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Outline of bases to be used in predetermining costs for guidance as to sales policies

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AN OUTLINE OF
BASES TO BE USED IN
PREDETERMINING
COSTS
FOR GUIDANCE AS TO
SALES POLICIES

PUBLISHED BY
THE COTTON-TEXTILE INSTITUTE, INC.
320 BROADWAY, NEW YORK CITY
August, 1928.

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CONTENTS

COPY OF LETTER OF TRANSMITTAL	1
AN OUTLINE OF BASES TO BE USED IN PREDETERMINING COSTS FOR GUIDANCE AS TO SALES POLICIES	6
INTRODUCTION	6
Definitions of Cost	6
NORMAL PRODUCTION	8
Guard against tendency to overstate and consequent underestimate of cost	8
Reasons why production is under theoretical maximum	9
Normal production for day and night operations	11
COTTON AND WASTE	13
Should be replacement cost	13
Method of ascertaining cost of Cotton and Waste	14
Sales of waste should be credited to cost	17
DEPRECIATION	17
Must be allowed for all the time	18
Must be increased for day and night operation	19
INTEREST ON INVESTMENT	19
Items included in Investment	19
Inclusion is justifiable and important	20
Indispensable to know relative cost of each fabric or yarn	21
MISCELLANEOUS QUESTIONS OF LABOR AND OVERHEAD	22
Labor	22
Supplies must not be treated as capital expenditures	23
Salaries	23
Starch and size	23
Fuel consumed	23
Rents	23
Taxes	24
Idle machinery	24
Selling expense	24
PREDETERMINED BUDGET	24
General method of preparing and using	25
ASSIGNMENT OF COSTS TO DIFFERENT PRODUCTS	26
Essential to sound results	26
Examples of incorrect methods	26
Unsoundness of averages per pound or per yard of average yarn numbers	27
Failure to assign pay roll costs properly	29
Erroneous methods of assigning overhead	30
PROPER DISTRIBUTION OF OVERHEAD	34
RECONCILIATION OF PREDETERMINED COSTS	35
GENERAL	37
Standard weight	37
Profit or loss per spindle and per loom	38
Cost records	38
Revision of cost system	39

**LETTER OF TRANSMITTAL ADDRESSED
TO MILL EXECUTIVES**

August 30, 1928.

Dear Mr ———:

Careful study and repeated discussion with mill executives, selling agents, cost engineers and others interested in the subject of costs convince me that one of the most important ways to promote the cotton textile industry will be to encourage a thorough-going reexamination by each mill of its cost finding methods.

Many mills have sound and complete and accurately applied cost finding systems. But the methods of many other mills fall far short of giving them trustworthy information as to their costs. If every mill will carefully reexamine its own methods, and in doing so will test them by certain fundamentals set forth in the enclosed outline, I believe that many will find it to their advantage.

The attached Outline is the outgrowth of the views expressed at a series of meetings conducted by George W. Duncan, the Institute's Cost Engineer, and attended by the cost representatives of the mills participating in the Narrow Sheetings, Wide Sheetings, Print Cloth, Carded Yarn, Osnaburg and Chambray Groups of the Institute. These views support, with a close approach to unanimity, the bases set forth in the Outline. Mr. Duncan has also discussed this matter with a great many individual mill executives and cost representatives, including many in branches of the industry not

yet organized into Groups. In addition, this Outline has been examined and approved by Joel M. Barnes and Ralph E. Loper, Textile Cost Engineers, and by Price, Waterhouse & Company. Mr. Duncan and I believe the Outline to be sound and recommend it to the mills.

This Outline is not a detailed cost manual, but is confined to developing what are regarded by the Institute and its advisers as proper basic principles. If a mill decides that its cost finding system calls for revision, the appropriate steps to that end will have to be taken by cost finding experts either in or outside of the mill's organization. Our Cost Engineer, while not in position to install new or revised cost finding systems, will be glad to answer questions and render any assistance within his power.

We shall welcome your views, suggestions or inquiries. In fact, we shall welcome any attitude but that of indifference to this vital phase of a work which is the opportunity and responsibility of the mill executives.

The Manufacturer who reexamines his cost finding methods should, in the light of the attached Outline, ask himself the following questions, and if he has to answer any of them in the negative he should further ask himself whether he does not owe it to his mill and to himself to consider the revision of his methods accordingly.

“Am I using cost finding methods that are intended to show separately the cost of each number or construction before I make it?”

“Am I using a sound and accurate figure for ‘normal production’?”

“In quoting prices for my product, am I employing proper replacement costs for cotton and other raw materials, with accurate determination of net waste?”

“Am I making due allowance in my predetermined costs for depreciation every year?”

“Am I making due allowance in my predetermined costs for interest on investment?”

“Am I assigning my maintenance items to operating costs, (and not to capital account)?”

“Am I assigning my labor and overhead accurately to the different products of my mill?”

“Am I free from the charge of assigning important items of my costs on bases of ‘averages’ which produce misleading results?”

Unless these questions can be answered in the affirmative, it is likely that the cost finding methods of the particular mill are producing misleading results to the confusion of its officers and selling agencies in their sales policies and to the detriment of the best interests of the mill.

I am aware that some mills and their selling agencies use the argument that costs are not of importance in determining sales policies because after all the mill must sell at the prices fixed by its competitors. But one of the principal reasons why competitive prices so frequently fall short of returning a new dollar for an old one is that far too many mills and their selling

agencies seem to leave costs too much in the background when determining their sales policies. The argument that costs are lost sight of when it comes to making prices is a good reason for making a beginning to look at the costs rather than a good reason for continuing to disregard them. It must also be remembered that large buyers employ "rule of thumb" methods to estimate costs and in doing so are likely to overlook important elements of costs and resolve any doubts in their own favor, with the result that they do their trading on the basis of their own underestimates of costs. One of the most constructive steps that can be taken for the industry will be to get the individual mills and their selling agencies to keep costs, accurately figured, always in the foreground, rather than in the background or entirely out of sight and out of mind, when sales policies are being considered.

