

Philadelphia Auditors - May 9, 1966

Mr. Chairman, Gentlemen

Many times in my career I have had the opportunity to look into the faces of a group of auditors. Being an engineer, at first, I did so with fear and trembling. As soon as we got under way with the work in Value Engineering and Value Analysis I found that we had a friend in camp.

It was interesting that we soon found that the auditors were interested in the dollars. So where we had problems in getting actions from engineering and manufacturing people, we invited in the auditing staff at the beginning of studies. In one particular meeting some of the engineers came and said "why do you do that? It's enough of a problem to do our job without having those guys who don't know anything about steel and they don't know anything about processes ~~but~~ without having them around to stick needles into you and report what's done in the bosses office -- or what isn't done.

Well, I stood that all right but they kind of got together and put in a little search and I think they played a little dirty pool on you fellows. They found an exception. They brought to me a check for 1¢, this is a photostat of it; one of the engineers had been on a business trip and in his poor and simple addition, altho' he was a genius in metallurgy, he made a mistake in addition and sent 1¢ too much. This check is written on the Nat'l. City Bank of New York and has two auditors personal signatures and it is to refund that 1¢. I hasten to say that I consider this by no means typical.

Perhaps I should right now introduce something that I hadn't intended to and that is a design of a type that you and I pay for of engineer's work. This was on the Minute Man missile. In each of the groups of missiles they needed a light underneath so they could turn it on with its own batteries and view a transparency on top. I'm giving you this example because, and no joking, it is typical. The space for the need for this light they assigned to two engineers who designed up the box and the clamps and the pieces and made the tooling for them. They needed a quantity of 24; they are all special pieces and they cost \$52.25 each and when you get done it is just an awkward flashlight. You have to take screws out to put in the two batteries.

In 1974, some of us, fortunately for me, under my leadership, had the opportunity to get away from production lines and take a ~~side~~ look at what can ~~be~~ good people do in a good organization to find not only this type of thing but the big volume of things where we can get more for our money. The result of this was the developing of a pattern of thinking and a pattern of searching which was called and is called "The techniques of Value Analysis". The results are shocking. I couldn't -- well, I think I could expect auditors perhaps to believe it. I'll just read a few of the types of items -- these are from a very good competitive product that it was seen that they needed to do better to get more for their money.

Now let me say, there is no hardware necessary to use these techniques. ~~They~~ We always start from a function, from the money, and the function we are trying to accomplish. and develop alternatives. Sometimes we go

from money to hardware to a function; from money to an organization to a function; from money to a communication to a function. These were hardware items. They controlled cabinets and the quantities here were about 1,000. From \$56,000 it went to \$16,000. Now this ~~it~~ is revolting and shocking. You may think its good but just listen, as we go on.

Some weld nuts went from \$3,700 to \$700; 80% reduction. Screws, \$3,000 worth went to \$200; 94% reduction. A plate -- \$24,000 went to \$7,500; a 69% reduction. and the page is full of them. I am telling you these because they sre typical. Because it wastes too much time, it could be done in a better way if you were interested, I will not read pages of examples but I will talk about methods and approaches. I would say to give a benchmark of what we are talking about -- if this system is supported by management and used where it fits, there is nothing anyone here is doing ~~it~~ from which you cannot remove 25% of the cost. and keep all of the functions, all of the benefits you are accomplishing for your customer or in serving the company. There is no reduction of quality and ~~it~~ at the same time, I want to say, on any expenditure of a military nature it becomes an easy 50%. This is the reason you are reading why the Dept. of Defense has learned something about this has studied it, and is studying it, and is now insisting that manufacturers start to learn to use it on orders above \$100,000.

