

THE RAY INDUSTRIAL COLLEGE
Washington, D. C.

Course 1939-1940

COST ACCOUNTING

by

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October 26, 1938

AIC 73 (11/10/39) 11 14

Colonel Miles and Gentle men of the Army Industrial College

I derive considerable personal pleasure in coming down here. It is always a compliment to be asked to come to a place like this, but it is very much of a compliment to be asked a second time.

Colonel Miles has advised me that you are interested in cost accounting, that you are prepared to begin from the beginning with me, that I shall not be out of order if I talk of some rather elementary concepts, as I am going to do, hoping in the process to carry the elementary conceptions a little way into some of the more difficult phases. My lecture, therefore, is going to be in the nature of a general survey of the cost field. Insofar as it is elementary, I apologize. It is with the purpose of using that as the basis for whatever other remarks I may be able to add.

We all have it in mind that your interest will be to examine the costs of others, to determine not only their accuracy in the arithmetical sense but the propriety and the reasonableness of any costs which may come to you as a basis for government contracts, as a basis for charging the government a price. A great many things enter into that question of reasonableness and I am thinking of the elements which I shall mention in that sense. We will examine them in that sense.

At the beginning comes the question of which cost system is appropriate in the circumstances. You have all heard the names of job costs, process costs, unit costs, standard costs, mass production costs, and all those things. What question is involved there? The question is, what is the basis upon which costs will be gathered? Does it make any difference which basis we select? Yes, it does. If we start out on a method inappropriate to the circumstances—we are not likely to get reliable or just results.

A job cost system is appropriate to those situations where the individual job or contract is the base or unit around which we gather the costs. That naturally is the case of things with which you will be more concerned. A government contract usually is an individual job, to which costs must be attached. But it doesn't necessarily follow that all government work will be on the job cost basis. In those cases where the government may appropriate all the facilities of a given plant so that there is an entire utilization of its resources, then the

individual job would be of secondary consideration and you would have something more analogous to a process cost, a continuous process, where the cost for a period of time becomes the basis of your consideration. Then this question of cost allocation takes on a somewhat different form. In the case of job costs the question is, are these items of cost properly allocable to job number one or job number two? If job number one is your job number two is somebody else's job, you will be interested in what is charged to your job as against the other job. If you are taking the entire output of a given plant, that division of interest and that necessity for allocations does not arise.

But there is another form of allocation which does arise and which becomes important even in the case of process costs where you are utilizing the entire facilities of a plant. That is the period or time allocation of certain charges like long-time charges for depreciation, amortisation of facilities, amortisation of patents, development, research work, and all those expenses which are incurred on a long-time basis. The problem of allocation there is not between one job and another job carried out simultaneously, but rather between one year and another. In other words, at what rates of amortisation are those expenses going to be written off over the different periods of time? I use that as an example to illustrate the fact that the basis of allocation of the different items of expense may be changed according as you select job costs in one case or process costs in another case.

The elements of cost are materials, labor and burden, "As every school boy knows." Materials - what problems do we have with them? First let me say that all charges are usually divided into direct and indirect costs. Usually the direct costs are more simple than the indirect. The indirect costs are those which we cannot attach to given units of product or to given jobs. Materials and labor are usually listed as the direct costs, the materials comprised within the product to be produced, and the direct labor actually put into it. It is true that these are the more simple aspects of our lives as cost accountants, but they are not too simple. For charges for materials the contractor - their cost accountants - can produce for us invoices showing that they paid the stated amount for the materials used. Then what questions can arise? The situation is still more simple if we have a fairly even price level, no violent changes in price. In the last year, as you are all aware, we did not have an even price level, but a rapid upward price movement in which every purchase was at a higher cost than the last one. That brings up problems of

how are we going to charge materials to process. Normally we carry raw materials in stores at their cost, and there may be no dispute about what the costs were. But with a rising price level, when you turn those raw materials into the production stream, what rules of charge do you use? In ordinary industry the most common practice is to take the average price, to average the purchase prices, and charge those average costs into production as you take the raw materials out of stores. But this practice is based chiefly on the financial requirement of the balance sheet and the income statement of the company. They are thinking of the financial accounting results for the purposes of management, for the purposes of stockholders, for the purposes of the income tax, and that sort of thing.