Figures developed by sound cost calculations are the only way in which a mill and its selling agents can know the comparative costs of the different yarns or fabrics it makes or proposes to make, and the relative degrees of profit or loss attaching to these different products.* Without this knowledge a mill may continue to make less profitable products and its selling agency may continue contented to sell them at prices disproportionate to their costs. The only argument to justify a policy toward cost methods which keeps the mill and its selling agency in ignorance of the true cost of every particular is the old idea that "ignorance is bliss"; but a

*One of the most important features in ascertaining the comparative cost of different products is the inclusion of depreciation and interest on investment in the cost figures all the time and the due allocation of these items to the different products made.

successful mill business can not be based, in the long run, upon any such principle.

A further advantage of sound and accurate cost figures is that they afford an invaluable guide to the efficiency of the mill organization and aid in bringing to light inefficient or less efficient methods which otherwise might be lost sight of. The opportunities in this direction will be greatly increased by the development of uniformity in cost bases and methods. Indeed this will afford an opportunity, if any group of mills so desires, for arriving at the average cost accounting results for that class so that each mill may gauge its own efficiency by comparison of its own results with the average results for the group as a whole. But even though mills may not desire to join in making such comparisons, each mill which is now without an adequate cost finding system will find its own adoption of such a system an important additional check respecting its efficiency.

We shall greatly appreciate it if you will keep us advised as to your conclusions and as to the steps, if any, you desire to take. We stand ready to render any assistance within our power.

Very truly yours,

WALKER D. HINES,

President.

AN OUTLINE OF BASES TO BE USED IN PREDETERMINING COSTS FOR GUIDANCE AS TO SALES POLICIES



THE following Outline deals with some of the more important problems relating to the proper computation of predetermined costs for guidance as to sales policies.

Costs may be either:

(a) **Ascertained costs**, that is, computed after the event when the actual expenditures are known. This type of costs is excellent for some purposes but is useless in a cotton textile or other mill when the need is for costs that will form bases upon which to fix selling prices.

(b) **Predetermined costs**, that is, costs that are computed before the products are manufactured and based upon a careful estimation of the expenditures which will be required to produce an agreed volume of goods. Predetermined costs are usually less expensive to compute and, if compared and verified with the actual expenditures at frequent intervals, are sufficiently accurate for practical purposes.

The first essential of any cost method is that it shall make proper provision for every element of cost or item of expenditure. This statement is so self-evident that it would be unnecessary to make it were it not for the fact that in many cases cost methods are incomplete

and fail to show the full cost of the products produced. In computing costs for guidance in making sales in the cotton textile industry, the following elements must be provided for and must be dealt with in relation to a proper figure for the total yards or pounds which will probably be produced and which is discussed below as "Predetermined Normal Production":

1. **Materials** that enter directly into the product. Cotton is the principal one, of course, in the industry now under consideration, and this and other direct materials should be charged into cost at the current market price of the quantity required.
2. **Total Labor.***
3. **Overhead.** These are for the most part made up of items which are less directly related to the product and therefore must be prorated over the costs of the product upon an agreed basis which should be as closely as possible related to the particular product. For present purposes management and sales expense should be included in overhead expenses.
4. **Interest on Investment.** When a mill has costs which include with a reasonable degree of accuracy this fourth element, it can proceed with assurance in making sales. Of course it is not intended that the ascertainment of costs should in itself fix selling prices, but the management of the mill should know when it is selling upon a basis of a profit over and above its cost, including interest on investment, and it should also know when it is selling below such cost.

* See page 22 for definition of "Labor."

PREDETERMINED NORMAL PRODUCTION

Since the object is to predetermine the cost per yard or per pound, it is necessary to have a trustworthy figure of the total yards or pounds which probably will be produced. In other words, we must have a trustworthy figure of production to be assumed as normal and employed as the divisor in our calculations in order to arrive at the cost per yard or per pound. This figure is called the normal production, and is a vital factor in cost predetermination.

When a mill comes to decide upon a proper figure of normal production for this purpose, it has to combat what seems to be quite a natural disposition to assume a volume of production in excess of the normal volume actually produced theretofore, and in excess of the volume which in the light of experience the mill can reasonably count upon producing on the average in the future. The mill needs to be on its guard against this tendency, which, if followed, will result in an underestimate of costs.

If the experience of a mill and also its reasonable businesslike prospects for the future indicate that its actual production is and will be at the rate of 75 per cent of its total maximum theoretical production, it is this 75 per cent which should determine the figure to be employed as its normal production in computing its predetermined costs. If instead of this the mill employs 100 per cent of its total maximum theoretical production as the figure to be used, the result will be that the mill's costs per yard or per pound will be understated as to many important items by 25 per cent and

the mill will be deceiving itself accordingly in relying upon its predetermined costs. If, as is more likely, the mill assumes as its normal production a figure less than its maximum theoretical production but nevertheless substantially in excess of its actual production, past and prospective, it will commit the same error but in a less degree. For example, if a mill assumes that its production is 90 per cent of its total theoretical maximum capacity but in fact its production is only 75 per cent thereof, the result is that it underestimates its costs as to many important items to the extent of $16 \frac{2}{3}$ per cent.

Experience must convince the mill that it does not in fact produce for the full fifty-two weeks in the year and at 100 per cent of its theoretical maximum capacity for every one of those weeks. Many causes contribute to actual production being considerably less. Among these causes are the inevitable stoppages of spindles and looms, and other stoppages due to mechanical conditions or labor interruptions, all of which, though only partial and temporary, operate to cut down the actual production per year. Above all such conditions the mill must also allow for the fact that production will likely have to be further diminished in order to avoid overproduction and surplus stocks of merchandise which would demoralize the market. The need of adjusting production to keep it in balance with demand is receiving increasing consideration, for it has become increasingly apparent that if the cotton textile industry runs continuously at anywhere near its full capacity it will so far exceed the demand for cotton goods as to create a condition of the utmost demoralization. It is

important to weigh all these elements in a practical, businesslike manner and in that way arrive at a sound estimate of normal production. Without this the cost per pound or per yard will be inaccurate and the strong probability is that it will be underestimated.

The figure decided upon as normal production has little if any bearing on the cost per yard or per pound of those elements of cost which generally vary directly with the volume produced, e.g. direct labor and a part of indirect labor, starch and size, mill supplies, etc. This is true because the amounts included in the budget for these items are built on the assumed normal production so that if the normal production is high these items of course are correspondingly high, and vice versa, with the result that the cost of these items per yard or per pound would not be put down or put up by the amount of normal production.

