

A STUDY OF THE METHODS OF ACCOUNTING FOR
MANUFACTURING OVERHEAD COSTS

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A STUDY OF THE METHODS OF ACCOUNTING FOR
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PREFACE

Any treatment of cost accounting must, necessarily, deal with the thorny problem of manufacturing overhead costs. Accordingly, all the writers in the field of cost accounting have devoted sections in their books to the study of such costs and many good articles thereon can be found elsewhere in the accounting literature. None of those writings can be considered as complete, although some of them do a fair job of explaining selected sections of the subject.

The purpose of this thesis is to assemble the best of this information regarding manufacturing overhead costs into one single treatment of the subject, and to examine critically the various methods of overhead application prevailing today. No attempt is made to enumerate all various methodologies; instead, a synthesis of the best methods has been attempted.

I am indebted to several individuals for their aid to me in the preparation of this thesis. I am particularly indebted to Dr. George B. McCowen for his guidance and kind assistance throughout the preparation of the thesis.

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CHAPTER I
INTRODUCTION

The Problem and Its Scope.

The cost of producing any manufactured article has three cost elements: direct materials, direct labor, and manufacturing expenses, or burden, or manufacturing overhead costs. At times direct charges for subcontracts are treated as a fourth element of cost.

This study limits itself to the single element called manufacturing expenses or burden or manufacturing overhead costs; the three terms are synonymous. The complete accounting for burden involves the distribution of properly classified burden costs to departments (first, in advance by way of preparing the burden budgets and second, the actual expenses in order to compare actual expenses with the budget for cost control purposes), and the application of burden to goods in process and production orders. This whole subject will be surveyed in order to produce the proper setting, but the critical part of the study is limited to the problem of the burden rate determination.

Need for the Study.

Although all cost accounting texts treat the problem of accounting for overhead costs, and there are many articles on various aspects of the subject, the unsettled and debatable nature of the proper basis for burden rate determination seems to offer fertile ground for further thought and investigation. Also, it appears that a single treatment of this subject might serve a useful purpose. Because the information on the subject is scattered through the various sources of cost ac-

counting in general, it is felt that a single treatment will serve to coordinate the information.

Delimitations.

The chief limitations were mentioned in the discussion of the scope of the problem. It may be noted, however, that none of the problems of commercial cost accounting will be discussed here, and only such limited discussion of budgeting will be included as is necessary for an understanding of the problem as it applies to burden or manufacturing expense budgets for departmental overhead. Very few, if any, of the accounting forms or journal entries will be displayed or discussed, and such as are included are not so included for the purpose of cost bookkeeping instruction, but only to illustrate the effect of using certain burden application rates.

Definitions.

No definitions are necessary at this time because only the most generally accepted accounting terminology will be used. When specialized terms are used, an effort will be made to give a proper conception of the term rather than a definition. It seems proper to give one such conception at this time which involves the distinction between an expense and a cost. The proper use of the word expense should be limited to those used up assets and services which have passed out of the business during the period's operations. An expense should never be capitalized into another asset; therefore, manufacturing expenses, most of which are capitalized into goods in process and finished goods, are not properly called expenses; they are manufacturing costs. They are converted into the asset called goods in process; however, despite the fact that expense is not proper terminology for them, the phrase "manu-

facturing expenses" is so embedded in the accounting vocabulary to designate such costs that the term is so used in this study.

CHAPTER II

THE CLASSIFICATION OF MANUFACTURING OVERHEAD EXPENSES

Manufacturing overhead expenses cannot be properly accounted for until they are classified. There are numerous classifications, sub-classifications, and sub-subclassifications. No attempt will be made in this study to exhaust the classifications of manufacturing overhead costs; however, a useful classification will be presented in this chapter.

The classification of manufacturing overhead costs used in a particular situation will be determined by the special requirements and peculiar circumstances of the situations involved.

There are a number of reasons why manufacturing overhead costs should be accurately classified. Some of the more important of these reasons are, for use in the development of predetermined overhead rates, as an aid in better control of variable overhead items, and as an aid in the design of the accounts for factory overhead expenses. As further evidence of the need of proper classification, the following quotation is presented:

Cost accounting records should exhibit overhead costs by type and by departments. The cost accounts are maintained to show the total amount of each class of overhead such as indirect labor, supplies, taxes, depreciation, insurance and rent. From these accounts, each cost is classified by departments. A careful study of overhead by types and departments made monthly by the comptroller and other officials should result in the curtailment of unnecessary costs and in the maintenance of overhead costs at a subsistence level.¹

¹John G. Blocker, Cost Accounting (New York, 1948), p. 159

Useful Classifications.

While manufacturing expenses may be classified upon many bases, the classification by type or kind of expense (the natural expenses), the further breakdown by departments, and the division of departmental expenses into their fixed and variable elements appear to be the most useful classifications. In this chapter, the reason for the breakdown into fixed and variable classifications is undertaken. The necessity for a classification by kinds is thought to be so evident that it is omitted entirely.

Fixed Expenses.

These expenses, sometimes called non-variable expenses, are those which represent a constant and recurring charge every month. The chief characteristic of fixed expenses is their uniformity and their recurrence month after month, without regard to factory activity. Fixed expenses are predicated on the time factor, rather than the activity factor, and they are constantly incurred regardless of whether activity is at zero or at maximum. Consequently, charges are made every month for these expenses even though the plant may be operating at a small fraction of its capacity. The following are examples of fixed expenses: fire insurance, property taxes, depreciation, rent, and some salaries.

It should not be understood that fixed expenses never vary from year to year. Depreciation rates may be revised, insurance premiums may change or rentals may be increased or decreased. Generally, however, the nature of fixed expenses is static.

Variable Expenses.

These expenses fluctuate nearly in direct proportion to the rate of activity. The chief characteristic of a variable expense is that

it is present only when there is activity. Since variable expenses depend entirely on the activity, there can be no variable expense unless there is activity. The following are examples of variable expenses: fuel for power, operating supplies, compensation insurance, and indirect labor.

Semi-fixed Expenses.

Certain expenses are partly fixed and partly variable. If the nature of these expenses is more fixed than variable, they are properly classified as fixed expenses. This type of expense does not increase constantly in relation to activity, but remains constant for an appreciable range of activity, then increases or decreases suddenly when a certain point of activity is reached. Expenses such as supervisors' salaries, foremen's salaries, and inspectors' salaries may be classed as semi-fixed expenses.

This classification of expense is seldom found in the literature of cost accounting. Most writers include all such expenses under the semi-variable classification, and seldom, if ever, even mention the semi-fixed classification. It seems reasonable to assume that more accurate burden rates could be calculated if this classification were generally used. The following are examples of semi-fixed expenses: salaries of foremen, cost clerks, and superintendents.

Semi-variable Expenses.

As stated in the preceding section, the semi-variable classification is generally used instead of the semi-fixed classification, at least, in cost accounting literature. If the semi-fixed classification is not recognized, of course, all expense items of this nature would be classified as semi-variable expenses. The opponents of the semi-

variable expense classification maintain that semi-variable expenses exist only as a result of insufficiently analyzed items of expense. It appears to this writer that cost accountants should apply themselves to the proper analysis of all expense items into their fixed and variable elements.

Actually, a semi-variable expense is an item of expense that increases or decreases somewhat more slowly than activity increases or decreases. There will never be many such expense items if proper analysis has been applied to the expense items to segregate them into their fixed and variable elements. An example of such an expense is the expense of fuel used in the production of power. The consumption of fuel will vary with activity, but not necessarily in direct proportion. This is because of the nature of the equipment used in the production of power and the fact that there are often certain rates of production at which the power plant operates more economically than it does at other rates.

The following quotation supporting the view that the semi-variable classification should not be used is presented:

The writer (Schlatter) is skeptical about the propriety of applying the term "semi-variable" to any expense. He holds the opinion that most, if not all, expenses commonly referred to as semi-variable may, with proper analysis, be broken down into their fixed and variable components.²

The above quotation serves to emphasize the extreme divergence of opinion among writers on the question of semi-variable expenses. It appears to the writer that the answer to this question lies in the process of proper analysis of expenses into their fixed and variable components. Probably some allowance should be made in particularly

²Charles S. Schlatter, Cost Accounting (New York, 1947), p. 416

difficult cases where absolute segregation into fixed and variable elements is impossible. In those cases, it would appear to be proper to use the semi-variable classification.

The Importance of Proper Classification.

The proper division of expenses into their variable and fixed elements is extremely important for two very important reasons. A proper distribution of expenses and the application of overhead or burden cannot be made unless expenses have been properly analyzed into their fixed and variable elements. This importance becomes clear when the distinction between fixed and variable expenses is understood. By definition, a fixed expense is affected only by the passage of time; while a variable expense is affected only by the rate of activity. Since there are two factors involved in the expenses themselves, it seems clear that recognition of this fact must be made if any intelligent distribution of burden application is to be made.

Many writers in the field of cost accounting solve the problems arising from the fixed and variable nature of expenses by ignoring the obvious distinction between the two items. They do this by distributing fixed and variable expenses to the departments on the same basis without regard to the fact that the expenses may not have been incurred at the same rate. It appears clear to the writer that such a procedure will be proper only under ideal conditions. That is, where the rate of consumption between the two remains constant. For example, assume two production departments to which the expenses of a service department are being distributed. If the normal capacities are in the ratio of 2 to 1, then as long as the activity ratio remains constant, it would be equitable to distribute the fixed and variable

expense together in the same ratio. This would not be an equitable procedure, however, if the activity ratio between the two departments changed. Assuming that the activity ratio changes to 1 to 1, then the second department would be penalized by having to assume part of the expenses for which the first department was responsible.

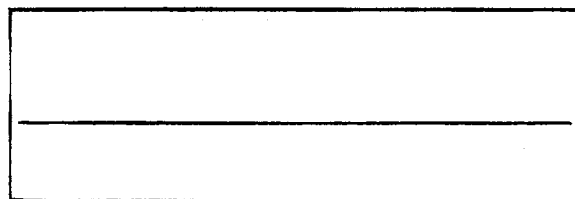
Situations such as the ones described in the preceding paragraph may be avoided by using a method whereby fixed and variable expenses are distributed separately on a rate calculated for each one. Under this procedure, the fixed expenses are distributed in the same amounts consistently without regard to the amount of activity, and the variable expenses are distributed, as they should be, in direct proportion to their usage in the department. Recognizing the distinction between fixed and variable elements also enables management to distinguish between "costs" and "losses" when the differences between actual and budgeted amounts are analyzed.

If the cost accountant is to make a useful and intelligent classification of manufacturing expenses, he must recognize and understand the behavior of the various types of expenses. Illustration 1 is presented as a graphical comparison of the most important classes of expenses.

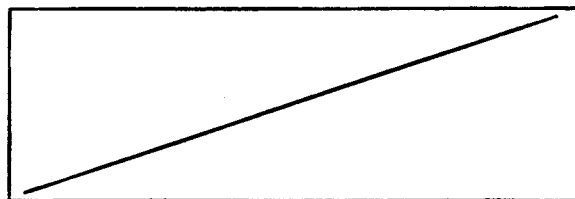
Analysis of Semi-variable Expenses.

