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Relation of the cost department to the factory organization

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The Cost Department
to the
Factory Organization

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An address of
Clinton H. Scovell, A.M., C.P.A.
at the meeting of the
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Lake Placid, N. Y.
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The Relation of The Cost Department to the Factory Organization

WHEN cost accounting is mentioned, most business men immediately think of a clerical department which is engaged in working out the cost of different articles produced, primarily that the management can tell at what price they can afford to sell each item. I have found in practice that other aspects of the work of a cost department, while less known, are considerably more valuable to the average business, and I am therefore very glad to have this opportunity to outline what I believe to be the most important functions of a cost department, and to show how it may be fully utilized in a modern factory.

It should be made clear at the outset that the cost department deals with cost *accounting*—with debits and credits, different in character but the same in principle as the debits and credits handled by the bookkeeper in the sales and cash records. Cost calculations are sometimes made entirely detached from the general bookkeeping, but it is very rarely that such records have anything like their full value, and their use is always attended by the very considerable risk

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that they cannot be proved by the showing on the financial books at the end of the year or other closing period. Only cost records which are "tied in" with the general accounting records in the treasurer's office will give complete control over the operating expenses of the factory, and enable the management to know at all times how much is invested in raw materials, work in process, and finished product; and also to know the cost of the goods which are being sold.

A cost department, therefore, should not be engaged simply in cost *finding*, but rather in cost *accounting*, which is much broader work and much more valuable to the management.

It seems to the author that the use of the term "cost finding" by professional accountants or industrial engineers is either a confession of ignorance as to how the transfer or conversion of values in an industrial enterprise should be recorded, or an attempt to make prospective clients think a short cut has been discovered. There is no royal road to sound industrial accounting.

Material Costs

Cost accounts are so closely connected with the production in various ways, that it is the practice in many shops to initiate or authorize production by means of an order, either prepared in the cost department, or put on record there before the work is actually started. It saves time and tends towards accuracy to combine as closely as possible the operation of ordering out material for a

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particular job and the steps necessary to record the cost of that material.

The material is not only charged to the cost of product being manufactured, but it is also credited to the stock from which it is drawn. Cost accounting, therefore, at the very beginning of production is part of the plan for controlling inventory, to make sure that the investment in stock of various kinds is kept at the economical minimum. The stock clerk at the same time is responsible for keeping the quantities of various items at the proper balance for efficiency with due regard to the factory's use of the goods in question.

The control which the cost department, working with the production department, has over the proper use of materials is most important for every industry. In one factory we found, when the cost department and production department were put in working order, that the stock of many parts was sufficient to last for more than a year, while there were none of others which were necessary to assemble the same machines. This condition is not unusual in large factories where there is no efficient cost and planning department. The result in the case cited has been a reduction of 50% in the total investment in the stock of finished parts, while the manufacturing in some departments has been considerably curtailed, and at the same time shipments to customers have been made much more promptly.

In another manufacturing plant the cost records, which were "tied in" with

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the general books, showed an unusual consumption of raw material. Upon investigation it was discovered that a large run was spoiled and simply dumped down the sewer, without any report to the management. This waste would not have been detected if the cost accounting had not provided a careful check on the quantities used.

The formula in a certain paper mill called for a small percentage of expensive pulp and a large proportion of cheap stock. The cost records proved that the quantity being used did not correspond with the formula. When this was investigated by the management, it was found that the men were not carrying out instructions, and that the company was losing many dollars a day through the kind of materials being used.

In another factory, too large a proportion of the materials was spoiled. When careful records of such losses were kept, the management was able to greatly reduce the extra quantity of castings which had to be made to fill an order and allow for breakage.

Labor Costs

As soon as manufacturing operations are started on the material withdrawn from the storeroom, cost accounting comes immediately to have a very definite and important relation to payroll, and payroll is removed only two weeks at most from the cash drawer. Efficiency in a manufacturing plant depends more or less on the *selection* of the material for manufacturing, but the term

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is ordinarily used to refer to the effective *handling* of materials with the most suitable equipment, men and methods, to make a salable product. The owner or manager, therefore, faces continually the problem of the quantity and quality of product secured from the expenditure of a given payroll, in connection with the manufacturing equipment or resources at the disposal of the employees.