But there are other important factors which do not vary directly with the volume produced, e.g. a part of indirect labor, fuel for heating and fire protection, minimum contract clause in power contracts, mill repairs, taxes, insurance, salaries, depreciation, interest, etc., and such elements of cost are incurred independently of the fact that the normal production decided upon is large or small. The result is that the amounts of these latter elements of cost included in the budget are fixed, and the cost per yard or per pound will be put down or put up by the quantity of normal production. For example, if a mill shuts down for two weeks and runs during the other fifty weeks in the year, the elements of cost which are fixed are incurred for the two weeks the mill does not run. These amounts of

cost for the two weeks the mill does not run must be assigned to the production made during the fifty weeks in the year the mill does run, or they will not be given any consideration at all.

It is extremely important to avoid overestimating normal production because the resulting underestimate of predetermined costs is likely to lead to an unsound merchandising policy and the disadvantage suffered in this respect is not likely to be corrected afterwards. Even though subsequently the mill, by reconciling its predetermined cost with the cost thereafter deduced from actual operations, can make a correction as a matter of form on the face of its records, this correction can not wipe out the unfavorable effects as to prices which have been made in the meantime on the basis or under the influence of an underestimate of costs.

A special question arises as to some mills habitually running day and night. In some instances mills of this character elect to predetermine their costs by adopting a forecasted budget of cost based only on their day run and by assuming a normal production with reference only to their day run. Other mills running day and night prefer to use as a cost budget their forecast of costs of both day and night runs and to use as their normal production their forecast of normal production for both day and night. Experience indicates, however, that the difference between these two methods is surprisingly small, sometimes varying only about 2 per cent i.e. the computations based on day and night runs being only about 2 per cent less than the computations based on day run when proper consideration is given to all factors which enter into the

computations. In connection with this difference, the following factors have a marked effect on the total result:

- (1) Increase for labor due to a premium of 10 per cent in wages paid to the night workers.
- (2) Increased maintenance expenditures for supplies and repairs due to the continuous operation of machinery and the divided responsibility of the day and night shifts.
- (3) Increase in power charges due to the continuous operation of machinery.
- (4) Increased depreciation on the machinery and equipment required for night operations.
- (5) Increased maintenance and interest on investment for the extra tenements required for night operatives.
- (6) Increased carrying charges on the extra raw materials and inventories required by night operations.
- (7) Decreased production per unit of equipment per hour on the night shift.
- (8) Increased allowance for defective product or irregular goods due to the inferior work produced during night runs.

The object to be accomplished is to arrive at the most accurate predetermination of costs in the light of actual experience as to volume of goods produced and as to the probability of the market being able to absorb the production where a mill runs both day and night. The use of production and costs for both day and night runs would appear to give the more accurate results but, as indicated, the difference between the two methods is comparatively small.

COTTON AND WASTE

Replacement cost, instead of book value, of cotton and waste should be used in the predetermination of costs for use in determining sales policies. In view of the fluctuating prices for such raw materials, a sound policy on this point is of the greatest importance. A mill is justified in assuming that the raw materials it uses have the market value current at the time of sale of its product and indeed the mill can not proceed with confidence and accuracy upon any other principle. If at the time a mill decides to sell its product, raw cotton has a market value of 15 cents, that should be regarded as the cost that the mill will put into the product, and this should be true whether at some preceding time the mill had bought that cotton for either 20 cents or 10 cents. The profit or loss the mill may have sustained on raw cotton between the time of its purchase and the time of sale of its product can not correctly be regarded as affecting the true value of the raw materials as of the date of sale. Not only is this sound from the standpoint of the facts, but it is highly important from the standpoint of merchandising policy because any other method involves the mill in misleading itself as to the significance of the cost of the raw materials with reference to the price of the product. If at the time of sale of its product the raw material has declined in price since its purchase, the mill can not on that account get a price for its product which will reflect the higher price it paid at an earlier date for its raw material. The mill must yield to the prevailing price levels of the market and these almost invariably reflect any declines that may have taken place in the

price of cotton. If at the time of sale of its product the raw material has increased in price, the raw material is worth *as material* that present value and if the price of the product reflects, as it should, the current value of the raw material the mill should not omit to profit by that condition. It may be true that very frequently the price of cotton products fails to reflect the increase in the price of cotton, but the mill should not accentuate that unfortunate tendency by deliberately disregarding the fact that, at the time of sale of its product, the product should be charged with the then value of the raw material. If a mill disregards the replacement cost of cotton at the time it sells its goods and seeks to predetermine its costs on the basis of what it theretofore paid for cotton, it not only disregards the fact as to what it could get for the raw cotton if it sold it instead of making it into goods, but it also commits itself to a rule of cost predetermination which will tend to affect it injuriously whichever way cotton prices move; if the price of cotton declines, market conditions will compel reduction in the price of the goods despite the fact that the mill may compute its predetermined costs on the book value of cotton; but if the cost of cotton increases, the mill's policy of predetermining costs will not only have no tendency to promote the mill's position as to the price of its goods, but will have the directly opposite tendency through understating the true cost of the cotton going into goods, as that cost stands on the date of such sale, and will encourage the mill and encourage the trade to act upon an underestimate as to such cost.

Methods of Arriving at the Costs of Cotton, Waste, etc. in Products. Even aside from the prices at which

the cost of raw material shall be computed, reasonable accuracy is called for in determining the percentages of net waste made on the different kinds of cotton used and, as a result, the cost of materials used in the finished products. Since many mills use different methods for these purposes, simple examples of proper calculations follow:

COST OF COTTON IN PRODUCT

N. Y. December Futures Contracts	21.00¢
Basis50 on
	21.50
Cost of Raw Cotton F.O.B. Mill	21.50
Allowance for Net Waste (12.24%)	3.00
	24.50¢
Cost of Cotton in Product	24.50¢

NOTE: In arriving at the cost of cotton in product the price of raw cotton F.O.B. mill must be divided by .8776 (1.0000—.1224%).

The above percentage of net waste pertains only to mills making products from carded stock as distinct from products made from combed stock. In the latter case the percentage of net waste, of course, would be greater.