It has been mentioned previously in this study that it is possible to analyze nearly all semi-variable expense items into their fixed and variable components. A method of making this analysis which is accurate enough for all practical purposes is called the "High and Low Points" method. This method involves determining the relation between the fixed and variable element in a semi-variable expense. The following example

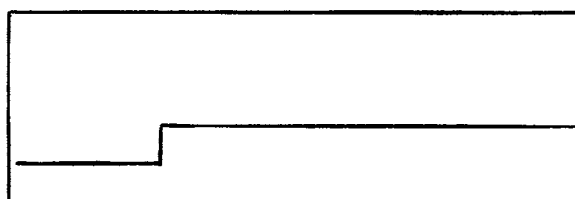
ILLUSTRATION 1
Behavior of Expenses



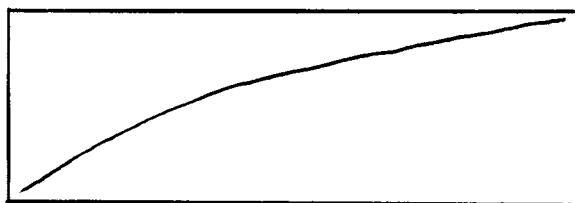
Fixed Expense



Variable Expense



Semi-fixed Expense



Semi-variable Expense

will illustrate the methods:

Machine Repairs

<u>Activity</u>	<u>Production Hours</u>	<u>Expense</u>
High	684 hours	\$277.
Low	276 hours	175.
Difference	<u>408 hours</u>	<u>\$102.</u>

$$\begin{aligned}
 \text{Variable rate} &= \$102. \div 408 \text{ hours} = \$.25 \text{ per production hour} \\
 \text{Fixed element} &= \$277. - (684 \text{ hours} \times .25) \\
 &= \$277. - \$171. \\
 &= \$106.
 \end{aligned}$$

The net difference of 408 hours between the high and the low points corresponds to an expense difference of \$102. The variable rate is determined by dividing \$102. by 408 hours to arrive at the variable cost per direct labor hour. The fixed portion of machine repair at every level of activity is found by subtracting from the higher expense, \$277., the total obtained by multiplying production hours on which the expense was incurred, 684 hours, by the variable rate of \$.26. The resulting figure, \$106., represents the fixed element at zero activity.³

Separating the fixed and variable elements of semi-variable expenses will result in a more useful classification of expenses and will aid in determining burden rates on an intelligent basis. There are other methods of separating the fixed and variable elements of semi-variable expenses, among which is the statistical scattergraph. It appears that the "High and Low Points" method is the easiest to use, particularly where a large number of expense items are to be analyzed.

³Adolph Metz, Othel J. Curry and George W. Frank, Cost Accounting (Chicago, 1953), p. 501.

CHAPTER III

MANUFACTURING EXPENSE DISTRIBUTION TO DEPARTMENTS OR FUNCTIONS

The costs of direct material and direct labor are quite easily determined and charged to specific jobs or processes. Manufacturing overhead expenses, on the other hand, present a problem in this respect. The manufacturer cannot know definitely the total overhead expenses until the end of the period. Neither is it possible for the manufacturer to know definitely the total quantity produced until the end of the period. In spite of the existence of these conditions, it would be hazardous for the manufacturer to wait until the end of the period to determine his costs. Generally, it is necessary for the manufacturer to compute selling prices during the process of production so it is absolutely imperative that the manufacturer have current cost figures available at all times.

The first step the cost accountant takes in realizing the objective of complete current cost information is to prepare a departmental budget of all the manufacturing overhead expenses. This budget should be prepared very carefully so that it may be used with the least alteration and change possible for a year. There must, of necessity, be considerable estimation in preparing the budget. However, these estimates must be as nearly accurate as possible based upon past experience, current conditions, reasonable forecasts of the future and good judgment. The accuracy and validity of unit product costs will depend to a great extent upon the care with which the budget of the manufacturing expense is prepared.

Many cost accountants now prepare what is called a flexible budget, particularly where a standard cost system is in use. A flexible budget is, in essence, a series of separate budgets for the same department. It projects the estimations of manufacturing overhead expenses on the basis of various percentages of total normal operating capacity. For example, if management desires cost information on a plant operating at 50 per cent of total normal operating capacity, the budget can be constructed to yield that information on a 50 per cent basis or any other desired basis. Some plants operate at different percentages of capacity during the year. Where flexible budgets are used, they are so constructed as to yield information in accordance with the anticipated percentage of operating capacity for any particular month. Sometimes they are broken down so as to show budget estimates by months or even weeks. If more detailed information is required, there can be even more detailed breakdown of the budget.

The procedure described in the preceding paragraph for preparing a flexible budget is correct and will accomplish the purpose of a flexible budget. As will be presently shown, however, there is available to cost accountants another method of preparing a budget at normal that will accomplish all the advantages of the flexible budget without sacrificing any of the utility or efficiency of the flexible budget.

The only prerequisite necessary to construction of a budget at normal which will serve the purpose of a flexible budget is that the expenses must be segregated into their fixed and variable elements. Sufficient reason for this segregation is presented in Chapter II, so those reasons will not be elaborated upon again at this time. Under this procedure, one budget at normal is prepared instead of a flexible

budget graduated at 5% or 10% intervals. This procedure materially reduces the labor involved in preparing and revising a flexible budget, and the budget adjusted to actual activity will be accurate enough for most comparison purposes.

Regardless of the form or type the budget takes, its principal function remains the same. That is, to furnish as complete and as accurate a forecast of the overhead manufacturing expenses as is possible by estimation and a tool for comparison of actual with budgeted amounts based on past experience and future possibilities. In practice, the budget would include estimates of all the manufacturing costs, including direct labor and direct material. For the purpose of this study, however, only the portion of the budget relating to the manufacturing expenses will be considered. Illustration 2 is representative of a budget at normal for manufacturing expenses.

Some writers devote a great deal of space to the preliminary work that must be accomplished prior to the actual preparation of the budget. It is necessary, of course, to decide upon a proper base for distributing the various manufacturing expenses to the departments. For reasons previously discussed, the most important division of expenses is that of segregating the expense items into their variable and fixed elements. Consideration must be given to the proper distribution of direct and indirect items of expense. There is no problem concerning the direct expenses, since they are incurred in the department they are distributed directly to the department responsible for them. The indirect expenses incurred outside the department, but for the benefit of all departments, must be distributed to the departments on some equitable basis.

ILLUSTRATION II

The Production Company Budget
Year of 1954

Expense	Total	Building Maintenance	Power Department	Department A	Department B	Bases
Fixed Expenses:						
Taxes	\$ 9,600.	\$ 1,000.	\$ 3,800.	\$ 2,400.	\$ 2,400.	Investment
Insurance	7,400	600.	2,800	2,000.	2,000.	Investment
Depreciation, Bldg.	4,000.			2,000.	2,000.	Investment
	20,400.					
Bldg. Maintenance Apportioned		\$ 1,600.	600.	500.	500.	Floor Space
Power Expense Apportioned			\$ 7,200.	3,600.	3,600.	K.W.H.
Total Fixed Expense				\$10,500.	\$10,500	
Variable Expenses:						
Supplies	13,000.		\$ 4,000.	\$ 4,500.	\$ 4,500.	Dept. Use
Depreciation	14,000.		2,000.	6,000.	6,000.	Dir. Labor Hrs.
Inspection	12,000.			6,000.	6,000.	Rate Per Hour
	39,000.					
	\$59,400.					
Power Expense Apportioned			\$ 6,000.	3,000.	3,000.	K.W.H.
Total Variable Expense				19,500.	19,500.	
Total Fixed and Variable Exp.				\$30,000.	\$30,000.	
Normal Hours				15,000	30,000	Dir. Labor Hrs.
Burdan Rate:						
Fixed				\$0.70	\$0.35	
Variable				1.30	.65	
				<u>\$2.00</u>	<u>\$1.00</u>	

This process of manufacturing expense distribution is called departmentalization by some writers. In this study, numerous departments are presupposed, otherwise, distribution would not be a problem. The distribution base depends upon the nature of the expense and the type of department. For example, an indirect expense, such as fire insurance, probably would be distributed on the basis of investment, while an indirect expense, such as building maintenance, probably would be distributed on the basis of square footage of floor space. The information upon which bases of distribution are predicated must be tabulated in some way. Some accountants use what is called a factory survey. (See Illustration 3.)

ILLUSTRATION 3

Factory Survey for Year 195_

Department	Bases				
	No. of Employees	Square Feet	H.P. Hours	K.W. Hours	Investment
Producing Dept. 1	15	1600	4000	1000	\$15,000
Producing Dept. 2	25	2500	3000	1000	10,000
Service Dept. 1	5	900	500	400	6,000
Service Dept. 2	6	800	400	300	4,000
Service Dept. 3	3	800	-	200	2,000
Totals	54	6600	7900	2900	\$37,000

The factory survey is a tabulation listing the features of each department, such as number of employees, square footage of floor space, horse power requirements, kilowatt hours, and amount of investment.

The basis upon which each item of expense will be distributed to the departments must be decided upon the merits of each individual item. The direct expenses, such as indirect labor and depreciation of

machinery, will be charged directly to the departments on the basis of departmental use. The indirect expenses will be distributed on some equitable basis applicable to the item. Superintendence, for example, probably will be distributed on the basis of the number of employees in the department. The bases for distribution can be organized in a formal tabulation (see Illustration 4), or the information can simply be incorporated in the preparation of the departmental budgets.

ILLUSTRATION 4

Bases for Distributing Manufacturing Expenses

Cost Item	Amount	Bases of Distribution to Dept.
Indirect Labor	\$ 7,000.00	Departmental Use
Indirect Material	10,000.00	Departmental Use
Superintendence	4,000.00	Number of Employees
Compensation Insurance	1,000.00	Gross Pay of Employees
Fire Insurance	1,000.00	Investment
Rent	3,000.00	Square Footage
Repairs to Machinery	2,000.00	Direct to Department
Light	1,000.00	Number of Bulbs
Heat	2,000.00	Square Footage
Depreciation of Machinery	3,000.00	Investment
	<u>\$34,000.00</u>	

It may be noted from the preceding discussion that indirect charges are much more troublesome than are the direct charges, as far as distribution is concerned. For this reason, an effort should be made to make direct charges of as many of the expense items as pos-

sible. A great many expense items if properly analyzed could be handled as direct charges that may otherwise have to be treated as indirect charges. Some writers regard this as a fundamental principle in accounting for manufacturing expenses, as shown by the following quotation:

The fundamental principle that should be adhered to in accounting for overhead expense is that as many overhead expense items as possible should be handled as direct charges to a departmental overhead expense account, and that as few as possible should be treated as indirect charges. By allocating the greatest possible number of overhead expense items as direct charges to a given department, the greatest possible accuracy in the overhead charges applicable to that department will be attained. No fixed rule, however, can be evolved to designate certain overhead items as always being direct overhead expenses and certain others as invariably being indirect expenses. [charges]¹

The discussion, thus far, assumes the distribution of the manufacturing expenses to both the service departments and the production departments. The next logical step then is to redistribute the expenses of the service departments to the producing departments. The problem here is how to distribute the service department expenses to the production departments. Obviously, the distribution should equal, as nearly as possible, the ratio of consumption of service by the various departments.