Perhaps I should have said earlier that we all ought to get clear, before we start off on a cost accounting system, as to what our objectives are, because a change of objectives may involve a change of methods, and it is perfectly proper and legitimate to select one method for one purpose and another method for another purpose. The problems of preparing a balance sheet and an income statement for management or reports, to stockholders or the income tax department, are problems of financial accounting that do not necessarily control our practice as cost accountants. We are interested also in another problem, namely, the cost of a given contract in relation to its price - that is a different problem. It requires different bases of allocation and we here are not necessarily controlled by the fact that the general rule for financial accounting purposes is to average the costs of materials. Furthermore, even for financial accounting purposes that average cost is not the universal practice and there is growing tendency to change or question it. The most notable example is the "last in first out" method of charging materials into costs. Undoubtedly it has a large part of its insulation in income tax considerations. Some companies and themselves paying a heavy income tax during a period of rising prices because they are making heavy profits on the average or usual cost basis, and then when prices decline they make heavy losses for which they get little or no relief from the income tax department. It is quite natural that industrial leaders should be concerned to find some escape from that if possible. The Internal Revenue Acts have made a gradual progression in recognition of last in, first out, practice. For a long time they would not recognize it at all, then they gave a limited recognition in certain cases, to one or two industries. In the act passed this year is a general clause that all industries may, if the circumstances justify, use the "last in first out" method. Now there is considerable discussion in drafting the

regulations of the Internal Revenue Department, which regulations will say exactly what "last in first out" means. What is the point at issue? It is that on a rising price level the "last in first out" basis means, as the champions of the method say, that you are charging current costs against current production. You are charging the current price level against the current production and you are not taking advantage of the fact that you have on hand an old inventory bought a year ago at lower price levels. Probably the practice does justice to the companies concerned, probably "going up with the rocket and coming down with the stick" does them considerable injustice. After examining last in, first out with some care, most people agree that there is a good deal to be said for it, and something less than justice may be done on the other bases. But I call attention to that fact in connection with another aspect of our problem not related to taxation. In ordinary cost accounting, where government contracts will be going through factories as individual jobs side by side with private contracts, it is also necessary to decide at what prices materials will be charged.

Another accounting problem which offers a choice of methods is that described in text books as the inventory method versus the cost accounting method. What do I mean by what? I will illustrate. Suppose we have a beginning inventory of \$100,000 and then costs of the period \$500,000, total costs \$600,000. The problem now is to divide the total cost into two parts - namely, that still in stock as inventory at the end of the period and that which is the cost of the goods finished and sold during the period. From my example on the blackboard it all seems over-simple, but in practice the choice we make brings an enormous difference to the cost accounting procedure. The old-fashioned method is simply to take stock - take an inventory, you might say, "Inventory is \$150,000, therefore \$450,000 is the cost of goods sold, arrived at by subtraction from the \$600,000." You can see that every penny added to the inventory reduces the cost of goods sold, and every penny subtracted from inventory increases cost of goods sold. Therefore that is something which must necessarily be of a technical nature all as a cost accounting problem. But the inventory method is an old-fashioned method, though still very prevalent in many industries.

The other method is that by means of your cost accounting procedure you attach these costs to individual job numbers or to products, and by those direct allocations of cost to individual jobs you arrive at this cost of goods sold figure by direct costing process. There you have a direct

attack upon the cost accounting procedure. Then if you also take an inventory the inventory amount and the cost of goods sold will serve as a check upon each other since the two together must add up to the total costs of \$600,000. If they do not, there is a discrepancy to be explained, which again will be of interest to those trying to find true costs.

I have wandered a little from my outline. We were talking about material costs. The problem is the allocation of total cost as between the costs of the period and the inventory as at the end of the year. That is the kind of thing I had in mind a moment ago as continuous process cost - where the problem of allocation also was between one period and another period. Coming to your problems again, if the government is contracting for years one, two, and three, and then ceases to be interested, pulls out of the market because the war is over or something else happened, then you have this problem of allocation of cost as between government contract periods and private industry periods. If on the other hand government and private contracts go along side by side, it becomes a problem of the price at which materials are to be charged to contracts, as mentioned before. As you know other people than accountants are laboring on this. Other departments of government are saying that there will be no rapid rise of prices next time, that prices will be pegged. If they can do that, it will save the accountants a lot of trouble. Then we will not have to worry about whether we are going to use an average price, or last in, first out, for charging materials into costs.