Some large industrial establishments will have a fairly efficient payroll department and not much of a cost system, and occasionally in a large business there will be a payroll department quite independent of the cost department, except that the operatives' records will be turned over to the cost department for entry after the payroll department has used them to calculate the amount due on the weekly payroll.

This detachment is unusual, however, and rarely feasible in small or moderate sized industries. The cost and payroll departments in a factory are, therefore, usually one and the same organization, presided over by the same directing head, and the work is carried on by the same clerks who handle production records from day to day as part of the cost accounting, and then frequently give their undivided attention to the making up of the payroll at the end of the week, when the last time slips have been turned into the office.

Cost accounting in respect to labor charges consists primarily of reporting correctly the manufacturing orders on which the work has been done, or the

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expense or special accounts to which the payroll should be charged. In a great many industries there are numerous activities carried on in addition to manufacturing itself. One industry, for example, may require heavy expenditures for experimental work, developing the product to keep abreast of competition, or to prepare for new markets. A long established industry, on the other hand, especially one that has an extensive mechanical plant, is almost sure to expend a portion of its weekly payroll on construction and repairs of various kinds, from work on small tools to outright additions to plant, like the erection of new buildings or the manufacture of new equipment. It is essential for intelligent management that the accounting under such circumstances should carefully separate manufacturing operations from all of the accessory work carried on at the plant. Cost accounting cannot be at all accurate or satisfactory unless all such additional elements of expense are carefully separated from the current cost of manufacture, as only by so separating these elements can the productive departments be held strictly responsible for the results obtained from given payroll expenditures.

Cost Reports and Production

The cost department necessarily has a very intimate relation to the factory administration, for while the man in charge of manufacturing directs labor and through foremen assigns the employees to their respective tasks, it is

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the duty of the cost department to keep track of expenses incurred and results secured, and report them promptly to the executive department of the organization.

In most cases it is tremendously important that the results should be reported promptly to the factory superintendent, to the foremen, and in many instances to the workmen themselves, if the efficiency of the factory is to be kept up to a satisfactory standard. The superintendent will not often concern himself with the cost of individual jobs from day to day, but where labor is handled in gangs, or where it includes all the men in a department which has a daily report of production by tonnage, or other operations on a large scale, it is of the utmost importance that the factory executives should know immediately what results are being secured, and at what cost per unit for the various kinds of products.

Some surprising results have been obtained from the use of records which give the management prompt and reliable information as to what each workman in the mill is doing. When records were introduced into one mill which had been going along at a fairly even pace, and the men realized that the management was getting information as to what each individual man was doing, the performances immediately began to improve, simply from the moral effect of having the records. Without any material change in the selling price or volume of sales the company made a greater net profit in the first two months when

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the cost system was running than in the previous ten months under the old plan, which did not give specific and up-to-date information. This was due to the fact that the company was selling with a very small margin of profit and any decrease in manufacturing costs materially increased the *net* profit.

In the repair department of a large plant, by keeping a record of the cost of individual jobs in comparison with standard tasks set before each job was started, a large decrease was made in the repair gang and in the unit cost of all repair work done. In this case two important factors were working together to improve the efficiency, one the task and bonus plan, and the other the prompt and reliable information as to what was going on. There is all the difference in the world between knowing to-day what the repair costs were yesterday or last week, and getting information of this kind that is a month or more old.

It is of great importance to have continuous current records in the manufacturing departments, not only from the standpoint of efficiency, but also to give reliable costs. Costs which are based on test runs are nearly always lower than the average, as the employees are considerably more efficient when they are under observation during tests than in their general work, when they know that no definite records are being made of their performance which will be figured out as part of the costs, and, if high, will be brought to the attention of the management. Costs, therefore, which

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are based on test runs and not "tied in," cannot be relied upon.

