from job costing

2. Describe two methods of controlling the issues of materials from stores in a system of process costing and state the class or type of business to which each could be applied.

3. Briefly describe a routine for dealing with the Collection, Allocation, and Recovery of Establishment Expenses for a system of process costing and state the class of business to which your method applies.

4. Using all the figures which appear in the process cost accounts Nos. 1, 2, and 3, and the by-products account in Chapter XI, pages

162 and 163, prepare journal entries and post the items to the cost control accounts Supply any other data which you consider necessary

5 Define—

- (a) Scrap
- (b) Spoilt Work
- (c) By-products
- (d) Defective Work

6 What basis is generally used for pricing by-products when transferring from the main process account to the by-product account?

7 From the following information prepare journal entries, open the necessary accounts and post the various items

(a) Stock on hand, 1st January	Raw Materials .	£13,200
	Finished Goods .	8,800
(b) Work in Progress, 1st January	Materials .	703
	Labour .	616
	Expenses .	881
(c) Value of completed work as at 31st December	Labour .	19,470
	Materials .	72,270
(d) Total sales for year		161,788
(e) Purchases of raw materials		77,000
(f) Pay-roll	Direct Labour .	19,228
	Indirect Labour	2,992
(g) Value of goods returned by customers and placed into stock		4,774
(h) Establishment Expenses	Administrative .	14,014
	Sales .	19,866
	Works .	21,472
(i) Works cost of goods sold		121,000
(j) Value of Raw Materials issued to production		72,076

Administrative Expenses are to be apportioned 60 per cent to production and 40 per cent to sales and the percentage on direct labour method of recovering expenses is to be used. Sales expenses are recovered in costs at the rate of 22 per cent on Total Works Cost.

CHAPTER XII

1. Give two methods of accounting for labour in connection with process costing and state the conditions under which each would be used Illustrate your answer with specimen forms.

2 Define Direct Charges and Direct Expenses and explain fully the difference between each

3 From a study of the Expense Control Accounts given in Chapter VIII it will be noted that both the Works and Sales Expense Control Accounts show a debit balance What information would this convey to the Cost Accountant and how do you suggest it should be dealt with?

4 Prepare specimen journal entries to indicate the entries you would make in your cost records for the following items.

(a) Materials spoilt in manufacture in (1) a process costing system and (2) a job costing system.

(b) Losses due to breakage in (1) raw material stores and (2) finished stores

5. Give a list of three industries that would use the process system of costing and five industries that would use the job costing system.

6. What are unabsorbed expenses and under what conditions do they arise?

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