Sometimes mills make the mistake of multiplying the average price of the raw materials, 21.50¢, by the percentage of net waste, 12.24 per cent, whereas the true method is to divide the average price of the raw materials by 1.0000 minus the .1224, or .8776. The former erroneous method would produce a result of 24.13¢ (assuming the price of raw cotton was 21.50¢) whereas the true method would produce a result of 24.50¢. The effect of employing the erroneous method is therefore to understate substantially the cost of the raw materials.

Attention is called to the following example of a correct calculation of the per cent of net waste made:

Stock in process beginning of year (January 1st)	89,000 lbs.
Plus total cotton opened during year	1,394,000
Plus Purchased Yarn	63,000
TOTAL AVAILABLE	<u>1,546,000</u>
Less stock in process end of year (Dec. 31st)	83,000
COTTON AND YARN USED DURING THE YEAR	<u>1,463,000</u>
Less all cloth produced	<u>1,262,000</u>
Less yarn sold	none
Gross Waste Made	<u>201,000</u>
% GROSS WASTE (201,000 ÷ 1,463,000)	13.73%
Amount received for waste sold \$5,375.	
At 21 ½¢ it would purchase 25,000 lbs. of cotton	
Therefore:	
(201,000 lbs. — 25,000 lbs.) =	176,000 lbs. net
(1,463,000 lbs. — 25,000 lbs.) =	1,438,000 lbs. net
% NET WASTE (176,000 ÷ 1,438,000) =	12.24%

NOTE: Where two or more different kinds of cotton are used by a mill, it will be necessary to amplify the calculation given above in order to determine the correct waste allowance on each kind of cotton.

There are two percentages of waste figures used generally by mills. These are (1) the percentage of gross waste which is the result of a computation which does not include the amount received from the sale of waste and (2) the percentage of net waste which is the result of a computation which does include the amount received from the sale of waste. (1) should be used only in calculations pertaining to quantity, i.e., if a mill desires to know the pounds of raw cotton required to fill an order, then the pounds of product specified on the order must be divided by 1.0000 minus the percentage of gross waste. (2) should be used as illustrated in the example on page 15, only in calculations pertaining to value in order to arrive at the price per pound of cotton in product.

Since the pounds of actual waste made are an important factor in cost calculations and since they are a definite indication as to the efficiency of the entire mill, the necessity of following carefully the pounds of actual waste made on each process and the percentage of actual waste cannot be stressed too strongly.

The Sales Value of Waste Made. A contract is made generally between mills and waste dealers covering the output of waste made for a specified period, but the amount a mill receives from the sale of waste varies largely with the fluctuations of the price of cotton. On account of this variable amount the mill will receive, it is the policy of some mills to exclude waste credits from costs and to consider such income as a factor of safety. Such practice cannot be justified because it is extremely important to include all expense in costs and it is equally important to relieve costs through all appropriate credits. The amount received from the sale of waste made should be credited to raw materials used (materials consumed) and not to warehouse stocks. In practice the waste credit, so far as predetermined costs are concerned, is treated as outlined on page 16.

DEPRECIATION

Depreciation will be understood to include both depreciation and obsolescence. It is a poor word to use in that it is understood to mean sometimes (1) a lessening of value or sometimes (2) a lessening of operating efficiency. In case (1) normal allowance for depreciation in the early years of operation does not cover the full difference between the original cost of a unit of equipment and its secondhand value. In case (2) operating inefficiency does not ordinarily arise until a relatively late date in the life history of any manufacturing unit. A more accurate definition of what is meant by depreciation as used in accounting is to say that it is the expired outlay upon productive equipment.

There is in point of fact a close resemblance, as fac-

tors in the cost of a product, between expenditures for materials, say cotton, and expenditures for productive equipment. Both are consumed at least in the sense of their useful manufacturing life, in the production of goods for sale. The most striking difference is that in the case of materials, the consumption is immediate, while in the case of equipment, a loom for instance, consumption is relatively slow. In both cases, however, consumption is constant. If accurate records were kept, it would be found that at the end of its useful life, a given item of productive equipment had produced a certain quantity of goods, and by dividing the cost of the equipment, less its salvage value if any, by the number of units produced, the cost per unit would be found of the equipment consumed in its production.

When productive equipment is worn out or becomes obsolete, it must be replaced, and the only safe method for assuring that provision has been made for its replacement is by including in the cost of the goods manufactured a careful estimate of the exhaustion of plant resulting from the production of the goods. As this factor of cost must be determined while the equipment is still in active use, it is necessary to adopt the best estimate that can be made of the probable exhaustion.

It is now well recognized that depreciation constitutes part of the cost of operating a manufacturing industry. Any industry which ignores it or fails to make adequate provision for it, misleads itself as to the result of its operations. The Federal Government recognizes the soundness of including depreciation in the cost of manufacture, and accountants are in agreement to the same effect. If a mill does not include these

items, it fails to keep itself informed as to the costs its sales must cover in order for it to be permanently successful, and if it habitually sells at prices insufficient to cover depreciation it is destined to failure.

Yet it is a well-known fact that many mills exclude depreciation in their costs, except in prosperous years. But a mill should face squarely just what its costs are in unprosperous years as well as in prosperous years, and of course depreciation takes place as much (and perhaps more) in unprosperous years.

The determination of proper percentages for depreciation requires a study of the individual mill, its hours of operation and its working conditions, and must be arrived at in the light of the policy of the management as to repairs and maintenance.*

If a mill should operate at greater than single shift capacity, depreciation on machinery and equipment should be increased. This is the most modern practice and is recognized by the Federal Government.

INTEREST ON INVESTMENT

This item of overhead or capital charge should be included in the computations of costs at a rate of 6 per cent or any higher rate indicated by the current cost of money. Investment is defined as including:

- (a) The investment in the plant after deducting depreciation.
- (b) Inventories of Raw Materials.
- (c) Inventories of Stock in Process.
- (d) Inventories of finished goods.

* As shown on page 23, that policy ought to be to charge all repairs and maintenance to operating expenses and not to capital account.

- (e) Other working capital included in the business, such as cash, accounts receivable, deferred items, etc.
- (f) It should not include outside investments such as stocks, bonds, etc.