Cost Accounting and Scientific Management

Before leaving the subject of the relations between the cost department and the payroll, I want to point out to you how intimate the relation necessarily is between the production department and the cost department under any plan of standard tasks with bonus, which is typical of modern or scientific management. The fundamental idea in such operations is to have a consistently high rate of production, a satisfactory compensation to the workers and minimum cost to the management. It has been found by experience that plans of this sort depend on detailed calculations of standard tasks and costs from day to day, and in some cases almost from hour to hour. The planning department in a highly organized factory directs production, but the cost department must co-operate with it to measure results and to establish effective working relations between the factory organization, the cash books of the owners, and the pay envelopes of the operatives.

Under the influence of the new science of management, there has been a constant study in the last few years of manufacturing methods, operating standards, cutting speeds, etc., resulting many times in such marked increases of production that the management may be sure that an improvement has been made, even if it is not

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known exactly how much saving has been effected.

It has been clearly established, however, that the cheapening of manufacturing operations which is brought about by a better operating practice is frequently secured at a considerably increased cost for office force, planning departments, helpers, supervision and other indirect labor, sometimes wrongly called non-productive. The practical problem for the manufacturer is to compare the lessened direct cost for labor and equipment with the increased cost for the other factors. This he can do only when he has an adequate cost accounting practice.

The weak point in scientific management, as often practiced, is in setting up records entirely disconnected with the general books, and thus failing to measure the actual performance in comparison with the standards set in a way that will prove with the net profits shown by an inventory. Scientific management is never complete unless there is developed at the same time an accounting practice which shall adequately reflect for the management the *net* results of all industrial endeavor.

Burden Costs

The most elusive, or I might say "de-lusive," element in the cost of manufacturing is that commonly known as overhead, but more accurately described as burden. The function of cost accounting in this respect is to determine as accurately as possible the burden be-

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longing to the various phases of manufacturing operations, or to the respective departments of a business, and then to record the burden element in the cost of the product as it passes through the various departments and adds to its value by absorbing its proportion of burden from its use of the manufacturing plant and equipment. Many cost systems which have fairly good records of material and labor fail entirely in their purpose because they deal so inadequately with the subject of burden. Important elements of indirect costs are thrown together in a "general expense" account, concealing the leaks and wastes that reduce efficiency and curtail profits.

Many manufacturers have no doubt been satisfied to handle burden in vague and general terms because they have not known of any better way to dispose of it. I will not attempt to take up in detail the methods of developing and distributing burden, but I wish to state that if the problems are approached in a scientific way and with an open mind, the overhead expenses can be first analyzed and then distributed to give burden costs as reliable as the labor and material costs.

Burden on Unused Equipment

Burden rates scientifically determined enable the cost department to obtain reliable costs of the work done, and also make possible an accurate measure of the loss due to slack production or interrupted operation, in each department and in the factory as a whole.

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When the board of directors is gathered at the end of the year, or once in six months, to learn about the results of the period under review, they do not often consider such detailed matters as the cost of individual products. On the other hand, they are always interested in any explanation which the manager has to make about losses that are due to curtailment of manufacturing operations.

The manager and the directors at such times would value more than any thing else, a clear statement showing how much their company had lost on this account, especially if the details of the statement could be readily understood and proved by analysis of the operating conditions. The big problems (in regard to manufacturing) which the directors have to settle, are to make efficient use of plant and equipment, especially if they are asked to decide on new buildings or equipment to meet a probable volume of business.

To illustrate the value of a record of equipment used in each department, let us consider a lathe department of a machine shop in which a press of work seemingly showed that more lathes were needed. By examining the records the management saw that for a long time many of them had stood idle. A little overtime work took care of the emergency, and the purchase of the additional machines was found to be unnecessary. The cost department thus makes possible scientific balancing of factory equipment, which is an essential feature of efficient and economical management.

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From the manager's point of view, the significant fact is that the burden is not appreciably less when the operating schedule of the plant is reduced. It is true that power charges may be slightly less, but the fixed charges for building space, interest, insurance, taxes, depreciation, and in some circumstances for repairs also, are no less when the machines are idle.