I am making these strong statements to save time. When I get into these steps they will sound deceptively simple; they are simple but everything is in this system that is needed to get results. A telephone is simple but it is a whole bunch of wires and parts and every part is there that is needed. A business, so far as getting the optimum of cost oriented decisions is just like a telephone with about 10% of the parts absent. This is why you see a little expenditure for the little thing that is needed will sometimes yield very large results. As I chat with you you will see that we are not necessarily introducing anything new but we are providing a method of looking at what we are trying to do, looking at waht we have, in any given organization or any given system and adding what is needed to get much lower cost with all the quality.

My task divides into three things: first of all to give you a little touch of what this technology is like; a thing that we can teach to people in about two weeks; secondly, to tell you womething about the very major problems you get when you try to use it; ~~and~~ ~~it~~ ~~xxx~~ makes it almost impossible to use it; it is impossible unless the top management understands it and ~~x~~ takes certain actions that we will indicate; and the third thing, How can you use it directly?

This technology has only one purpose. It is not used to try to create better performance. If it is a communication~~xxx~~ system, we expect

communication experts to get the information where you want it, ^{to} ~~to~~ get it there. If it is a product we expect engineers to learn how to make what the customer wants in performance. In mature products and services, the only one who stays is the one who does it at competitive cost so we keep all of the performance the customer wants as prescribed by the people whose job it is to find out but do it at very much lower cost. We are attempting to put together a system of measurements that will work just as effectively as pounds and inches and the other efficiencies that the engineers use to measure performance. We want to measure appropriate cost just the same.

What would we use for a unit? Condensing an awful ~~a~~ lot, it was found that the one thing that is basic is function. No one pays any money unless he expects some function from it -- and let's take it from the customer's viewpoint. There are only two types of functions he wants: We are going to look at this very clearly, cut it down so we can put any problem into mind sized steps with things of a kind together. The two types of things he wants, he wants functions that will perform a use for him and functions that will please him. And we have all kinds of cost in what we do that do not contribute to either of them; all of that cost is waste.

To carry it just a little farther, let's take my tie. ~~Exam~~ First of all we have found that we must put a value in dollars -- let's say for the moment a worth in dollars on everything and have it written on a piece of paper the same as we have the function on the specs. What would be the worth in dollars of this tie? 50¢? \$2.00. I'll take the \$2.00. You said 50¢ or \$2.00 because you know what you pay for yours.

Since you've bought them, you have something to compare it to and you know the worth of it. This is just as real as can be. I've seen metal parts that engineers have designed that you can hold in your ~~an~~ hand and they will cost \$3,000, the same as an automobile. They have nothing to compare it to. They just go walking along like a bunch of blind ants in some groove the accountants have prepared for them and they come out

We then have to have a comparison. We got our \$2.00. There are two things only that is for -- that is use function or aesthetic function. One performs a use for the customer, the other pleases him and causes him to buy this one. Does the tie have a use function? I'm going to say no. We could have some fun. Why do I buy it? Why do I pay \$2.00 for it? To conform to custom is one of the reasons. So we in Value Analysis, we don't want to take one iota of the use function out or the aesthetic function that the customer wants. But we want to get each one for what it is worth.

Let's take another little example. Here we have \$2.00 of aesthetic value. Let's take the tie clasp - the tie holder. Does that have a use function? Yes it does? Does it have an aesthetic function? Yes. Now, what would you say is the value of the tie clasp -- not this one but any tie clasp. I got \$5. We know the \$5 because we have something to compare it with - the only basis for knowing dollar value.

Let's put a separate value on the use function and on the aesthetic. We will do this with every part of every search on every part of a product.

What is the use - name it very precisely. Hold tie. Before we know what that function of holding tie is worth, we have to compare it with other methods of holding the tie equally well. paper clip - '1¢/ etc.

We get some interesting things to look at. Refrigerator for example - on one particular outside assembly, the piece was costing \$11. \$7. was for aesthetic, not needed for performance. (engineers) Marketing said it cost only \$3. They got together, made some changes that pleased them both, took something like \$3 or \$4 out of it. Each had what he wanted.