There is one further problem with materials, and that is the economy and efficiency of use of materials. Here we come once again to the borders of standard costs. The basic idea of standard costs is that we are not going to be content merely to find out the actual cost of the contract or period. We are going to raise questions of what the cost should be. What is normal? What is standard? What is a good performance? We want to know whether so-called actual costs offered to us are reasonable or not. In setting standard costs for, let us say, small units turned out in large numbers we take account of past experience, of present manufacturing practices, of everything we know about the production of that unit. For example, in considering the standard amount of material supposed to go into an article, we might say Performance in the past shows that this article required half a pound of copper. In the future we think we can get along with 7 ounces of copper, because of better shapes, better practice, and so forth. We can get along with seven-eighths of the former amount, and so we decide to call

7 ounces the standard. After that, the problem of cost accounting is to see that the factory lives up to that standard or betters it if possible. The purpose of costing then is not so much to ascertain the cost as to keep the practice and performance up to a predetermined cost. Much money can be wasted by using more materials than the standards call for. There you have the double question of setting up a standard which is reasonable, which can reasonably be attained, and afterwards by measuring the performance to show whether or how far they are living up to that standard.

The problems of labor costs are practically parallel to those of direct materials. Labor also has fluctuating costs for two reasons. Labor rates are apt to go up or down, if they go up, then the standard cost which we have predetermined as the basis for a price becomes obsolete. It is necessary to increase the standard to agree with the increasing wage levels that correspond with the rising price of raw materials. Then similarly there is the problem of the use of labor, its efficiency, its output, how many hours of labor constitute the operating standard, and then how many hours are actually used. These things are made more difficult when we have a period of rapidly changing conditions, where new work is being undertaken by factories which have never made such articles before. Then the problem of setting standard for contract price is a very difficult thing. It is necessary to accumulate experience as you go along. Experience also may be transferred from other factories by government inspectors who have observed certain things in plants they have visited, and who try to apply them to new plants. May I speak of a quite difficult matter, namely the attitude of our labor unions about wage incentive plans. It is generally known that the unions do not like them. The labor unions are opposed to Mr. Beccaux and others like him. They designate them speed-up, unfair to organized labor, and so on. What should we regard as the truth there? The theory of all these incentive plans is that management, by superior organization, by having the materials ready, having the tools ready, by superior routing and lay-out will so facilitate production that a man with the same expenditure of effort can turn out more work. Now if these conditions are met then there is no hardship and no injustice to labor in saying that management should participate in the increased output. Putting it the other way round, there is no obvious need to pay labor for that extra output if it is the product of the same effort as before on the part of labor.

Obviously when output is stepped up from 50 pieces an hour to 60 pieces an hour the big problem is, who did it,

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the worker or management? That is the real argument. If management can demonstrate that by superior skill in organization that by thinking of better tools, better processes, and so on, they accomplished it, then in pure justice (which we all understand does not exist anywhere) the wage incentive plans are just. If, however, management is simply using such plans as an excuse, and is really driving the men harder under the guise of an incentive wage plan, it is bound to fail, for there is an essential injustice. In the cost accounting field you are bound to run constantly into these wage incentive plans, and to become involved in this dispute between labor and management as to what the justice of them is and whatever you decide is going to affect the cost, moving the cost up or down, and in this way these matters come into our field. Burden questions constitute the most difficult part of our task, the allocation of indirect expenses. There are two steps, one more simple than the other.