There is some diversity of view as to the propriety of including interest on investment, although the modern tendency is unquestionably toward its inclusion as a cost item in arriving at a minimum cost at which sales can be made and the business continue to enjoy reasonable prosperity. For that purpose, certainly a moderate compensation on the capital employed must be taken into consideration as a part of the cost predetermined as an aid to a sales policy. If a mill ignores this item and predetermines its cost in disregard of it, then the mill may sell its goods for prices sufficient to cover all other elements of cost, and still be unsuccessful and unsound as a commercial proposition because it has ignored any allowance for compensation for the capital employed.

The showing of the item of interest on investment is therefore important in order to keep the mill constantly on its guard as to the success of its operations. Perhaps under the stress of temporary commercial influences, a mill may find itself under the necessity of selling its goods at prices which will not cover interest on investment in addition to all other elements of cost. But when a mill does this, it should keep clearly before it the fact that it is doing so, and should know the extent to which its prices are falling below meeting its total costs. The mill will thereby be constantly reminded that if it continues to accept such low prices, and does not find itself able at other seasons to get higher

prices which will offset the failure to get back the cost of investment in the less favorable periods, then the mill is slated for failure. The more constantly the mill keeps this inexorable condition in mind, the better the guarantee against ultimate failure. If a mill does not include this item in forecasting its costs, then it fails to keep itself as constantly and pointedly posted as it ought to be.

An additional reason of very great importance for considering interest on investment as a part of cost for sales purposes is that if a mill makes several different yarns or fabrics an estimate of the interest on the investment as a part of the cost is indispensable in keeping the mill fully informed as to which particular yarns or fabrics are profitable and as to the comparative extent of profit. For example, assume 4.25 yard sheeting and 4.00 yard print cloth are made in a typical, low cost mill operating on a schedule of 110 hours per week. If the cost of each fabric is calculated on a proper basis, it will be found that if the cost per pound for interest on investment is 1.10¢ on the sheeting, the corresponding cost will be 1.92¢ on the print cloth. Thus including proper interest charges widens the difference in costs between the above two constructions by about eight-tenths of a cent per pound.

It may well be that the item of interest on investment should be kept separate from the other items, but it is nevertheless necessary for the mill to make a distribution of the interest on investment to the respective productive departments so that both yarn and cloth may bear their due proportions of this burden. The entry and distribution of interest on investment in the predetermination of costs for sales purposes will

be of course confined to the working sheets employed in computing such cost and will not be carried in the mill's books of account. But this makes it none the less proper to give due weight to interest on investment in predetermining cost as a guide to sales policy.

MISCELLANEOUS QUESTIONS OF LABOR AND OVERHEAD

Labor. In one section of the country it is an established practice to include all salaries and all wages in the figure computed for the total average labor cost per pound. In another section of the country it is an established practice to exclude all salaries and to include only wages of all operatives up to and including overseers in the figure representing the total average labor cost per pound. In the latter case superintendents' and clerks' salaries, whose duties pertain only to an individual mill, are treated as manufacturing overhead while salaries of executives and general supervision are considered as general overhead. Manifestly proper comparisons of the total average labor cost per pound can not be made between the two sections without first analyzing the items included in the above costs and reconciling the figures. Therefore, in the interest of uniformity, the Institute recommends that Total Labor include all wages paid and such is construed to include all items on the payroll from overseers on down. The total amount for labor (direct labor and indirect labor), which should be included in the budget to be used in building up the labor part of the predetermined costs, should be, of course, a wage allowance schedule which conforms with the normal production already decided upon.

Supplies should not be treated as capital expenditures. Not only supplies* and repairs which are commonly known as mill supplies, machinery parts, etc., but also the so-called large supplies and repairs, such as spools, bobbins, reeds and harness, card clothing, painting mill villages, etc., should generally be treated as maintenance expenditures and not as capital expenditures, because ordinarily they do not add materially to the value of the property or increase its productive capacity or appreciably prolong its life, but merely keep the plant in proper and efficient operating condition. This is believed to be the general practice of the mills. The occasional practice of some mills to treat some of these items as capital expenditures is an unsound practice, understating costs and overstating investment without correspondingly increasing the mill's ability to pay a return on the investment.

Salaries should include all employees', not included in labor, and all executives' salaries.

Starch and size should be treated as a supply rather than a material expense; i. e., it should not be treated as a part of or incident to the cost of cotton and waste except in cases where the goods are to be weighted.

Fuel consumed should be considered to mean the net amount after coal sold has been credited.

Rents should be credited to village expense and the net difference in these items should be debited or credited to cost.

* With regard to supplies, it is believed that a central supply store will save money. Requisitions for all supplies issued are advocated. Even with the accurate checking out of all supplies to operations, there will, at times, be errors found at inventory periods. Therefore, the supplies consumed must be the amount resulting from taking the starting inventories, to which are added the purchases, less the inventories at the end.

Taxes should be included in costs including Income* Taxes payable to the Federal or State Governments.

Loss on account of Irregular Goods, seconds, shorts, etc., should be included in the total costs.

Idle Machinery. Machinery which is required for normal production should be treated, even when temporarily idle, as a factor in arriving at predetermined costs, but all machinery permanently idle should be excluded. An illustration of idle machinery which should be taken as a factor in predetermined costs is the following: A mill may be balanced on one or more products, but frequently some other product, within its range, will bring a premium in the current market. The result may be that the mill will change over to the product which yields the greater return. If such change-over is made and if it thereby causes idle spindles or idle looms, the overhead incurred on this idle machinery should be charged to the new product.

Selling Expense. Trade discounts, freight allowed on outgoing products, and selling commissions should be included in the total costs, rather than as a deduction from the gross selling price. This will insure against these items being overlooked (as they frequently are) in comparing costs with prices and will facilitate the promptest and most accurate comparison between costs and prices.