The distribution of the service department costs to the producing departments is very often difficult to accomplish. This situation arises because of the fact that some of the apportionments of some service department charges will apply to departments previously closed out by prior distributions. There will be a problem in this connection only if the so-called "vicious circle" method of distribution

¹Clarence L. Van Sickle, Cost Accounting (New York, 1938), p. 263

is used.

The vicious circle method distributes and redistributes until insignificant amounts are being apportioned and reapportioned. A more realistic and infinitely more practical method is to distribute service department charges to producing departments in order of amount of service rendered to other departments. For example, assume that the total charges of Service Department No. 1 have been apportioned to all the other departments. When apportioning the total charges of Service Department No. 2, no charges should be apportioned to Service Department No. 1, even though some service was rendered to Service Department No. 1 by Service Department No. 2. In support of this contention, the following quotation is presented:

A safe rule to follow in apportioning service department costs is to first close out the account for that service department which affects the greatest number of other service departments. If such a distinction is not possible, close first the account for the service department which involves the largest amount of costs. Once a service department account has been closed, no further items are distributed to it.²

Discussing the process of expense distribution by chronological steps seems to make the process appear involved, which it is not. Actually, the entire process is (or can be) accomplished simultaneously with the preparation of the departmental budget at normal, including the computation of the predetermined burden application rate. An inspection of the departmental budget in Illustration 2 will bear out this contention. Column one lists the various items of expense by kinds segregated into their fixed and variable elements; column two lists the totals of the estimated expenses for the year; the next four

²John J. W. Neuner, Cost Accounting (Chicago, 1952), p. 251

columns show the distribution of the expenses to the service and production departments, and, finally, the last column shows the bases upon which the various items of expense were distributed. Next, the departmental columns are totaled reflecting the total manufacturing expense for each department. The service department totals are redistributed to the production departments, thus furnishing the amounts which will be used in determining the departmental burden rates. The departmental burden rates are easily calculated both for fixed and variable expenses by dividing the total expenses by the direct labor hours shown for each department.

The manner in which the departmental burden rates are determined is the subject of a later chapter; however, the calculation is included here to make the budget complete.

Some accountants follow different procedures to accomplish the same results relative to expense distribution. For instance, an elaborate columnar distribution is sometimes prepared and then transferred to the budget, and perhaps a graduated flexible budget. It seems obvious that by preparing one budget at normal and incorporating the expense distribution in it is a desirable procedure for reducing labor costs in preparing the budget.

The accounting for manufacturing expenses is a dual process in most plants because of the necessity for predetermining the amount of these expenses at normal before the actual amounts can be determined. The other half of the process is accounting for or assembling the actual manufacturing expenses as they are incurred. The task of accounting for the actual overhead expenses is present in every manufacturing situation, regardless of the presence or absence of a method of

predetermination of these costs.

The incurrence of the various manufacturing overhead expenses is first recorded in the various journals of the general books of account and ultimately are collected in the manufacturing overhead control account. The procedure to this point may be regarded as general and almost universally applicable. The procedure beyond this point will usually involve the distribution of actual expenses to departments, if the factory is departmentalized.

The first extended procedure from the above description would be the establishment of subsidiary ledgers to contain the detailed information represented by the total of the overhead expenses in the Manufacturing Overhead Control account in the general ledger. The size of the subsidiary ledger and its detailed breakdown will be determined by the size of the plant and the number of departments. Ordinarily, there will be a separate subsidiary ledger for each department, or the expenses will be departmentalized in a distribution sheet.

The procedure of assembling the actual manufacturing overhead expenses will be found to parallel the procedure in departmentalizing the estimated manufacturing expenses in many respects. In fact, some of the same procedures may well be used in both cases. The principal difference is that the actual fixed expenses will be distributed to the departments on the same basis as was used in the preparation of the budget, i.e., capacity to use the service, while the actual variable expenses will be distributed on the basis of actual use of the service. The same type of analysis sheet, with the exception of the difference stated above, can be used for distributing the actual manufacturing expenses to the departments. Some sort of a departmental

analysis form is necessary to assemble the amounts of the manufacturing expenses as they are incurred and charged to the departmental overhead accounts. In some plants, these departmental analysis sheets are referred to as standing order sheets. Generally, there is a sheet or order for each department containing the detail for the subsidiary ledger accounts. Ordinarily, these records do not constitute a part of the regular accounting records. In some cases, however, the departmental analysis sheets supplant the subsidiary ledger accounts and are controlled by the Manufacturing Overhead Control account. The Manufacturing Overhead Control account can be used to control both the subsidiary ledger accounts and the departmental analysis sheets.

At the end of the month, the major task in regard to manufacturing expenses is to summarize the data in the overhead accounts in such a manner that a comparison can be made of the actual expenses with the budgeted amounts. Just how this procedure is accomplished will depend upon the type of budget used. If a static budget is used, all that can be done will be a comparison of actual expenses with the budgeted amounts as originally set out in the budget. If a flexible budget of the type graduated by percentages is used, a better comparison can be made by interpolating the actual between the graduated percentages. A much more meaningful comparison can be made if the budget at normal is used. The budget at normal can be adjusted to the actual activity, thus forming a basis for realistic and truthful comparisons.

For the purpose of showing this comparison of actual expenses with budgeted expenses, Illustration 5 is shown. The budgeted figures are the same as those in Illustration 2 for Department B, representing the budgeted expenses for a year, or 30,000 direct labor hours of

activity. For purposes of this illustration, it is assumed that the department operated for 2,000 hours in the month of February. In column two of the illustration, the amounts of expense are shown that should have been incurred at a capacity of 2,000 hours. By listing the actual expenses incurred in column three, a realistic comparison is immediately provided. Column four provides for any difference between the budgeted expenses and the actual expenses. It will be noted in the illustration that there were no differences between the budgeted and actual amounts of the fixed expenses. The total difference, then in this illustration can readily be attributed to the variable expenses. In general, using this method, there should not be any increase or decrease in the fixed expenses as between the budgeted and the actual amounts incurred. The preceding statement is made, of course, on the assumption that the budgeted amounts were carefully prepared. Occasionally, items of fixed expenses will experience some change, but generally not over a short period. A change of an appreciable amount in a fixed expense item generally calls for a correction in the original budget. This type of comparison indicates the deviation from budget, if any, of each expense item, thus pointing to any deviation of an amount that perhaps would require further investigation. In this connection, it should be pointed out that it may be necessary to look behind the department for the cause of certain deviations. For example, in this illustration, the increase in power expense may not be because too much power was used in the department. It is possible that the cause is within the power department and an excessive amount of expense was apportioned to Department B.

The comparison of actual with budgeted expenses can be made where

ILLUSTRATION 5

Budget at Normal Adjusted to Actual

	Budget For Year at Normal	Budget Adjusted to 2,000 hours	Actual Expenses February	Increase of Decrease From Budget
Fixed Expenses:				
Taxes	\$ 2,400.	\$ 160.	\$ 160.	
Insurance	2,000.	66.	66.	
Depreciation, Building	2,000.	67.	67.	
Total Departmental Fixed Expense	6,400.	293.	293.	
Building Maintenance	500.	34.	34.	
Power	3,600.	240.	240.	
Total Fixed Expenses	10,500.	567.	567.	
Variable Expenses:				
Supplies	4,500.	300.	315.	\$ 15.
Depreciation, Machinery	6,000.	400.	425.	25.
Inspection	6,000.	400.	400.	
Total Departmental Variable Expense	16,500.	1,100.	1,140.	40.
Power	3,000.	200.	225.	25.
Total Variable Expenses	19,500.	1,300.	1,365.	65.
Total Variable and Fixed Expenses	\$30,000.	\$1,867.	\$1,932.	\$ 65.

either the graduated flexible budget is used, or the budget at normal, but not, in the writer's opinion, with as great a degree of accuracy, nor with as little labor in adjusting the budget to actual. The process of interpolation, necessary with the graduated flexible budget, makes it very little more accurate than the adjustment to actual of a budget at normal when all expenses are properly analyzed into their fixed and variable element. Where a static budget is used, even less accurate results are obtained. For these reasons, it appears to the writer that the one budget at normal is definitely the better procedure.

CHAPTER IV

BURDEN RATE DETERMINATION AND BURDEN APPLICATION

One of the major tasks of the cost accountant is to spread the manufacturing overhead costs as accurately as possible over production. As mentioned previously, a predetermined overhead rate is necessary to apply the overhead costs as production proceeds. A major portion of this problem is solved by budgeting and departmentalizing the overhead costs on an estimated basis. We have now to examine the methods for determining the burden rate.

Mathematically speaking, the problem is simply a computation consisting of dividing the total of the estimated overhead expenses by some selected base. The difficulties arise in choosing the base which is used as the divisor. The base chosen must be the one which will result in the most accurate and equitable distribution of the overhead costs to each unit of product.

Some of the bases used in determining the manufacturing overhead rate to be used in applying overhead costs are:

1. Direct labor hours
2. Machine hours
3. Units of Product
4. Direct labor costs
5. Direct material costs
6. Prime cost

A combination of any of the above bases may be used - even two or more in one department.

The following facts and figures are assumed to illustrate the computation of the rates using the bases listed above:

Manufacturing overhead from budget	\$ 50,000.
Machine hours from budget	25,000
Units to be produced from budget	5,000
Direct labor costs from budget	\$ 75,000.
Direct Material costs from budget	\$ 60,000.
Prime cost	\$135,000.
Direct Labor hours	50,000

Direct Labor Hours Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Direct Labor Hours } 50,000} = \$1.00 \text{ per labor hour.}$$

The direct labor hour base is an equitable base where labor operations are the major factor in the production processes. The chief objection to this method is the necessity of compiling direct labor figures for each job and each process or department and the additional expense that such compilation entails. In spite of this objection, this method can be used with quite satisfactory results where the work is of a manual nature.

Machine Hour Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Machine Hours } 25,000} = \$2.00 \text{ per machine hour}$$

The machine hour basis is subject to the same objections as the direct labor hours basis in that considerable expense is incurred in compiling the total number of machine hours for each department, job, or process. For a plant that is highly mechanized, however, this does appear to be a very equitable method of distributing overhead, particularly in situations where a large portion of overhead consists of depreciation on machines, machine repairs and power. Also, this method and the direct labor hour method take into consideration the time factor in applying overhead which in many cases is an advantage over the materials or labor cost method, and most overhead costs are time factor costs.

Units of Product Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Number of Units to Be Produced } 5,000} = \$10. \text{ per unit produced}$$

This is the simplest method of determining the overhead rate, but it is quite limited in its application. This method is generally satisfactory in small concerns with simple manufacturing processes. It has been found satisfactory for use in some large concerns where only one product is manufactured in large quantities.

Direct Labor Costs Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Direct Labor Costs } \$75,000} = 66 \frac{2}{3}\% \text{ of Direct Labor Cost}$$

This method of calculating the predetermined overhead rate assumes a uniformity of wage rates. The inequities resulting from non-uniform wage rates with the use of this method can be seen by comparing the results where wage rates are not uniform. For example, if one worker is paid at the rate of \$2.00 per hour and another worker is paid \$1.00 per hour, twice as much overhead would be applied on the labor cost of the first worker as would be applied on the labor cost of the lower paid worker. This could be an equitable distribution, but probably would not be. The two workers may very well use up the same actual amount of manufacturing overhead expense.