First we have departmental overhead, that is to say, general costs of the individual shop or department in which the particular products are made - the foreman's wages, the depreciation, taxes, insurance, and interest on the building and equipment of that shop. There is not much question but that those costs must be allocated to the products produced in that shop. That is only one degree removed from direct costing and that is not too difficult. But the second stage involves the general overhead of the company as a whole - the president's salary, the secretary's salary, the treasurer's - all of the administrative offices - all those things devoted to the general purposes of the company. Here is more difficult territory, an area where there are practically no rules. We are forced to the use of the best judgment we can apply to the situation, which is always very distressing to people who do not like to use their judgment. The expense allocations become more and more arbitrary, and the more arbitrary they become the less it is possible to prove them right. All one can do is to study the situation and proceed by the rule of reason, one of the most difficult things in the world to find. I have here some excerpts from the Regulations under the Vinson Act for Navy contracts. No doubt some of you gentlemen are much more familiar than I am with these regulations, but I would like to illustrate what I am saying by reading a portion here. Beyond the departmental overhead, which no doubt must be charged to the product, and beyond the general company overhead which must be charged to the product but with considerably more uncertainty, there comes a still more difficult class of expenses which a company incurs in the process of doing business as a company.

To illustrate that let me read this thing here.

Article 8, (g) (4) General Heading - "Other Expenses".
"Among the items which shall not be included as a part of the cost of performing a contract or subcontract or considered in determining such cost, are the following. (I select a few items, which you will visualize as raising difficult problems).

"Entertainment expenses (Always suspicious, but sometimes reasonable and necessary.)

"Dues and memberships other than those of regular trade associations.

"Donations except as otherwise provided above.

"Losses on other contracts.

"Profits or losses from sales or exchanges of capital assets. (The Company cannot avoid such items, can it?)

"Extraordinary expenses due to strikes or lockouts. (Who pays for those?)

"Fines and penalties.

"Amortization of unrealized appreciation of values of assets. (That is all right.)

"Expenses, maintenance and depreciation of excess facilities." Commonly called 'idle plant' - here you have the problem of deciding what part of the plant is devoted to production and what part is idle. As you know, this is no constant factor. The activity percentages published for the steel industry are not absolute. The steel industry is sometimes said to be working 105% of capacity. Mathematically speaking that is impossible, but it means that 100% capacity is that maximum capacity which they use in normal times. But in abnormal times old blast furnaces may be added to the 100% capacity which has come to be spoken of as the total capacity of the plant, but under normal conditions. Under abnormal conditions, the 100% may be in question.

Then comes another question, upon what capacity basis are we going to allocate the burden charges? This calls for the actual normal or average, not for the maximum normal just referred to. If 80% of a plant will regularly be utilized, we

may set that as a standard base for distribution or allocation of our burden charges, that means that at 80% of capacity you are absorbing 100% of your burden. According to that theory any work, any contract, going through is required to assume an equal share of the normal amount of idleness, here estimated at 20%. A literal interpretation of the Vinson regulations would mean that no amount of idleness is going to be charged to a contract.

"Increases in reserve accounts for contingencies, repairs, compensation insurance (except as above provided with respect to self-insurance) and guaranteed work.

"Federal and State income and excess-profits taxes and sur-taxes. (Income taxes are not a part of the costs, they are part of the distribution of profits after you have computed them.)

"Cash discounts on purchases. (The Government says you can keep up to 1%. Over that amount the Government says, "Except that all discounts on subcontracts subject to the Act will be considered."

"Interest incurred or earned.

"Bond discount or finance charges. (Again they say - that is not part of the cost of operation, that depends on the manner in which you finance your business.)

"Premiums for life insurance on the lives of officers.

"Legal and accounting fees in connection with reorganizations, security issues, capital stock issues, and the prosecution of claims against the United States (including income tax matters).

"Taxes and expenses on issues and transfers of capital stock.

"Losses on investments.

"Bad debts.

"Expenses of collection and exchange."

All those items are excluded. What does it mean as a practical matter? Under the Vinson act theory, the company is allowed up to 10% profits, the government takes all the rest. If then a company incurs any of the charges listed above the

must be taken out of the 10% profit. That may not be unjust - it is assumed that the 10% is at a level high enough to be able to absorb those items. Yet you can imagine cases where those items might run high enough to absorb all the profits. I use that as an illustration of the definition of costs, and especially of what belongs in 'overhead'.

Let us return to something already mentioned in connection with standard costs. We are all of us confronted with this double question - what are costs? what are reasonable costs - what should the costs be? That will always be a question in your kind of work. The object of government auditors, government inspectors - is not merely the acceptance of such costs sheets as the company gives them, but also to inquire into them and find out whether they are reasonable or not. We are all aware of the possibilities of fraud, but they are very few compared with the number of cases where differences of opinion constitute the real problem. We must not overlook the fact that we might run into a case of fraud, but the judgment and opinion questions will occupy 95% of your days.