PREDETERMINED BUDGET FOR COST CALCULATIONS

After the figure for normal production has been decided upon, which thereby fixes the amount for labor

* Inasmuch as interest at not less than 6% on investment is being included as part of the cost, it follows that corporate income taxes payable in respect of an income equal to such rate upon the investment should also be included.

and much of the overhead, it then becomes necessary to forecast the total expenditure, exclusive of materials, for the coming year. This should be done as follows:

The labor and overhead items, as reflected by each individual mill's books of account for the preceding year, should be listed in the first column on an analysis sheet of paper containing about 21 columns. In the next column build up the budget forecast for all items for the coming year, taking into consideration, of course, any changes which have been made in the preceding year's figures or any changes which may be anticipated such as a reduction or increase in the price of coal, supplies, etc., or changes in wages, insurance, taxes, salaries, etc. To the total figure built up for the forecast of expenditures, exclusive of materials, for the coming year, add the amount for interest on investment and other items, if any, which should be included in cost computations but which are not entered on the accounting records, thereby arriving at the total anticipated cost over materials. In the next column reduce these yearly figures for the coming year to the amount per week for each item on the list by dividing by 50 weeks or whatever number of weeks per year it may have been decided upon as normal running time.

After the predetermined budget has been completed, each item on it should be distributed to the operating departments on a proper basis* and then the costs of the individual yarn numbers and the different fabrics should be figured. Whenever appreciable changes occur in the price of supplies, coal, etc., or in the cost of labor or overhead items, corrections in the budget reflecting these

* See Assignment of Overhead—Page 34.

changes should be made promptly and the costs should be refigured to allow for these variations. Also if the factors from which normal production has been deduced should change to such an extent as to call for the adoption of a new figure for normal production, the computations respecting costs should again be made so as to reflect this modification.

ESSENTIAL TO ASSIGN COSTS ACCURATELY TO DIFFERENT PRODUCTS

The object of predetermining costs is to afford the management a guide as to sales policy. Since what the management sells is specific fabrics or yarns, each at its own price, it is essential to assign the various costs so as to reflect accurately the cost of each fabric or yarn, and in due relationship to the costs of other fabrics or yarns. Unless this is done, the management is in the dark as to the profitableness or unprofitableness of different products. It would be possible for a mill to include in its costs every sort of cost dictated by correct principles, and in the correct amount, and yet by assigning these costs to different products by incorrect methods the mill might arrive at a substantially incorrect cost as to every product it made. A few striking examples are here cited as illustrative of serious errors of this character, and it is well to emphasize the fact that such errors are by no means infrequent:

(1) A practice still resorted to in some instances is to divide the total expenditures by the actual production in pounds and to assume that this represents the cost per pound; and then to divide this cost per pound by the yards per pound for a particular fabric and to

assume that the result represents the cost per yard for that fabric. This method of course ignores every differentiating circumstance in the business, whereas, at practically every stage of manufacture, the production of every distinct yarn number or construction of cloth involves differences in relative expenditure of labor and overhead. Hence this method is a complete negation of the theory of cost finding except when a mill confines itself exclusively and invariably to the making for sale of a single yarn number or to the weaving of a single construction of cloth.

(2) Other practices, still employed quite frequently, are equally as untrustworthy as are the "average per pound" and "average per yard" methods. One of these is to figure the average yarn number for the mill and assume that the average cost per pound is the cost of those products made from this average yarn number, and then to assume that the cost of a product whose yarn numbers have a different average from the average yarn number for the mill has a certain mathematical relationship to this assumed cost of the average yarn number for the mill. For example, if a mill estimates that it costs on the average $7\frac{1}{2}$ cents to make a product containing 10's yarn, then it should cost twice that to make a product containing 20's yarn, etc. Another mill may estimate that within certain ranges, if the cost of a product containing its average yarn number is so many cents per pound, then for some other product made from yarn which differs from the average number, one-quarter cent per pound should be added for each increase in the count of yarns, or subtracted for each decrease in the count of yarns. These are "rule of thumb" methods which disregard the facts that actually control the rela-

tive costs of different numbers or constructions and no mill should continue to employ them.

Attention is called to the following examples which fairly suggest the extent of error in the results derived from these rule of thumb methods.

In the first case:

Assume the charge per spindle per week for overhead amounts to 3.75¢ and the production per spindle per week on 10's and 20's is 4.74 pounds and 1.93 pounds respectively. The cost, therefore, would be 79¢ per lb. ($3.75 \div 4.74$) on the lower count yarn. On the average yarn number basis the cost would be 1.58¢ per pound for the higher count, whereas in fact the cost would be 1.94¢ per lb. ($3.75 \div 1.93$) on 20's yarn, or an increase in cost of about 23 per cent over the figure indicated on the average number basis.

In the second case:

Take 40" 48x48 2.85 sheeting which may be made from 15's average yarn and 31" 48x48 5.00 sheeting which may be made from 20's average yarn. On the assumption of a variation of $\frac{1}{4}$ cent for each variation of one yarn number, and there being a difference of 5 numbers between the average yarns, the result of this method would be that if, exclusive of cotton, the first fabric cost 10.73¢ per pound, the second fabric would cost 11.98¢ per pound. But, if a

careful survey is made of costs of the typical mill selected for working out this example, and the costs of those two fabrics are computed on a proper basis, it will be found that if it cost 10.73¢ to make the 2.85 construction, then it will cost 14.64¢ to make the 5.00 construction, or an increase in cost of about 22 per cent over the figure indicated on the $\frac{1}{4}$ ¢ per pound differential per average yarn number.

(3) Many mills refrain from the sweeping "average" methods described above in paragraphs one and two, and go to the extent of properly dividing the payroll among the different departments, but then proceed to nullify in large part even this step toward accuracy by failing to assign the payroll costs in a particular department in accordance with the actual relative costs therein. For example, the labor costs in the card room may be figured as an average cost per pound for the card room, disregarding the fact that two or more hank rovings may be made, each of which has a separate cost. Again, the labor costs in the spinning room may not be computed separately, as they should be, for warp yarn and for filling yarn. Again, the indirect labor costs in the weave room (overseer, loom fixers, oilers, etc.) may be figured at an average cost per loom per week for all looms, notwithstanding numerous distinguishing factors, such as narrow and wide looms, common automatic looms and the more complex box looms with various attachments. But in addition to failing to "follow through" the proper assignment of labor costs in the various departments so as to reflect actual differences in costs in different processes in each

department, these mills are likely to fail entirely to make any sound assignment of their overhead costs.