This method of applying overhead enjoys wide acceptance, and is a particularly good method where manufacturing overhead costs are departmentalized and where wage rates within departments are fairly uniform. This method considers the time factor because costs are based on time and it is easy to use. The total labor cost on each job is easily obtained from the time tickets and hours need not be entered on the cost sheets for the operation of this method.

Some accountants object to this method because they feel that an insufficient amount of manufacturing expense is added to the value of some jobs. This objection is particularly strong where a major portion of manufacturing expense arises from charges for depreciation and maintenance of high-cost machinery. They feel that these expenses bear little relationship to the direct labor payroll and the use of the direct labor cost method of applying overhead tends to ignore this fact.

Other accountants attach greater significance to the fault arising from the lack of uniformity in wage rates. They believe that the majority of plants would find it impossible to departmentalize in such a manner as to insure uniform wage rates within departments.

Direct Material Costs Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Direct Material Costs } \$60,000} = 83 \frac{1}{3}\% \text{ of Direct Material Costs}$$

The historical cost records of a small minority of manufacturing plants might show a constant and consistent relationship between manufacturing overhead costs and the cost of direct material. In the few cases where this condition is present consistently, the material cost basis of applying manufacturing overhead would be an equitable basis for applying overhead to production. In most cases, material costs bear little logical relation to manufacturing costs; therefore, this method has very limited application.

This method assumes a uniformity of value of materials used in each article of product. It would not be at all applicable where one article was made of cheap material and another article made of expensive material, but using approximately the same amount of time. Also, this method ignores the time factor involved in applying over-

head unless the use of material is controlled by machines and approximately the same amount of material is used per hour.

In spite of the limitations of this method, there are some cases where it can serve a very useful purpose. In a case where a large portion of the manufacturing overhead expenses bear a logical relationship to material costs, a rate may be predetermined for the related expenses on a material cost basis and the remaining overhead items can be applied on some other secondary basis such as direct labor hours or machine hours.

Prime Cost Basis

$$\text{Rate} = \frac{\text{Budgeted Manufacturing Overhead } \$50,000}{\text{Estimated Prime Cost of Production } \$135,000} = 37\% \text{ of Prime Cost}$$

This method is considered here only because it is sometimes encountered. It tends to combine the weaknesses of both the material cost and the direct labor cost methods without producing any improvements over either. The only attractive feature of the method is that it is simple and easy to apply.

Moving Average Basis

The moving average basis is not actually a method, although it is sometimes so termed. Rather, it should be called a procedure because it can be adapted for use on any of the previously mentioned bases. It is included here for the reason that it is occasionally found in use.

$$\frac{\text{Sum of actual overhead expenses for 12 months}}{12} = \text{Estimated overhead for month}$$

$$\frac{\text{Estimated overhead for month}}{\text{Direct labor hours}} = \text{Rate per Labor hour}$$

or

$$\frac{\text{Estimated overhead for month}}{\text{Machine hours}} = \text{Rate per machine hour}$$

or

Direct labor cost	Rate per dollar of direct labor cost
or	or
Direct material cost	Rate per dollar of direct material cost
or	or
Units to be produced	Rate per unit of product produced

This method requires no predetermined or estimated manufacturing overhead figures, as actual costs of the preceding twelve months are used to determine a figure for the following month. Sometimes, under this method, the burden rate is not computed until the end of the month, thus using the latest actual figures in the computation. In many cases, however, this would not be possible, as it means holding up all the orders for costing until the overhead rate can be determined.

It is obvious that a new rate must be computed each month under this procedure which most accountants would regard as a disadvantage. Another disadvantage is that the computation of the rate bears no relation to either the practical capacity or the expected actual capacity of the plant. Also, it would be of little use when the capacity of the plant has been changed. Probably the chief disadvantage to the method is that it results in a varying charge each month for overhead and such figures are not of much value to management for comparative purposes.

The principal deduction to be made from a study of the various methods of calculating a predetermined overhead rate is that care should be exercised in the choice of a basis for calculating the predetermined overhead rate. A thorough study of the plant is necessary to determine upon which basis the rate is to be calculated. The relationship between the various possible bases and the total overhead expenses, as well as the proportions of labor hours to machine hours,

should be analyzed. The desired result is an overhead rate that will apply the overhead expenses to production on a fair and equitable basis. The following quotation is a good summation of the items to be considered in selecting a method for applying manufacturing overheads:

1. The method selected should use as its base the main productive element in the particular manufacturing operation; i.e., it should relate manufacturing overhead to the product in a logical way.
2. Separate rates should be established for each area that constitutes a homogeneous cost unit from the point of view of obtaining correct product costs. In some cases, this may mean cost center or operation rates; in others, blanket rates.
3. The method or methods adopted should make possible monthly profit and loss statements of operating significance, as well as facilitate the compilation of specific reports.
4. Other things being equal, departmental rates or cost center rates are superior to blanket rates, because of the greater flexibility of the former.
5. Other things being equal, rates based on time (labor hours or machine hours) are to be preferred to rates based on a variable cost factor (labor dollar, material cost). This is because many important expense items, particularly fixed charges, are functions of time (depreciation, fire insurance and rent).¹

The above quotation will serve as a guide for choosing a base for the predetermined overhead rate. As added emphasis on the selection of the base for determining the overhead rate, certain other characteristics are pointed out in the following quotations:

- It should be easily computed.
- It should be inexpensive to use in applying it to the cost of production.
- It should have some relation to the time factor involved in many indirect costs.
- It should be computed on a departmental basis, if possible, so that the causes of variations may be localized.

¹Theodore Lang, Walter B. McFarland and Michael Schiff, Cost Accounting (New York, 1953), p.273.

It should be reasonably accurate, that is representative of the estimated overhead costs applicable to each unit.²

Any repetition in the above quotation should serve to emphasize the importance of selecting the proper base for calculating the predetermined overhead rate.

It would be impossible to choose a base for burden determination that would apply in all cases. Conditions will vary among plants and the base chosen for burden rate determination should be the one that will produce the most accurate application. The direct labor hours method will probably serve best in most situations because it is a good measure of the time and activity factors found in all expense items.

Determination of Normal Capacity

It was stated in the beginning of this chapter that the calculation of the burden rates was a simple mathematical process. This statement is true as long as all the factors in the calculation have been determined beforehand. The determination of one of these factors is very important and very often presents considerable difficulty. This factor relates to activity, or stated another way, normal activity. How many direct labor hours, machine hours or units of production shall be included in the denominator of the calculation of a burden rate.

The answer to this problem lies in how the accountant interprets the theory of normal burden. The following quotation is an excellent expression of just what is meant by the theory of normal burden:

²Neuner, Cost Accounting, p. 234

The amount of burden charged to a unit of product at any volume of activity shall be that which would have been charged at normal volume. That is to say, if at normal volume each unit of product should be charged with \$10. for burden, it should not be charged with more than \$10. if activity is less, or with less than \$10. if activity is greater than normal.³

Before the cost accountant can construct his departmental budgets and predetermine a burden rate, he must have some measure of activity. What is the normal rate of activity that will insure a fair and accurate application of burden? Accountants are not in agreement on just what the normal rate of activity should be. Historically, there have been three methods, all of which are in use today in greater or lesser degree. Expected actual production was the first method used. Average production over the next business cycle was the second method. The third method was practical capacity based on what a plant is equipped to do.

The first method, expected actual production, was soon found to be unsatisfactory for several reasons. It assumed that all expenses were costs of product without regard to the rate of activity. Therefore, it made no distinction between the fixed and variable elements of expense items. Unit costs under this method fluctuate violently and are not useful to management for control purposes. For all practical purposes, this method has no useful application.

The second method, average production over the next business cycle, is an improvement over the first method, but it has some serious defects. Those who advocate the use of this method still maintain that all expenses are part of the cost of product and must

³Charles S. Schlatter, Cost Accounting (New York, 1947), p.445

at some time or other be attached thereto. They fail to distinguish between cost and loss. The reasoning underlying this method is that a manufacturer must recover in his selling price an amount sufficient to meet all fixed and variable costs, plus a margin of profit. They argue that a manufacturer would be inclined to set his selling prices too low if the cost of unused capacity were not included in the cost of product.

Actually, the average capacity method is very little different than the first method. When analyzed, it amounts to expected actual capacity for a period of years instead of for one year. Assuming that there is justification in this method, there still remain some serious questions. For example, what is a business cycle and how long is it; who can predict sales of future years with any appreciable degree of accuracy; and what should be done with the overabsorbed or underabsorbed burden over a period of years. Also, if the setting of sales prices is the problem, why not include selling expenses and administrative expenses too, as they must be recovered in the selling price. In view of the reasons mentioned, it appears that this method will not produce accurate unit costs nor will it distinguish between costs and losses.

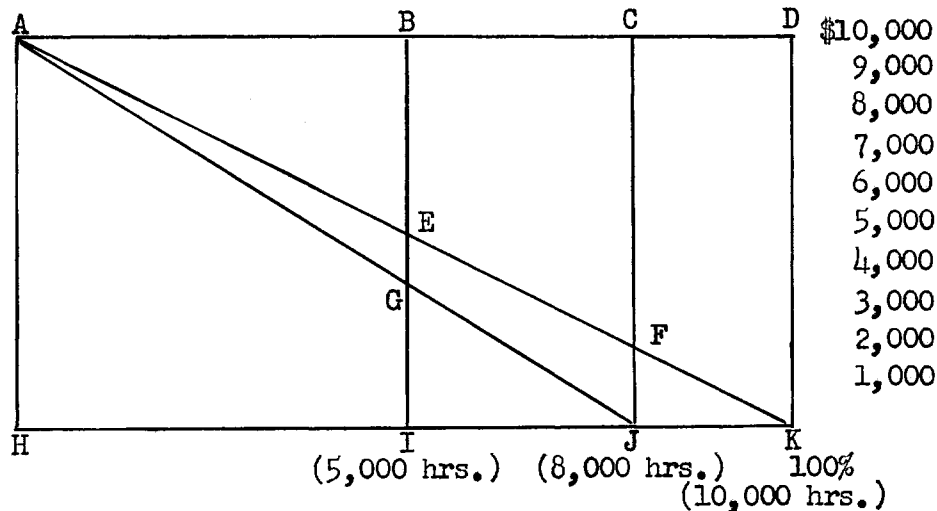
The third method, practical capacity, is based on the logical and reasonable contention that an idle plant or any part of a plant which is idle produces no goods. The proponents of this method argue that only that part of fixed expense which is actually used can be regarded as cost of product. Therefore, it is necessary to use a burden rate that will distinguish between product costs and losses incurred as a result of carrying idle equipment. The practical capacity method,

based on what a plant is equipped to do, will charge to product cost only that part of fixed expense used in the production of goods, the cost of unused capacity being eliminated from the unit costs. The proponents of this method maintain that unit costs under the practical capacity method are, as nearly as possible, true costs of goods; that inventories of goods in process and finished goods are not overstated by inclusion of idle capacity losses, and, that the burden balances will reflect the true amount of expense lost or unused capacity.

The proponents of the average capacity method and the practical capacity method are in agreement as to the treatment of the variable items of expense. The differences between the two methods relative to fixed expenses is graphically demonstrated in Illustration 6.