Effect on Sales Policy

If the distinction is maintained in the cost records between losses or gains on goods made and sold, and losses due to restricted output, the management will consider sales policies in a much more certain way than is possible when the facts are obscured in the haze of average costs, calculated on varying volumes of product. In respect to burden it is frequently true that costs figured as averages vary beyond all hope of comparison as the volume of output goes up or down.

When a cost accounting practice is maintained that distinguishes carefully between prime costs for materials and labor (which vary almost directly with the volume) and overhead charges of burden, the managers can see exactly in times of slack production at what price they can offer a new line to get something to carry the burden of the factory, in addition to the direct cost of labor and material. This, it must be admitted, is to some extent a matter of policy, for it may be better to hold a price and restrict output, rather than break the market by

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quoting prices that will give temporarily a little additional business.

Whatever the effect on sales policy, good cost accounting, including correct burden distribution, is a matter of enduring importance from the point of view of manufacturing. Changes in volume may completely obscure gains or losses in efficiency, and render comparative cost of similar product impossible from season to season, solely because of the variations in the amount of business done. Reliable costs, comparable under all conditions, are not to be secured unless the burden charged to production is only that pertaining to the equipment that is actually at work.

Cost Accounting and Manufacturing Policy

The executives are also interested in scientific burden distribution when they determine large questions of policy in buying, manufacturing and selling, whether, for example, to manufacture, or to buy and assemble. There may be some work, such as box making or printing, which is in competition with outside companies, and where true comparisons can be made only after the proper proportion of burden has been considered.

The question may also arise whether to buy or sell the main product partially completed. For instance, a factory making shoe findings may buy leather in sides, blocked or cut, and may sell at several stages in the process of manufacture, depending upon the market, the condition of the factory, and the

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cost of the product up to any given point. A scientific distribution of burden is essential in determining the point where the greatest profit can be made.

In solving such problems the management should look to the cost department for the information on which to base **their decisions**. In any large concern the cost department must be the eyes and ears of the executives, as it impossible for them to know by personal observation what is going on in all the departments at all times.

What personal observations they make are liable to lead to incorrect conclusions, without reliable information regarding the average performance of employees. For example, in a large plant where the superintendent was accustomed to make daily rounds of all the departments, it was the custom of the workmen in one of the stockrooms to have a man on guard at each door who would, on the approach of the superintendent or foreman, signal to the other employees by dropping a casting or giving a low whistle. The result was that the department had a good reputation for hustling. As a matter of fact it was exceedingly inefficient, as was proved later by a change in management and the introduction of records and a piece work system for handling the stock, which reduced the force by 15 men.

The function of the cost department is to gather information from which the management can outline its policies, and then record to what extent and how quickly these policies are being carried

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out. Proper reports should relieve the manager of details and at the same time so visualize conditions that his personal efforts may be applied wherever and whenever necessary. Better management, more profitable management, is not to be attained through some miraculous remedy to be applied as a fertilizer to make the business grow. It is almost solely a matter of studying the business critically and then acting intelligently upon the information secured. The information for such study will be at hand in the cost department.

Since the cost department is both the eyes and ears of the management, it is especially important that both their sight and hearing be acute. Not only should the records be well designed to fit the peculiar needs of the business, but the man in charge of the cost department should be capable, not only of keeping the records in balance and seeing that they are arithmetically correct, but able also to read the results and present *live* facts to each man interested, whether he is a mechanic operating a machine tool, or is a member of the board of directors. The head of the cost department should be so recognized in the organization that he may be in touch with all important matters, and thus be of the greatest assistance to the executive officers. I might almost say that it is impossible to get too good a man to have charge of the cost department.

Checking Salesmen's Estimates

One of the minor results of a good

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cost system and yet a very useful one in some industries is the check which the management secures on salesmen's estimates.

On construction work bids are made and contracts taken which remain to be proved by experience either profitable or unprofitable for the contractor, and sometimes the margins of loss or gain are very large. If the contractor in such cases is to reap any benefit from his experience it will be by having an analysis made of the cost of the work as it is actually done, to compare section by section, or kind by kind, with the estimate on which the bid was made and the contract taken. This is equally true of plants manufacturing on order special machinery or any other product to meet special requirements of customers.