What are the effective checks upon costs? Here, of course, we have in mind not only costs but resulting prices. There is some relationship between costs and selling price. What then are the checks?

First, competitive bidding, if we can get it, is one of the most potent checks, but competitive bidding presupposes that there are enough companies able to make the article we want, and to put in a bid. This presupposes experience in making that article but frequently you will want a new article. You will go to people making sewing machines and say, "How much for making cartridges?" which they never made before, thus puts limitations on the possibilities of competitive bidding. But do not underestimate the reliance that may be placed on competitive bidding when it generally exists.

In the absence of it we are forced to some use of standard costs, costs based on standard practices, therefore standard costs in a cost accounting and in an engineering sense. We can consider comparisons with prior costs, and tentative standards on new work, which standards will be constantly checked as we go along. All big companies which use standard costs have classifications of work "On Standards" and "Not on Standard". "On Standard" means work on which they have

sufficient experience that they know what they are doing, they can hold a workman to the standard. "Not Yet On Standard" means changing design and methods of manufacturing, on which they have not yet accumulated sufficient experience. Some of those companies, of course, are operating on the 'deaux system and the two things run together. "On Standards" wage rates can be included in bids and they can rely on those standards to see that the work is done within the bid price. Most of the companies engaged in ordinary peace time practice will have this category. But in rapidly changing conditions, such as any kind of emergency, enormous amounts of work will not be on standards, and the only thing we can do is to use our best judgment, to set on standards as soon as possible, to match accumulated experience, and do the best we can as we go along.

It seems desirable here to refer to that body of men called industrial engineers. Most of them are already engaged as employees of large industrial concerns, others are consulting engineers, who offer to come into a plant to overhaul the manufacturing methods and practices, to set up cost accounting systems, and to cut present costs. In discussions like ours they play an important part. Some of them have had enough experience and ability to be liable to walk about a factory, and looking at men working say "These men are doing well, those men are below standard." Therefore upon occasions where we are dependent upon that kind of ability, it is well to remember that we know where to find them if we need them.

I have a few notes with respect to the new forms of contracts which you gentlemen in the Navy Department have been discussing for possible future use. We are all aware of the weaknesses of the cost-plus contract, where there is no incentive for the contractor to keep costs down to any reasonable level. In addition to that is the impetus that comes from rising price levels, if prices really do break loose so that manufacturers have constantly ascending price levels, it is impossible to bring contract costs down. But if changing price levels can be controlled by other governmental agencies, that will in itself take away a large part of the basis for the use of the cost-plus forms. You have, of course, contracts which are likely to be an improvement on the old cost-plus contracts, and which have an effect of providing some incentive to keep costs down, such as the forms with a sliding scale fee. But none of these devices can evade the problem of finding out what is a reasonable cost. None of us can write a contract which does not raise the question of what is a reasonable cost. The exercise of judgment upon the facts of the case will always be necessary.

The subject of price is in a sense beyond the subject of cost. The two are connected because of the part cost plays in price, that is why we are so much interested in cost. I am going to make one or two remarks not strictly called for in a discussion of costs. I suggest to you that a policy of reasonable generosity in prices will give best results. Remember that after prices come profits, and after profits come income taxes, the contract price is not the final word, the government gets another turn at them. Therefore, I am inclined to think that as a matter of policy for getting the best results, those results are most likely if in questions of reasonable doubt are answered on the generous side. This does not mean extravagance in any degree. It means reasonable prices and reasonable profits. In the case of Navy contracts, out of that profit the contractor must take those charges he is disallowed under the Vinson Act, and then he comes face to face with the income tax collector. If contractors enjoy the experience of handling money profits for a few minutes and then handing it back to the government, why not let them have their fun? If a contractor makes an actual loss on his work because the rules do not allow him to recover his costs, then of course, in effect the government is making a capital levy upon him. We all understand if and when the day of burden comes we all must contribute our part, but we all understand there is still some value in justice, in having our people feel that some equality has been achieved in the distribution of this burden.