ILLUSTRATION 6

Comparison of Average and Practical Capacity



In the illustration, the horizontal axis represents activity, and the vertical axis represents the amount of fixed expense. Line HK represents practical capacity at 100% of 10,000 hours. Line KD represents total fixed expenses of \$10,000. When actual activity is 10,000 hours, the burden rate at practical capacity (\$1.00 per hour) will charge

product cost with the total fixed expense of \$10,000, all of which was used in producing goods. Assume practical capacity of 5,000 hours; then line BE, \$5,000., is the amount of fixed expense charged to production. The amount below line AK represents the amount of unused capacity, \$5,000, which will be left in the burden account and charged to profit and loss. It will be noted on the graph that line IB intersects line AK at exactly \$5,000 when activity is at 5,000 hours, thus dividing the fixed expenses into the exact amount used and the exact amount represented by unused capacity. Average capacity is generally regarded as about 80% of practical capacity, so line HJ represents average capacity of 8,000 hours (\$1.25 per hour). Line AJ divides the total fixed expenses into used and unused elements at average capacity. Line JC represents the total fixed expense of \$10,000 charged to production by the average capacity method, thus overstating the cost of product by \$2,000 by charging \$2,000 to cost of production which, in fact, represents the cost of unused capacity. Assume 5,000 hours of activity which is 62½% of average capacity (50% of practical capacity); under the average capacity method, \$6,250 will be charged to production, which overstates product cost by \$1,250 (line GE). By extending line AK, it is readily apparent that production would be overcharged if activity exceeded average capacity of 8,000 hours and leave a credit balance in the burden account for fixed expenses. For example, if activity were 9,000 hours, \$11,250 would be charged to production when actually there would still be 1,000 hours of unused capacity. The preceding graphical comparisons appear to emphasize the inherent weaknesses in the average capacity method as compared with the practical capacity method.

Recording the Applied Overhead.

Thus far, the discussion has treated the problems involved in budgeting, expense distribution and burden rate determination. In a natural sequence of procedures relative to overhead costs, the question ordinarily arising at this point is when should the overhead costs be applied to production. The answer to this question will depend upon the type of cost system in use, the base upon which the overhead is applied, the use for which the cost information is intended, and the requirements of management.

The conditions present in each case would govern the procedure and the determination of the proper time to apply the overhead to production. If a job order cost system is used, the chief requirement would be to apply the overhead so as to be able to complete the cost of orders without delay. This will usually mean at the end of each month and as jobs are finished during each month. In a process cost system, the overhead should be applied at a time consistent with the time other costs are applied, usually monthly. If a standard cost system is in use, the overhead costs will be standardized and included along with the other costs. In cases other than standard systems, the cost department should be provided with time tickets and other necessary data as soon as possible so that the manufacturing overhead can be computed and applied as soon as the jobs are finished or the month ends.

The entries to record the applied manufacturing overhead will follow the previously determined procedure and will vary in accordance with the type of cost system in use. Different methods of making the entries will also be found in different plants using the same type of cost system. The end result and the principles are the same, although

the methods of making the entries may differ.

The simplest application is the case of the one-department plant where a predetermined overhead rate is used. Assuming a situation in which the estimated manufacturing overhead costs for the period are \$50,000, and the base is 50,000 direct labor hours, the overhead rate would be \$1.00 per direct labor hour. Assuming 5,000 direct labor hours on the cost sheets, the entry to apply the manufacturing overhead cost would be:

(1) Work in Process	\$ 5,000	
Applied Manufacturing Overhead		\$ 5,000

A variation of this same entry would arise where separate accounts were kept for materials, labor and manufacturing overhead in process.

If separate accounts were kept, the entry would be:

(2) Work in Process - Manufacturing Overhead	\$ 5,000	
Applied Manufacturing Overhead		\$ 5,000

A plant with more than one department would follow essentially the same procedure, except there would possibly be a separate Work-in-Process account for each department. Assuming a similar situation as entries (1) and (2) with two departments, the entry would be:

(3) Work-in-Process - Dept. A.	\$ 3,000	
Work-in-Process - Dept. B.	2,000	
Applied Mfg. Overhead - Dept. A.		\$ 3,000
Applied Mfg. Overhead - Dept. B.		2,000
or		
(4) Work-in-Process - Mfg. Overhead - Dept. A.	\$ 3,000	
Work-in-Process - Mfg. Overhead - Dept. B.	2,000	
Applied Mfg. Overhead - Dept. A.		\$ 3,000
Applied Mfg. Overhead - Dept. B.		2,000

It is apparent from the preceding entries that the actual entries to effect the application of overhead costs to production are quite simple. Entries similar to those illustrated are representative of the methods used in plants using job or process cost systems and a

predetermined overhead rate. The chief differences in journal entries for applying overhead exhibited by various authors in the field of cost accounting are in terminology. The following terms are all used with identical meaning for actual overhead:

Manufacturing overhead
 Manufacturing expense
 Manufacturing overhead costs
 Manufacturing overhead expenses
 Burden
 Burden incurred.

While the preceding procedures for applying overhead are all commonly found in textbooks, and, actually, no serious fault can be found with any of them, it does seem desirable to simplify the procedure whenever possible. It appears to the writer that the use of such accounts as overhead applied and burden incurred are superfluous. The use of one account (or one account for each department) will accomplish the same result without any sacrifice of utility or accuracy. The use of one account, titled Manufacturing Overhead, or Burden, will suffice nicely merely by debiting the actual expense to the account and crediting the same account with the amounts applied to production. By this method, the over or underapplied overhead is contained in the balance of one account, rather than being the difference between two different accounts.

Many continuous process industries have not, customarily, used a predetermined overhead rate. This has been especially true of those process industries whose manufacturing processes have been of the type that tend to normalize the amounts of manufacturing expenses. This condition will exist only where the flow of production is even and automatic. Only if such regularity of production exists is a predetermined overhead rate unnecessary. If the production work is not

produced uniformly throughout the accounting period, production costs will fluctuate from period to period unless a predetermined rate is used. Where a predetermined overhead rate is not used, the credit for the charge to Work-in-Process would be to Manufacturing Overhead Control instead of to Applied Manufacturing Overhead and would consist of the entire amount.

As far as recording the applied manufacturing overhead is concerned where a standard cost system is used, the journal entries will be essentially the same as those thus far discussed and illustrated. In most cases, however, an additional debit or credit item representing the efficiency variation will appear in the over or underabsorbed balance of the account. The treatment of manufacturing overhead variations is the subject of Chapter V.

CHAPTER V

DISPOSITION OF THE OVER OR UNDERAPPLIED MANUFACTURING OVERHEAD

The question of disposing of the over or underapplied manufacturing overhead should be considered under two classifications relating mainly to the type of cost accounting system employed. For the purposes of this classification, only two divisions are necessary, one for non-standard burden rates and one for standard burden rates. In every plant there will almost always be a debit or credit balance in the Manufacturing Overhead Control account, regardless of whether or not a standard burden rate is used. The distinction is made between non-standard rates and standard rates because the accountant has more opportunities for careful analysis of the over or underapplied manufacturing overhead in situations where standard rates are used and can obtain more pertinent information as a result of analyzing the balance in the Manufacturing Overhead Control account.

Procedure Under Non-standard Burden Rates.

The most common method of disposing of the over or underapplied overhead is to close it into the Cost of Goods Sold account. If the accounts are not closed monthly, the balance of over or underapplied overhead is carried forward monthly. When this procedure is followed, the overapplied amounts tend to offset the underapplied amounts. At the end of the fiscal period, the resulting balance is closed to the Cost of Goods Sold account. This procedure is easy to apply, is convenient, expedient and widely used, but it cannot be regarded as theoretically correct, because some of the over or underapplied manu-

facturing overhead so dealt with may apply to work still in process, or to goods in the finished goods inventory. This method is defended on the ground that it is practical and that, if the cost accounting system is reliable, the amounts debited or credited to the Cost of Goods Sold account will be proportionately small.

Another method, better grounded in theory, though not possessing the benediction of wide usage, is one whereby the balance of over or underapplied overhead is distributed on an equitable basis among Work-in-Process Inventory, Finished Goods Inventory and Cost of Goods Sold. If overhead has been applied to production on the basis of direct labor hours, this would be an acceptable basis upon which to distribute the over or underapplied overhead to the three accounts. The major objection to this method is that it requires more clerical work because adjustments would be necessary on all the cost records to maintain balances with the controlling accounts.

A method quite similar to the first method discussed is quite often used. That is to close the overapplied or underapplied overhead directly to Profit and Loss. A slight variation of this method is to set up an account Overapplied and Underapplied Manufacturing Overhead and then close this account directly to Profit and Loss. Aside from directing greater attention to the amount of over or underapplied overhead, this appears to be unnecessary work.

A procedure advocated by some accountants is to carry the overapplied or underapplied overhead forward at the end of the year as a deferred charge or as a deferred credit. This procedure appears to be contrary to generally accepted accounting principles because overhead is a cost that must be absorbed in the period in which it is

incurred.

There are instances, however, where an adjustment of predetermined overhead rates is desirable and acceptable accounting practice. This situation would develop where, as a result of unforeseen conditions, the predetermined rates are grossly inaccurate. The correction may be made either by a recalculation of rates and adjustment made for the entire period, or a new rate for the remainder of the period calculated on a new estimate of production. The first alternative requires not only an adjusting entry, but the cost sheets for the period must also be adjusted. The latter alternative requires no adjustment, but the unit cost figures under it are not as accurate as under the first method. An example of this situation would be a change in a fixed expense item, such as an increase in fire insurance premiums.

The preceding discussion of methods of disposing of the over-applied or underapplied overhead is representative of most textbook treatment. A closer look at these methods should be revealing. It will be noted that all these methods except one attach the overhead or burden balance in one way or another to product cost. These same textbooks present excellent definitions of fixed expenses and variable expenses, and most of them thereafter forget the distinction. Very few of these textbooks advance the reasonable and truthful contention that idle plants produce no goods, at least, not to the extent that these facts are reflected in the methods they present for disposing of burden balances. It seems only reasonable to assume that a properly determined burden rate will be based on figures that distinguish between the fixed and variable elements of manufacturing expense. Burden or overhead applied on such properly determined rates will automatically

charge product for the cost of capacity used and will leave as a balance in the burden account the cost of unused capacity. It appears ridiculous to attach these balances to the product after going to so much trouble to keep them out of the cost of products in the application of overhead or burden. The balances in the burden account should be analyzed into "costs" and "losses" and properly cleared through the profit and loss account.

Thus far, the discussion has been centered on "how" to dispose of the overapplied or underapplied overhead, but very little has been said about "why" there is such a thing as overapplied or underapplied overhead. It is important that the issues involved be understood. A succinct statement of the importance of overapplied or underapplied overhead is presented in the following quotations:

Whatever the disposition of the overapplied or underapplied manufacturing overhead, the student should attempt to understand the issues involved. These are briefly: (1) The over or underapplied manufacturing overhead indicates to management that an error has been made in the estimate either of overhead or of the volume of production, or both. Management should analyze the causes and, if possible, eliminate them if they affect efficient production. (2) The treatment of the over or underapplied manufacturing overhead affects the statement of profit for the immediate period and for the subsequent period. Therefore, careful consideration must be given to the disposition of the amounts involved. Conservative accounting suggests that a small understatement of profits may be less serious than an overstatement. (3) The fact that there is over or underapplied manufacturing overhead suggests that the unit costs for the period have not been correctly computed. It is assumed, however, that the differences are not large enough to seriously affect the costs. Otherwise, the cost system is a needless expense.¹

The preceding quotation is evidently based on the premise that estimated actual production is the correct way to make a budget. The

¹Neuner, Cost Accounting, p.238

first issue, as discussed in the quotation, would not arise if a budget at normal had been used and adjusted to actual activity. It is worthy of note, also, that no mention is made of the distinction between "costs" and "losses" that should be reflected in any useful analysis of the balance in an overhead or burden account. The contention made in the quotation that unit costs have not been correctly computed is also open to argument. One of the cardinal principles involved in the use of standard burden rates is to provide against fluctuation in unit costs. A budget at normal, adjusted to actual, will produce uniform unit costs as far as manufacturing overhead is concerned.