People have a lot of operating practices of -- I don't want to call them thinking patterns, I want to call them non-thinking patterns. Deterrents to thought. Detours that make it unnecessary to think. Clock from employees store in Louisville (before the Derby). Give me approximate value on this. \$7. That's pretty high. But that is approximately what you have paid for clocks you have seen around. You put that value on it on the basis of it's cost.

Threw clock on floor. I definitely put more cost into clock. More cost has gone into clock but what has happened to its value. I want to wash out from everybodys mind any idea that there is any relationship between cost and value. There isn't any.

What we need is a system that will allow us to start at something fundamental and build up value and know when we get it. That system is what we are talking about - function.

Take an example from u. S. Navy. Adm. Leggett was afraid the complication of military gear would make it so costly they couldn't get enough. He came across VA; his people said we think this is what we need. I had the opportunity to work with them on a couple of their first training programs. The first one was a landing craft where they had already bought them and were buying another 1,000. they followed this technique - expanded a little. Always we take a total product and divide it into functional groups.

On a refrigerator, nearly every part will divide into from 4 to 8 major functional groups. We have a contain area; we have an insulate area; we have a control area; we have a cool area. possibly one or two others but if you group these together and put the costs under those functions, which is always done in this system, you have the whole product. Then you will divide the control down into different areas; to detect, to amplify, to open circuit. Attach dollars to that. There will not be any part name on the list. It is all function.

In the landing craft, what is it: contain, float, power source, armament and a number of others. But the one I bring up is contain gasoline. \$200 x 200 gallons. for how long? 8 years.

Get information. How has it been done? tank, special shape welded together cost \$520 each - \$500,000 for previous purchase. On this one we are looking at as a function and say "how would you contain 200 gal. of gasoline. etc. \$90,000 instead of \$500,000.

force

What happened? Somebody said, we are going to ~~xxxx~~ a little thinking at the key places before we move ahead. What are we really trying to do.

So - identify the function, divide it into basic function, secondary functions costs - the choice of how to make the basic function work; etc.

This is all used in the framework we call the job plan.

- First phase of thinking is information phase;
- analytical phase
- creative phase -suspend judgment
- judgment phase
- development phase

Creative phase - college dean said, "We in the universities are not yet teaching it altho we realize like Einstein said, when there is a problem to be solved, creativity is more important than knowledge. We have enough trouble to teach and grade knowledge without opening up this whole new field of teaching people how to become creative.

Automobile company - wrapping spare parts in news papers. Used blind people. Direct result of creativity - deciding what problem is, deciding what we want to do and putting kind of effort on it to solve it.

Close technique side with one example - illustrate with one device or part of this system because it will always work. Take any idea and develop something worthwhile. Overhead bus bar that my former employer sold. Functional areas: current conducting area, enclosing area, means of support; Hang it with rope.

Now start the chain that will always work. Of course it worked this time or I wouldn't tell you about it.

All I've told you is about how to develop ~~xxx~~ good things to do -- things that will get the quality you want and get lots of money out. Now I want to tell you YOU WILL NOT BE ABLE TO DO ~~XX~~ IT because of the people and I will give you a figure. ~~ix~~ 20%. 80% of the job is in the people. I'll give you a couple of examples.

A company with about \$10,000,000 business - their profit started going sour. They came to me for a value analyst. I helped them get a good one and they got another good one. In one of their seminars they had a large forging. cost \$500,000/year purchase cost. ---- At end of seminar 9 suggestions, 5 were immediately put in which saved \$180,000/year.

Then what happened? That was 3 years ago and the engineering mgr. has prevented the value analysts from having any raise in 3 years.

Furthermore, they are unwelcome in his office. This is absolutely typical and just as soon as we face it and deal with it instead of

Now what happened? The engineering manager, when shown the answer ~~this is the answer~~ said, "What have I got down in my engineering and manufacturing area there -- men or boys?" So, I'm telling you right now, as I leave this, the problem of getting big buckets of dough is the manager. There is no problem to get these individual problems where you can do this. By management, I mean about 3 layers,, no matter the size of the company.