In certain kinds of industry salesmen are constantly taking small orders at agreed upon prices which are based on schedules or estimates in the salesmen's price books. Specially ruled stationery, either loose-leaf, bound book, or card, provides a familiar illustration. Different salesmen will frequently serve widely different lines of industry, so that their orders, although manufactured in the same shop, will be quite distinct in character. To a manufacturer who is selling goods in this way, it is a great advantage to have cost records so built up that he can check the standards which have been set for his salesmen as the basis for quoting prices, and can check the use that the salesmen make of these schedules.

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It is hardly necessary to say that if an article is made or work undertaken that is likely to be repeated, it is of special interest to the vendor to keep such a record and control of the costs as will enable him to consider similar work intelligently in the future.

Cost Accounting in Different Industries

One of the most obvious facts connected with cost accounting is the widely varying demand that different kinds of industry make on a cost accountant.

I know of one mill devoted exclusively to the manufacture of grain bags, with no change throughout the year in the size or grade. The chief variable element in the cost calculations is that of raw material, which in turn depends on the cotton market. The cost system in this mill consists solely of a subdivision of the expense accounts, following more or less closely the successive steps in manufacturing the absolutely uniform product. The chief function of a cost department under such circumstances is to record correctly the subdivision of the payroll, and to report the unit costs from week to week or month to month.

A textile mill making fancy worsteds, on the contrary, has one of the most complex cost problems. This is due to the great variety of product, frequently sold on such a narrow margin of profit that small and exact distinctions must be made between the costs of different fabrics—and for each, the labor, material and burden separately.

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Tannery cost accounting is difficult chiefly because hides and partly finished leather are relatively unknown quantities, and costs can be apportioned only on the information secured when the finished leather is graded and ready to ship. In tanneries, as in many other continuous process industries, "process rates," combining labor, supplies and burden, are the only practical means of getting reliable costs at a reasonable expense of clerical labor.

A machine shop, doing jobbing work, must keep an individual cost of each job. Reports must come from the shop showing the material used, the work done, and the time consumed. The cost department will accumulate the direct charges and add the burden (which includes all the indirect labor) so that they will have a reliable total cost for the completed job.

Another factory makes only suit-cases of rattan, cane and woven grass, using a little metal for fastenings and trimmings, and leather in small pieces for the corners and bindings. A few of the suit cases have iron frames and substantial straps in addition, but all of this product can be finished within such a few hours after it is started that the cost accounting consists solely of scheduling the various steps of manufacturing, taking an inventory at the beginning of a production period and another inventory at the end to check up the scheduled cost of the goods manufactured in the interval.

This principle of scheduled costs is

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capable of wide application in such industries as the making of shoes and clothing, and sometimes can be applied successfully to manufacturing operations so minute and complex in their relation to each other that they cannot be satisfactorily or economically recorded in any other way.

Cost accounting in a piano factory is largely a question of scheduling material on master lists and keeping an exact control of production. If the labor is largely piece work, as it is in many factories, both labor and burden may be scheduled almost as conveniently as material, and the scheduled costs proved at frequent intervals by accounts controlling stores and work in process.

These examples show how the ingenuity of an experienced cost accountant is sometimes taxed, like the resources of a mechanical engineer, to find new ways to apply well-known principles so that the operations may be accurately recorded and measured.

Cost accounting at its highest development is a science and an art worthy to rank beside some of the older and better known professions. It depends not only on mathematics and economics, but sometimes to an important extent on physics and chemistry. It deals constantly with great problems of human nature; it is one of the most interesting vocations for an energetic man; and it has a large reward for a man interested in adding to the sum total of human knowledge.

We have also published and will send on request to executives, booklets of general interest, with titles as follows:

Burden Application.

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Paper Mill Problems.

Which deal with subjects of interest to several other industries, such as Steam and Electric Power, Transmission, Belting, Lubrication, Safety, Illumination, Repairs, Handling Materials.

And a number of other pamphlets on cost accounting which are of special interest to particular industries, including machine shops, paper mills, foundries, textile mills, box makers, candy manufacturers and others.



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