Regardless of the method employed to dispose of the overapplied or underapplied manufacturing overhead, management should analyze the causes producing the overhead balance. Generally, this task will fall to the accountant and it will be up to him to determine the causes, and, possibly, recommend procedures to eliminate the causes. In cost systems that do not use standard overhead rates, the accountant is somewhat limited in his analysis of the causes of the overapplied or underapplied overhead. He can, however, deduce some valuable information from an analysis of the overapplied or underapplied overhead even in non-standard cost systems. Assume the following set of figures:

Estimated volume for period in terms of machine hours	10,000
Estimated manufacturing overhead costs for period	\$15,000.
Predetermined overhead rate per machine hour	\$ 1.50

Actual Results for the Period:

Actual volume for period in terms of machine hours	11,000
Applied manufacturing overhead @ \$1.50 per machine hr.	\$16,500.
Actual manufacturing expenses for period	\$16,000.

According to the above figures, this firm worked 1,000 hours in

excess of the estimated volume of production. Considered in itself, this would appear to be a favorable variation. This increase, however, should be further investigated and analyzed. It may not, in fact, be a favorable variation as it could be the result of defective work reworked, spoilage or inexperienced labor. It would be necessary to determine if actual volume of output increased accordingly with the increased number of machine hours. If the conditions mentioned along with any other similar factors can be ruled out, then it could be said that the variation was favorable, resulting in a proportionate amount of increased output.

Another factor to be considered in this situation is the increase in the actual overhead expenses over the estimated overhead expenses for the period. Assuming that the actual output increased in direct proportion to the increase in machine hours, it might be inferred that the increase in actual overhead is reasonable. This may or may not be accurate. The variable overhead expenses would probably increase in proportion with the increase in machine hours, but the fixed overhead expenses would not. Any further analysis in this respect would be impossible in this situation because the fixed and variable expense are not budgeted separately. A possible variation due to price changes could be a possibility.

The point to emphasize here is that the accountant should look behind the figures representing the overapplied or underapplied manufacturing overhead. A variation, which on its face, appears to be a favorable variation may very well be a very unfavorable condition. The use of a standard cost system enables the accountant to make a more intelligent and a far more comprehensive analysis of overapplied and

underapplied manufacturing overhead. This demonstration is added evidence of the necessity of distinguishing between fixed and variable expenses for any intelligent analysis of over or underapplied overhead.

Procedures Under Standard Burden Rate.

The importance of overapplied or underapplied manufacturing overhead is further demonstrated by the fact that more types of variations are computed for manufacturing overhead than are computed for either material or labor. In standard cost systems using seven common variations, three variations are computed for manufacturing overhead. These three variations are commonly called the efficiency variation, the capacity variation, and the budget or expense variation.

These three variations are the result of and are made possible by predetermined standard overhead rates for applying overhead and by applying it for standard time to do the jobs done instead of using actual hours. The predetermined unit cost is regarded as the amount which each unit of product should cost and is called the standard cost. Variations are computed as over or under standard.

The use of budgets in computing the predetermined manufacturing overhead rate is discussed in Chapter III. No additional attention will be given to budgeting here, except to point out that in a standard cost system a budget is a prime requirement. Also, it should be remembered that the computation of variations and the analysis of overapplied or underapplied overhead is facilitated by preparing separate budgets for fixed overhead expenses and for variable overhead expenses. It is common procedure in plants using standard cost systems to prepare flexible budgets and to compute predetermined standard unit costs for each level of production, or using one budget at normal which can

be adjusted to what it should be at actual activity.

To illustrate the procedure in accounting for manufacturing overhead expenses from recording the actual overhead expenses to disposing of the overapplied or underapplied overhead in a standard cost system, the following illustrative problem is presented:

Data: Based on data in budget in Illustration 2 for Dept. B.

Direct labor hours:

Standard time for orders put in production	26,800 hours
Excess time used	200 hours
Total	<u>27,000 hours</u>

Manufacturing Overhead:

Manufacturing overhead per adjusted budget (27,000 hours)	\$28,050.
Standard overhead rate per direct labor hour:	
Fixed	\$0.35
Variable	<u>.65</u>
	\$ 1.

Actual manufacturing expenses:

Fixed	\$10,500.
Variable	\$17,950.

Journal entries based on these data are as follows:

(1)

Manufacturing Overhead or Burden	\$28,450.	
Vouchers Payable		\$28,450.
To record actual expenses.		

(2)

Work in Process	\$26,000.	
Manufacturing overhead or burden		\$26,000.
To record applied overhead.		

The manufacturing overhead account will now appear as follows:

Manufacturing Overhead (Burden)			
Actual expenses:		Applied at standard:	
Fixed	10,500	Fixed	9,380
Variable	17,950	Variable	17,420

The analysis of the underapplied balance in the Manufacturing Overhead account will be greatly facilitated because the budget at normal can be adjusted to the actual activity of 27,000 hours. The budget adjusted to actual will reflect what the expenses should be for 27,000 hours of activity. In total, the budget adjusted to actual will be \$28,050 (\$10,500 fixed and \$17,550 variable). In other words, with activity of 27,000 hours, the total expenses should be \$28,050. Applying burden to production in standard amounts at the standard burden rate (full standards) a debit balance of \$1,650 is left in the Manufacturing Overhead account.

The problem now is to analyze this balance and to determine why the actual expenses exceeded the amounts applied to production. This amounts to an analysis of the three variations included in the underapplied balance. Part of the variation can be attributed to the fact that the plant operated for only 27,000 of the practical capacity of 30,000 hours. This variation, called the activity variation, can be calculated as follows:

Possible hours at practical capacity	30,000
Actual hours of activity	<u>27,000</u>
Idle hours this year	<u>3,000</u>
3,000 hours idle capacity at \$0.35 per hour (fixed expense) equals \$1,050, the activity variation loss.	

Another part of the variation results from the fact that the actual expenses incurred exceeded the amount budgeted for the 27,000 hours of actual activity. This variation is commonly known as the expense or budget variation and can be calculated as follows:

Fixed expenses budgeted for 27,000 hours	\$10,500.
Variable expenses budgeted for 27,000 hours	17,550.
Total expense budgeted for 27,000 hours	<u>\$28,050.</u>
Actual expenses incurred for 27,000 hours	28,150.
Expense variation loss	<u>\$ 100.</u>

The remaining portion of the variation is due to inefficient labor, resulting in wasted labor hours. The actual hours spent in making the product exceeded the amount of hours predetermined as the standard time or the time that should have been spent in producing the amount of product which was produced. This variation, called the efficiency variation or burden efficiency variation, can be calculated as follows:

Actual hours used in producing the product	27,000
Standard hours predetermined for the product	<u>26,800</u>
Hours wasted	<u>200</u>

200 hours wasted at burden rate of \$1.00 equals \$200., the burden efficiency variation loss.

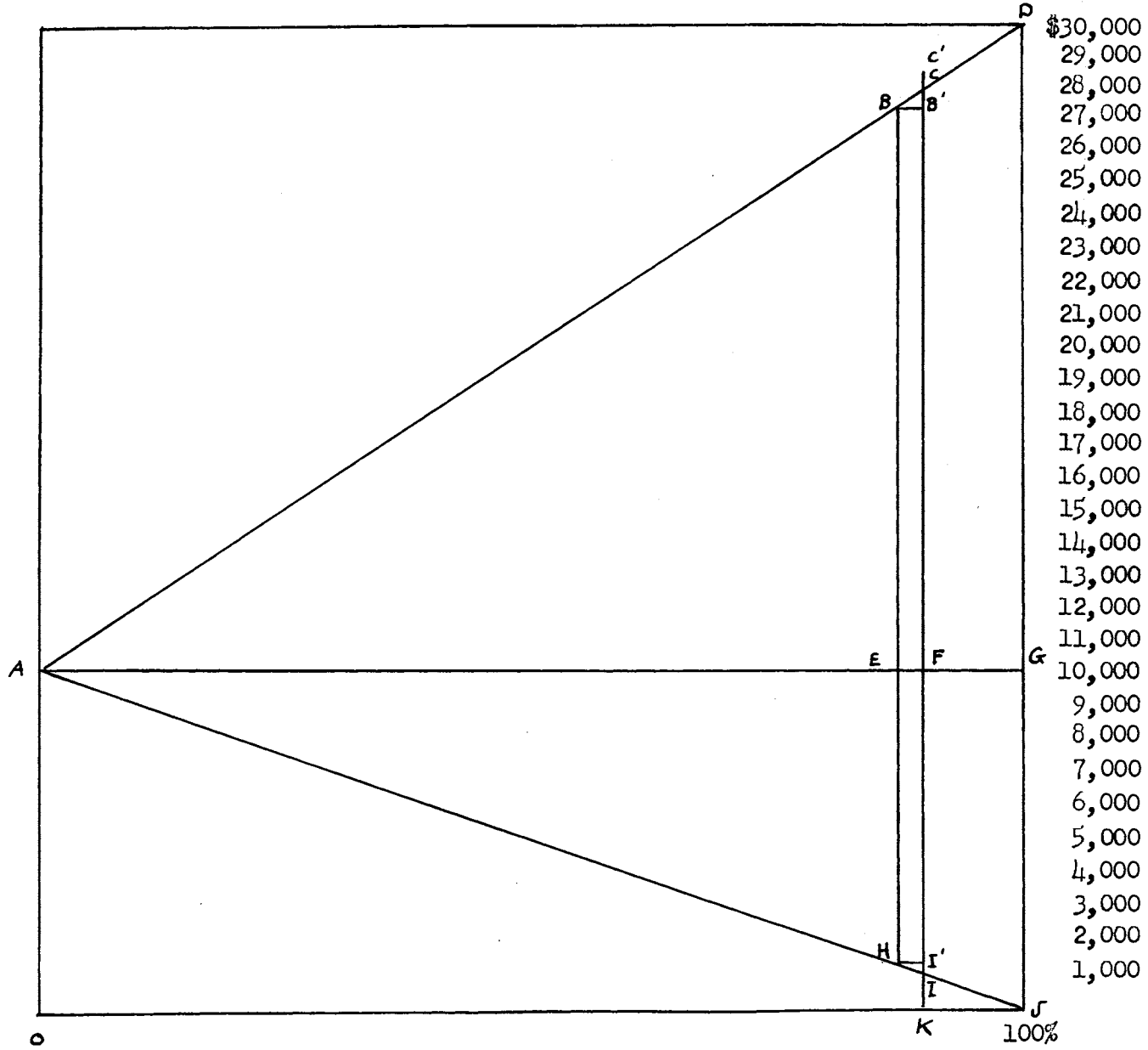
When the underapplied balance in the overhead account has been analyzed, the account should then be closed to profit and loss. The overhead account would then appear as follows:

Manufacturing Overhead (Burden)			
Actual expenses:		Applied at standards:	
Fixed	10,500	Fixed	9,380
Variable	17,950	Variable	17,120
	<u>28,450</u>	Bal. to P&L	1,650
			<u>28,150</u>

Approximately the same results would be obtained from the data in this problem assuming a flexible budget of the graduated percentage of activity type. Using the same data, interpolation probably would not be necessary, as there would very likely be a graduation at 90% (assuming practical capacity as 100%). Basing the problem on a static budget would not produce the same results, because a static budget cannot be adjusted to actual. The results of the preceding problem are displayed graphically in Illustration 7.