(4) The inadequate and inaccurate treatment of overhead elements is widespread and causes more variance and error in costs than any other single factor. The following erroneous methods are frequently encountered:

- A. Overhead charged uniformly per pound.
- B. Overhead charged uniformly per spindle.
- C. Overhead charged uniformly per loom.
- D. Overhead charged as a percentage of labor cost.
- E. Overhead charged by assuming the mill to be "running on only one style."

A—Charging overhead 'uniformly per pound'—involves the same unsoundness in principle as charging all costs on the 'average per pound' basis above referred to. Some mills maintain that the total expenditures must be gotten back by the sale of product, and, so long as the total overhead is applied, it is immaterial as to what the particular distribution is. But this argument completely disregards the fundamental purpose of cost calculating which is to ascertain as accurately as practicable the relative cost of different sorts of products. Inevitably any 'average per pound' method of distributing overhead will result in burdening some sorts of product too much and other sorts too little and hence will serve as a continuing obstruction to the development of sound sales policies. For example, the cost per unit of product from any machine is dependent upon the rate of production from the machine. If a mill is making both 20/1 and 30/1 yarn, it will on the 20's

get more pounds per spindle and a lower cost per pound. Even when a mill makes one warp yarn and one filling yarn it usually makes fabrics which differ in the sley, pick, or width. The result is, that using the same yarns they get different production from the same loom on various fabrics, and there is a resulting difference in the cost per pound for weaving. Any calculation which averages the results on different constructions ignores all such differences and is certain to be misleading.

B-C—While the basis of figuring 'overhead as a uniform charge per spindle or per loom' is better than treating this burden as a uniform charge per pound of cloth, it too will give misleading costs. To make the distribution of all overhead solely on the basis of spindles is to assume that costs in the weaving department, for example, vary as to the many different sorts of fabrics produced according to precisely the same variance found in the spinning department, whereas this is obviously not the case. Similarly if the total overhead is charged uniformly per loom, the results are also misleading since this assumes that the costs in the carding and spinning departments are distributable in precisely the same ratios as the costs in the weaving department, whereas the burden chargeable to the yarn departments may not have any just relationship to a loom because, on the same type of loom, it is quite possible, with cloths requiring approximately the same yarns, to weave one and a half to two times as many yards of a certain construction as of a different construction. In such instances one fabric would require considerably more preliminary machinery than the other, and no correct allowance is made for this if the overhead is apportioned

only according to looms. If the total overhead charge is distributed uniformly per spindle or per loom the practical results are that the costs of some cloths are figured too low and others are figured too high.

D—Perhaps the most convenient as well as inaccurate and misleading basis for overhead distribution is that of 'overhead charged as a percentage of labor cost.' Such items as the value of buildings and machinery, power required, general supplies, salaries, insurance, taxes, etc., for departments bear no uniform relationship to the labor employed therein. Consider, for example, a weave room which contains both plain and automatic looms. The initial investment for an automatic loom is greater than for a plain loom and an automatic loom requires more supplies, power and floor space than a plain loom and it should, therefore, absorb more overhead. Yet the total labor cost on the automatic loom will be much less than on a plain loom so that if the assignment of the overhead is made on the percentage of labor cost basis, the result will be that the amount of overhead assigned to an automatic loom will be much less than the amount of overhead assigned to a plain loom, whereas the fact would be just the reverse.

E—Another basis which is used to assign the overhead cost to yarns and cloths is that of 'assuming the mill to be running on only one style.' That is, the assumption is made, in order to ascertain the cost for making a particular product, that the mill runs exclusively on that product, and calculations are made accordingly. Then in order to arrive at an estimate of the cost of some other product, the assumption is made that

the mill is run exclusively on the latter, and computations are made on that theory. Of course such a method completely disregards the realities of the case and arbitrarily assumes a fictitious condition which not only does not exist but is not likely to exist. If such a condition should actually come about, it would probably result in throwing the mill out of balance. As an illustration, if a mill contained sufficient machinery to be balanced on 4.00 yard print cloth, it would become unbalanced if 4.10 broadcloth were put on the looms because the spinning department could not produce sufficient yarn to keep all the looms running. On the other hand, if 4.73 filling sateens were put on the looms the spinning production would be in excess of the consumption of yarns by the looms with the result that carding and spinning machinery would be shut down. If the mill were actually running on a single product and if the result of that practice were to involve the stoppage of machinery not required therefor, a true ascertainment of costs would necessitate charging to that product the cost of the machinery-idleness which would be involved if the entire mill ran exclusively on that product. But this concession to accuracy is not made by those who resort to this arbitrary and fictitious method. The only sound method is to deal with the facts as they are and to assign the cost accordingly.

ASSIGNMENT OF OVERHEAD

Since inadequate and inaccurate treatment of overhead elements is a fault common to many mills, a proper distribution of these various items to the Departments of a mill for the purpose of calculating costs for sales policies is given below:

OVERHEAD ITEMS	BASIS OF DISTRIBUTION
Starch and Size	To Slashing Department
Roll Covering	To Card. & Spin. Depts. % Consumed
Fuel and Purchased Power	To Power Departments ¹
General Supplies	Records of Supplies Consumed ²
General Repairs	Records of Repair Work Done ²
Drayage	Records of Work Done ²
Office Expense	} Separate between miscella- neous ³ selling ⁴ and mate- rial ⁵ overhead
Office and Executive Salaries	
Taxes	Value of Land, Bldgs. & Mchy.
Insurance—Fire	Value of Bldgs. and Mchy.
Insurance—Liability	% of Payroll of Prod. Depts.
Insurance—Group	% of Payroll of Prod. Depts.
Insurance—Boiler	To Power Department
Insurance—Fly Wheel	To Power Department
Insurance—Use & Occupancy	Miscellaneous Overhead ³
Depreciation—Buildings	Value of Buildings
Depreciation—Machinery	Value of Machinery
Interest—Plant and Equipment	Value of Land, Bldgs. & Mchy.
Interest—Materials	Applied to raw material cost
Interest—Stock in Process	Value of Stock in Process
Interest—Finished Goods	Selling Overhead
Interest—Supplies	Records of Supplies consumed
Interest—Cash	Miscellaneous Overhead
Licenses, Donations, etc.	Miscellaneous Overhead
Legal Expense	Miscellaneous Overhead
¹ Power Dept. for Power	% of Horse Power
Power Dept. for Heat & Lights	% of Floor Areas, exclusive of storehouses
Power Dept. for Steam	% of Steam Consumed
Repair Shop Charges	Records of Repair Work Done
³ Miscellaneous Overhead	% of Payroll of Prod. Depts.
⁴ Selling Overhead	Applied to the product
⁵ Material Overhead Expense	Applied to raw material cost

²NOTE: If records are not kept, experience and knowledge of local conditions must determine the treatment of these items.