Line KC represents the budget adjusted to actual activity of 27,000 hours which shows budgeted expense to be \$28,050. Actual

ILLUSTRATION 7



activity is represented by line KC¹ and total expenses are \$28,450. Line HB represents the standard hours and amount applied to the product cost of \$26,800. Line KI represents the capacity variation loss of \$1,050. It will be noted that this is the amount falling below line AJ and is the amount of unused capacity. The expense or budget variation loss is represented by line CC¹ or \$400, the amount extending above line KC which is the amount of expense budgeted for 27,000 hours. The burden efficiency variation loss being composed of both fixed and variable expenses is the sum of line III¹, \$70., and line B¹C, \$130, total \$200.

The method used in solving this problem is not, of course, the only method of doing so. It appears to be the best method for several reasons. For one reason, it is based on a budget at actual which is easily adjusted to actual, thus furnishing a reasonable and true basis of comparison with the budgeted figure for the actual activity. Another reason is that the method recognizes and maintains the distinction between the fixed and variable elements of the expenses. More important, it attaches to product only those expenses incurred in making the product and recognizes as losses those expenses for which idle capacity is responsible. Furthermore, this method eliminates a great deal of labor by using one budget at normal; by using one single account for actual expenses and applied expenses instead of one account for actual expenses, another for applied burden and another for variations; and by closing the balance of the burden account to profit and loss, where it rightfully belongs, instead of prorating the balance to cost of sales and finished goods, as some methods do. Finally, this method charges product costs to product, and losses to profit and loss, recognizing

throughout that idle capacity produces no goods.

This method is particularly adaptable to use where full standards are maintained. It seems obvious that any other treatment would defeat the purpose of standard costs. Standard costs should be looked upon as "true costs" and any deviations from standard are the results of inefficiency and should be recognized for what they are - losses. If standards are developed with care and revised when necessary, then they are true costs. It is extremely difficult to understand the logic of some methods that maintain standard cost systems and then charge the variations to cost of goods sold.

CHAPTER VI

SPECIAL PROBLEMS IN OVERHEAD DETERMINATION

There are several special problems that deserve consideration in a study of manufacturing overhead costs. This study does not attempt to consider all the extraordinary problems that might arise in accounting for manufacturing overhead costs. An attempt is made, however, to consider the more important problems in this category. The problems presented in this chapter are those which appear most frequently in the literature of the field. The special problems chosen for consideration in this study are as follows:

Interest on Investment.

Replacement Values as Basis for Computing Depreciation of Fixed Assets.

Administrative Expense as an Item of Cost of Manufacturing.

Amortization of Unrealized Appreciation Value of Fixed Assets.

Fully Depreciated Fixed Assets.

The question immediately arises, why should the above mentioned items be of concern to the cost accountant and more specifically, of what importance are these items in a study of manufacturing overhead costs? The answer is the same in both cases. Without exception, the above items are considered by some accountants to be legitimate inclusions in manufacturing overhead costs. Therefore, it is extremely important for the cost accountant to acquire a thorough understanding of these problems so that he may render a proper accounting of manufacturing overhead costs.

These problems will be considered in the order mentioned. This is not to infer that this is the order of their importance. Rather, for the purposes of this study, the order is one of convenience. The rank in importance of any particular one of the problems will depend upon the circumstances surrounding the situation in which the problem is confronted.

Interest on Investment.

Many accountants are quite emphatic in their views on this subject, regardless of the side of the question which they support; however, the majority view seems to be in favor of excluding interest on investment as an element of cost. Since there is a strong minority view favoring the inclusion of interest on investment as a cost, the problem should be investigated further.

Let us assume first that it is proper to include interest on investment as an element of cost. It should also be recognized at the outset that interest on investment is an "economic" concept of interest. Of course, it is immediately necessary to determine how much interest is to be charged as an element of cost in a particular situation. Determining the amount of interest raises at least two problems. First, how much is the investment? One definition of investment is the total assets of a business. Another is the net assets of the business. The choice of just which definition is selected in a particular situation is not so important as the requirement that the same definition of investment be used consistently.

The next difficulty which immediately presents itself in this problem of interest on investment is to determine the proper rate of interest to be charged on investment. There seems to be a tendency to

use 6 per cent. There seems to be little evidence in support of the 6 per cent rate. Interest on investment, according to the economic theory, is supposed to represent the return on investment with a minimum of risk. Certainly, in the light of this definition, 6 per cent is unreasonably high. It would appear that the rate of interest should bear some relation to existing conditions and circumstances.

A major consideration in arriving at a conclusion to this problem is the purpose for which the cost figures are to be used, which is to say that the same set of figures may not be appropriate for all uses. For example, many trade associations favor the inclusion of interest on investment. They feel that more accurate measures of efficiency are provided in this way, particularly as between large and small concerns. To cite another example favoring inclusion of interest on investment would be some situations wherein reports based on inclusion are desirable for purposes of managerial control. A firm operating several plants might use such reports as a more reliable measure of the relative efficiency of each plant.

For concerns that keep their cost records on a statistical basis, the problem is relatively simple. The costs are not recorded on the books; therefore, it is necessary only to include interest on investment in those reports where it is desired to use such interest, and to exclude the interest as an element of cost on those reports in which it cannot appear.

It is probably true that in most situations, there is no need to include interest on investment as an element of cost. It is interesting to note that the Federal Income Tax Division of the United States Treasury does not favor the inclusion of interest on investment as an element

of cost. There is no intention here to advocate that the accounting records should be devised solely to yield information for tax purposes. In the absence of a contrary showing, however, such a procedure should not be overlooked because tax information must be provided one way or another.

In summation, the conclusion to the problem as to whether interest on investment should be included as an element of cost should consider the following points:

1. The question has never been definitely settled.
2. The answer probably lies in the purpose for which the cost figures are to be used.
3. The inclusion or exclusion is a matter of judgment, based on the circumstances surrounding any particular situation.

Replacement Values as Basis for Computing Depreciation of Fixed Assets.

The question as to whether depreciation of fixed assets should be computed on replacement values has been of concern to accountants in varying degrees since the period beginning in 1916. It is probably significant that the question has demanded attention from accountants in direct proportion to the periods of rising prices since that time. Also, it is probably an important observation to note that those in managerial capacity have been the greatest proponents of the proposition that depreciation of fixed assets should be computed on replacement values. At least, it appears to be a safe observation that little or no agitation for the theory was discernible during the depression thirties.

The question here and now is, "should depreciation of fixed assets be computed on the basis of replacement values?" In consideration of this question, the arguments proposed by the proponents of this theory

will be considered first.

One of the first arguments used to support the theory of depreciation based on replacement costs was that by so doing, a possible impairment of working capital would be avoided. The argument was along the line that a manufacturer using fixed assets acquired at less than present replacement cost, and computing depreciation on these values might set his selling prices lower than his competitors who were using fixed assets purchased at a higher cost. The theory was that in the long run, the manufacturer selling at lower selling prices would be unable to replace his fixed assets without impairing his working capital.

Some accountants contend that basing depreciation rates on replacement costs tends to compensate for the fluctuating value of the dollar. These accountants hold that it is unrealistic to use prevailing dollar costs for material and labor and use some prior dollar cost for manufacturing overhead. They say that this procedure is the same as adding two different things in order to arrive at a total of the same thing. Consequently, they advocate that the depreciation cost be brought into adjustment according to value with the material and labor cost. For example, if it presently requires two dollars to purchase the same amount of fixed assets as one dollar purchased when fixed assets were acquired, then the depreciation charge should be based on replacement costs which would double the dollar based on cost at acquisition.

Then we have those accountants who point to "LIFO" methods in inventory valuation as a proper procedure in matching current income with current costs. They advance the proposition that basing depreciation rates for fixed assets on replacement costs would accomplish

the same result for fixed assets. That is, current fixed asset costs would be matched against current income.

Of course, running through all these arguments so far is the idea that depreciation is for the purpose of providing for the replacement of fixed assets. Also, there are some other necessary assumptions, some of which, at least, are peculiar. These questions, however, will be dealt with in a subsequent section when the refutation of these arguments is presented.

The argument advanced more often perhaps than any other in favor of computing depreciation rates for fixed assets on replacement costs is the one based on the economic concept of income. This argument appears to be a reversion to the economic theory about real and nominal wages (economic and monetary wages). The proponents of this theory believe that the same distinction that is recognized as the difference between real and nominal wages should be extended and the same distinction recognized between economic and monetary income of a business enterprise. This theory from here on appears quite involved, but the gist of it is that the economic capital of a business enterprise measured in things, rather than dollars, must be maintained before there is any economic income. The advocates of this theory say that the accountants' concept of depreciation is based on the assumption of stable money, which assumption, they say, is false. Because there is no such thing as stable money, then, the charges to operations must be sufficient to replace the things constituting economic capital; otherwise, there is no economic income and the capital is impaired regardless of what the books may show as monetary income.

The arguments, thus far presented, appear to be a fair represen-

tation of the arguments advanced in favor of computing depreciation of fixed assets on replacement costs. Of course, there are other arguments in favor of this method of computing depreciation on fixed assets, but those presented seem to be the most important. Following, now, the principal arguments opposed to computing depreciation of fixed assets on replacement costs will be presented. The opposing arguments will be presented in the same order in which the initial arguments were presented.

Those opposed to the theory of computing depreciation of fixed assets on the basis of replacement costs as a procedure to prevent the impairment of working capital say, in effect, that this argument understates the ability of the average business man. Any good business man knows that his selling prices must be high enough to provide the funds for replacement of fixed assets, but this does not mean that he must overstate his costs. A merchant would not arbitrarily misstate the cost of merchandise so why should he do so in the case of fixed assets.

It should be pointed out here that at the time this argument was first advanced, the "LIFO" method of inventory pricing had not come into general use. With the advent of the "LIFO" method of inventory pricing, this argument could have very well been combined with the "LIFO" argument.

The argument for basing depreciation on replacement costs to compensate for the fluctuating value of the dollar has never been accepted by accountants. Accountants feel that this argument is based on the assumption that the determination of cost should recognize the changing purchasing power of the dollar. Traditionally, no attempt has ever been made to construct the accounting records in such a manner

that the records would reflect the changing purchasing power of the dollar. It is not contended here that such a procedure would actually be wrong; however, it is obvious that it would be a physical impossibility to apply this principle to every business transaction. Furthermore, consistency would demand that the principle be applied to all transactions and not to depreciation alone.

Most accountants oppose the theory of basing depreciation costs on replacement costs because of the contention that replacement costs of fixed assets are in some way similar to the "LIFO" method of pricing inventories. Fixed assets as compared to inventories are in a quite different category and are purchased for entirely different purposes.

The Committee on Accounting Procedure of the American Institute of Accountants has given much study and consideration to the problem business faces with respect to replacement of fixed assets. Their recognition of the existence of the problem is partially illustrated by the following quotations:

The committee recognizes that business management has the responsibility of providing for replacement of plant and machinery. It also recognizes that in reporting profits today, the cost of material and labor is reflected in terms of "inflated" dollars while the cost of productive facilities in which capital was invested at a lower price level is reflected in terms of dollars whose purchasing power was much greater. There is no doubt that in considering depreciation in connection with product costs, prices and business policies, management must take into consideration the probability that plant and machinery will have to be replaced at costs much greater than those of the facilities now in use.

The committee on accounting procedure has reached the conclusion that no basic change in the accounting treatment of depreciation of plant and equipment is practicable or desirable under present conditions to meet the problem

created by the decline in the purchasing power of the dollar.¹

In general, those who object to the theory of computing depreciation of fixed assets on replacement costs believe that it is neither realistic nor objective to compute depreciation charges in this manner. It is inconsistent to base depreciation on so elusive a thing as replacement costs. What is replacement cost and how can it be determined? Replacement cost is based wholly on estimate and mere conjecture. Injecting such figures into the books will destroy the dependability, reliability and consistency of the financial statements. Accountants cannot condone this departure from the traditional cost principle of financial reporting because they desire to construct financial statements that are definitely and consistently tied to certain objective standards. Because of the great difficulty in ascertaining true replacement costs and the possibility that an asset will not be replaced by a similar asset, most accountants believe that management should explore other possible solutions to this problem.

Administrative Expense as an Item of Cost of Manufacturing.

The question as to whether administrative expense is properly included in the cost of manufacturing is not well settled. Many authorities contend that the primary function of a manufacturing concern is production and distribution of goods and that administration is merely a service. Under this plan, a portion of the administrative expenses ultimately become a part of inventories. Others contend that administrative expenses are more of the nature of selling expenses and

¹American Institute of Accountants, Restatement and Revision of Accounting Research Bulletins (New York, 1953), p. 67.

should never become a part of the cost of inventories.

A decision as to how the question should be answered in a particular situation would depend upon the circumstances including the cut-off point of charging overhead, whether before or after administrative expenses, and the type of cost system in use. The question is presented here because it does exist and at times demands consideration by accountants.

Amortization of Unrealized Appreciation Value of Fixed Assets.

The discussion of basing depreciation of fixed assets on replacement costs indirectly includes the question of amortizing unrealized appreciation value of fixed assets. If one takes the position that it is proper to base depreciation on replacement costs, then he would probably support the writing-up of asset values, and he would be confronted with the question of amortizing the appreciation value. The majority view of accountants is very well stated by the Committee on Accounting Procedure of the American Institute of Accountants:

1. Historically, Fixed Assets have been accounted for on the basis of cost. However, fixed assets in the past have occasionally been written up to appraised values because of rapid rises in price levels, to adjust costs in the case of bargain purchases, etc. In some of these instances companies have continued to compute depreciation on the basis of cost.
2. When appreciation has been entered on the books income should be charged with depreciation computed on the written-up amounts. A company should not at the same time claim larger property valuations in its statement of assets and provide for the amortization of only smaller amounts in its statement of income. When a company has made representations as to an increased valuation of plant, depreciation accounting and periodic income determination thereafter should be based on such higher amounts.²

²Ibid., p. 73.

This is not, as it may seem, a contradiction of the Institute's position on this question. There are some conditions under which it is proper to write up the value of fixed assets. An example would be the write up of fixed assets in connection with a corporate reorganization or a quasi-reorganization. The point is made that where fixed asset values have been written up, then depreciation and amortization should be based on the new values.

Fully Depreciated Fixed Assets.

Quite often fixed assets outlast their estimated period of usefulness and are kept in use after they no longer have any value as reflected by the books. If such fixed assets are kept in service it is apparent that the provisions for depreciation were excessive. Accountants are not in general agreement as to the proper procedure in these cases.

Some accountants advocate leaving both the cost of the asset and the reserve for depreciation on the books and simply make no more charges for depreciation. Others believe that the accounts should be cleared from the books and that the asset be set on the books at a nominal value to serve as a record that the asset is still in service. A method advanced by other accountants is to indicate by a footnote on the balance sheet the cost of fully depreciated assets still in service.

Other accountants take the position that the prior estimates for depreciation were in error and should be corrected. They would make a new estimate of the useful life of the asset, adjust the reserve account through the Earned Surplus account and continue depreciation charges on the new estimate at the revised rate.

None of these procedures is entirely right or entirely wrong.

They do serve to emphasize the fact that the question does arise from time to time and serve as an illustration of the importance of making the best estimations possible when setting up depreciation estimates. It might be noted here that, for income tax purposes, no additional depreciation charges are allowable for fully depreciated fixed assets.

CHAPTER VII
SUMMARY AND CONCLUSIONS

Summary.

The purpose of this study was to examine the methods of accounting for manufacturing overhead expenses. The procedure followed was one of reviewing current thought on the subject and then choosing the one or two methods which seemed best. Wherever possible, the chosen method is defended. The research conducted in this study was confined to the library type of research. The order in which the component parts of the study are presented follows, as nearly as possible, the natural sequence with which manufacturing overhead expenses are treated in practice.

The emphasis in this study is not on the number of methods or the variety of methods, but rather on the implications involved and the effect of various methods on burden rate determination. Therefore, cost bookkeeping is not of great concern in this study; rather, those segments of cost accounting which have influence, direct or indirect, on burden rate determination are the principal items of concern in this study. Underlying the effect of any particular method on burden rate determination is the problem of distinguishing "cost" from "loss."

Throughout this study, the problem of "cost or loss" is given consideration from the original assembling of the estimated manufacturing expenses in the budget to the final disposition of the balance in the budget account. The study is concerned with useful classifications of manufacturing expenses, intelligent analysis of expenses

into their fixed and variable elements, the choice and use of workable budgets, proper burden rate determination, sensible burden application and reasonable disposition of the overapplied or underapplied overhead.

Methodology is not accepted as proper in this study simply because it may happen to be popular with a majority of writers. The yardstick applied to various methods is according to the description of matters of concern mentioned in the preceding paragraph. For example, is a particular expense really a semi-variable expense or can it be analyzed into its fixed and variable elements; and, does a burden rate distinguish between cost and loss.

Special problems in overhead determination are included in this study because they are of concern to cost accountants and, at times, may affect burden rate determination.

Conclusions.

Accounting for manufacturing overhead is much more difficult and presents many more problems for the cost accountant than any other segment of cost accounting. Much has been written on the subject and various theories and methods for the treatment of manufacturing overhead have been advanced. There is a wide range of opinion among cost accountants on the various treatments of this item of cost. It does seem possible, however, to choose some useful methods and procedures with which an intelligent procedure can be directed toward the treatment of manufacturing overhead expenses.

Taking first things first, manufacturing expenses should be properly classified. The conclusion derived from this study is that the classification should be useful in the determination of a proper bur-

den rate. The most useful and the most important classification, in this respect, is the classifying of the expenses into their fixed and variable elements. It is at this point in the procedure that the cost accountant must become cognizant of the problem of "cost and loss," a problem he must face throughout the entire procedure if he expects useful results.

The choice of the type of budget used is extremely important for intelligent analysis of burden balances and for comparison of actual expenses with those budgeted. It appears that ample evidence is presented in this study to indicate the advantages of the one budget at normal. It seems ridiculous to prepare multiple budgets when one budget at normal will provide for all ranges of activity merely by adjusting to the actual activity.

There is probably more divergence of opinion among cost accountants on the interpretation of normal capacity than any other phase of the treatment of manufacturing overhead. This is probably because of the fact that many cost accountants persist in their belief that all fixed expenses must somehow be attached to the cost of the product. There appears to be sufficient evidence that this is an untenable position. Certainly, it is obvious that idle plants produce no goods. Normal capacity as represented in this study by practical capacity appears to be the only reasonable and logical concept of normal capacity. Burden rates based on practical capacity attach to the product all the expenses incurred in making that product and recognize as losses all the expenses incurred by idle capacity. It is readily apparent that a burden rate, so determined, is the only one that will reflect true cost.

Given the amount of estimated manufacturing expenses and the normal

activity (practical capacity), what shall be the basis or bases of application of these expenses to production? It must be recognized that all manufacturing expenses are either time expenses or action expenses. The base chosen for the application of burden must be one that measures both of these factors. The direct-labor hour method is a good measure of both these factors and in most cases is the better method. There are cases where some other method would be better. For example, in a department where the work is done mainly by machines, labor being of secondary importance, the machine-hour method would apply burden more accurately than the direct-labor hour method. There are very few cases where a dollar cost method will yield as accurate results as either the direct-labor hour method or the machine-hour method because wage rates are seldom uniform throughout a department. The simplicity of application of any particular method should not receive undue consideration if the base will not yield accurate results. For most practical purposes, the direct-labor hour base appears to best fulfill the requirements of a good application base.

At the end of the accounting period, the cost accountant must analyze the balance in the burden account. There are various methods of making this analysis and the question arises as to which is the best variance analysis. It seems obvious that the best method will be the one which yields the most useful information. If a static budget is used, the variations are likely to be of little use and may even appear ridiculous unless actual activity is very close to the budgeted activity. Because a static budget does not lend itself to adjustment to actual activity, the comparisons are most likely to be with figures that bear little relation to actual figures. All of these disadvan-

tages can be eliminated through the use of a flexible budget or one budget at normal. Some methods compute only two variations, the controllable variation and the volume variation. The disadvantage of the two-variation method is that it buries the burden efficiency variation and is not as useful as the three-variation method. The best method for all practical purposes is the three-variation method used in conjunction with one budget at normal based on practical capacity. Then the expense variation will reflect the difference between actual expenses and what expenses should have been at that level of activity. The capacity variation will show how much of the capacity is being used in the actual production of goods and how much is being carried along as idle capacity. The burden efficiency variation reflects how much time is wasted by comparing the time used with the standard time allowed for the work done. It appears that this method makes sense and yields useful and intelligent information to management for control purposes.

The final decision regarding manufacturing overhead is the disposition of the final balance in the burden account. The usual case will be a debit balance in the burden account as a credit balance generally indicates the need for adjustments in the budget or burden application rate or both. If the debit balance in the burden account is recognized for what it really is, then there should be no problem regarding its disposition. If it is recognized that idle capacity produces no goods, then it should be equally obvious that to charge the cost of idle capacity to cost of sales overstates the cost of the product. In the final analysis, it is the distinction between cost and losses that must be recognized. The profit and loss account

is the proper place for losses.

The manner in which manufacturing expenses are treated, the choice of the type of budget, burden rate determination, variance analysis and the disposition of the burden balance all affect the unit costs of product. The use of unit costs is important to management for control purposes. To tell management that costs are increasing or decreasing without relating to increases or decreases in cost to the quantity of production is not very useful information. It is quite a different story to tell management that unit costs are increasing or decreasing and include reasons explaining the change. The unit costs should be true costs, as nearly as possible, and it is the responsibility of cost accountants to use methods and procedures which will yield such costs.

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