RECONCILIATION OF PREDETERMINED COSTS

The total predetermined cost (the predetermined cost over raw materials per pound or per yard of each product multiplied by the pounds or yards produced of the respective product during a given period) should be reconciled periodically with the accounting records of the mill. Under normal conditions, quarterly reconciliations should suffice.

A simple reconciliation of predetermined costs for a given Quarter is shown below:

Style No. of products made	Lbs. made during quarter		Predetermined costs over raw materials per lb.	Total predetermined cost over raw materials
63	1,545	@	\$.2616	\$ 404.17
58	9,027	@	.3218	2,904.89
68	44,192	@	.3038	13,425.53
89	9,796	@	.2968	2,907.45
98	142,816	@	.3139	44,829.94
39	255,511	@	.3272	83,603.20
69	169,644	@	.3030	51,402.13
100	137,279	@	.2773	38,067.47
Total	769,810		.3086	\$237,544.78

The total, \$237,544.78, represents the amount of labor and overhead absorbed by predetermined costs to manufacture the actual pounds produced during the given quarter. But the pounds produced may have varied from normal production and prices for fuel, supplies, etc. and the amounts for taxes, insurance, salaries, etc. may have changed also from the amounts included in the predetermined budget so that it becomes necessary to compare (1) the total absorbed costs (as above

shown) with the total actual payroll for the quarter plus the total overhead from the predetermined cost budget and (2) if the variation between the totals of (1) exceeds 1 ½ per cent, then compare the details (each item) in the predetermined cost budget with corresponding items on the books of account in order to determine where the variation lies or where the budget should be adjusted. For example, in the reconciliation referred to above, this is done as follows:

(1) Total Actual Payroll for Quarter	=	\$137,713.02
Quarterly Overhead from Predetermined Cost Budget		= 97,693.86
	Total	= \$235,406.88
\$237,544.78 — \$235,406.88 = \$2,137.90		
$\$ 2,137.90 \div \$237,544.78 = .009\%$		

Costs thus arrived at were, therefore, 9/10 of one per cent lower than the predetermined Costs during the above period. Since the variation would be less than 1 ½ per cent, it would not be considered necessary to make a detailed comparison of all the items.

NOTE: In the above example it is presupposed that the predetermined budget will be made to reflect promptly any substantial changes in expenditures for overhead.

Pounds of Stock in Process at the beginning and end of the above period remained about the same so that no adjustment on this account was necessary.

In the reconciliation of predetermined costs with the cost shown by the books of account, the cost of raw materials must, of course, be omitted, since the books are based on the actual price of raw materials, while the predetermined costs should be used in connection

with the replacement cost of raw materials at the time of sale.*

GENERAL

Standard Weight. Usually, in the sale of cloth, payment is received by the mill on standard weights only. If the cloth actually weighs more than the standard weight, the extra material in the cloth is given away by the mill. If a mill has determined the cost per pound of finished product, this figure should be divided by the actual yards per pound to get the cost per yard. Many mills make the mistake of dividing by the standard yards per pound even though their goods are regularly made heavier than standard, and thereby understate their cost per yard. As to price also mills frequently make the mistake of basing their calculation of selling price per pound by multiplying the price per yard by the standard weight, whereas they should use the actual weight when the goods are heavy. In the interest of sound practice and uniformity, it is believed that each mill will find it to its advantage to adopt the above methods as to figuring cost per yard and price or return

* The following point deserves consideration :

Mills seldom keep their books so as to show separately the profit or loss from transactions in raw materials on the one hand and profit or loss from manufacturing operations on the other. Hence a mill may show an ultimate profit due entirely to profit in the purchase of cotton, and even in spite of a manufacturing loss. On the other hand a mill may show a profit due entirely to manufacturing operations and even in spite of a loss on cotton. It is a question worthy of serious consideration whether it would not throw extremely valuable light on the efficiency of raw material transactions on the one hand and manufacturing operations on the other, and also promote sounder merchandising policies, to keep records separating these two matters so as to show with clearness the profit or loss, whichever it may be, each independently of the other. Some mills accomplish this result by entering on all orders for product sold the price of cotton used in the quotation at the time of sale and then the actual price of cotton bought to fill the orders when fixed, is also entered on each order. By such practice a mill may accurately and conveniently determine the profit or loss on orders so far as raw material transactions are concerned.

per pound unless they are able to maintain their actual weights very close to standard weights.

Profit or Loss per Spindle and per Loom. While the predetermined profit or loss per pound or per yard is necessary and useful information, it is also advisable to carry the calculation still further and show the profit or loss per spindle and per loom per week because these further figures give additional light on the situation inasmuch as yarns and fabrics are produced at varying rates.

Cost Records. As a rule, it will not be necessary to change the accounting records of the mill in order to calculate accurate, predetermined costs because all necessary cost data can usually be obtained from the general accounting and production records in use. After the installation of a proper cost system, a very small additional amount of time is required to maintain adequate cost records. One man, who should be recruited from the mills or textile schools and instructed in proper cost methods, can look after all cost details in the average mill.

Yarn and fabric cost can be accurate only to the extent that the starting, basic data is correct. Therefore, educate the personnel of the office force, superintendent, overseers and second hands to keep accurate records of production, payrolls, repair work done, etc. When such records are in operation, insist upon and use the facts in all cases, because only accurate costs are useful in determining sales policies which will result in reasonable profit.

Revision of Cost System. As indicated in President Hines' transmittal letter, this Outline is not intended to be a detailed Cost Manual. If a mill on consideration of the matter presented herein decides that its cost finding system calls for revision, it will have to take additional steps to effect such revision and cost finding experts, either in or outside of the mill's organization, will need to give the problems their attention. The Cost Engineer of the Institute will be glad to answer any specific inquiries that may be made of him respecting this subject.

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