There is a way to do it. I don't know what it is. I know one example. I asked a general manager, the equivalent of a president, if he would, each time a group of engineers sign off drawings, sign this paper and give each one a copy. On the paper it said something like this: Gen. mgr. signed, giving it to engineering people.

"I know that if we had more time and resources to work on this, we could accomplish this for half of what it is now costing. Nevertheless, I concur that it is good business decision to sign it off and get on to another job." This puts the engineer in a very different position. He knows that his boss doesn't think that he is picking up these things that a keen thinking process can find any time on any product. He is not embarrassed. He could come back later and say, "my men found another \$10,000."

Now let's get ~~off the subject~~ into the last one. But I can't get off of that subject without - I'd like to make a picture for you people in auditing -- you should look at every product as a series of monuments. It is a series of monuments. Engineering groups of people worked on difficult problems under adverse conditions, short of time, short of money; they found a way to do this that would work and got a reputation on it; wrote articles on it. Made money on it. If you will just take your product or your process or your communication, whatever you're working on, make a graphic picture and actually write well I'll say tombstones because I think of tombstones as being monuments, put pictures of them all over and try to think of the people whose monuments are on there -- it will help. Because that's what you will find is the reason. Good men, successful men are channelled by their successes; they have gone out through this groove, they have found this diamond mine and the company has made lots of dough on it, everybody knows it, and as they have gone out and back, the track is worn down; they put in mechanized mining equipment and all but they are worthless they can no longer get out into another area and find a new, totally different way to cope with the same problem. Nor can they support somebody else who does. because of the fear of embarrassment.

Now, how does it fit you. What can you do? There are just a number of things I'll rattle off. 1. take nothing for granted. Anything that you want to have a thorough study made of on, if you really have it made and don't let technical folks snow you, will really yield.

Even in technical work, one of the managers took this full course. I asked him what he felt was the main thing. He said, it opened my eyes. The main thing is, "don't believe it." Don't take for granted the things that are accepted around as being fact in your area. A bunch of fallacies we run into. "We have to do that ourselves. It is either more profitable or too fussy etc. It is a fallacy. There is no other source. would be the same thing. We can get lower

costs if you give us higher investment.

I have one superb client who will not allow any of his men to talk higher investment. He says it is either higher investment or better thinking. I ~~think~~ expect you to do it with thinking, not with dollars. This sounds kind of ridiculous if you're not used to it but he is doing it -- taking blocks out of his costs and keeping the quality up and ~~he~~ says I want the investment to go down and the cost to go down. I won't hear of any project where you up the investment to take down the cost.

Now, in accounting, I think the rule is, also in engineering, does it make sense? And so far as dollars are concerned, you fellows are a lot closer to that measurement, I think, and all the time you are looking at dollars, does it make sense to pay this block of money? What is the function we are getting? And what are we paying for it?

I had an experience during the War where I had an accounting manager operating a business of a few million dollars for my former employer. At the end of six months we checked on the accountant who insisted on checking every invoice before we paid it. We found that we had ~~paid~~ spent \$3500 checking those bills below \$25 and we had got \$150 recovered. But it is shocking to pay a bill without checking it and I don't suppose any auditor could approve it.He said, "I will never allow my company's money to be spent until the bill has been audited." So that's they way they did it. But you wouldn't.

Now I want to tell one horrible example and then let's open for questions:

I can see you people at the heart of the business. You know what's going on. You see where lower costs are needed. You can see these monuments. A monument is fine but in competitive business, it is our job, when the monument has served its purpose, to get

In this particular case, and I'm telling it because of the importance of motivation, you can get twice as much accomplishment from engineering and mfg. people if they are enthusiastically motivated to do the job. That comes out in these training seminars p- where they are doing what they want to do and are thrilled by it. An engineer was in Pittsfield, Mass. which is 60 miles from Schdy. He had a piece of equipment weighing 1,000 lbs. to run thru' a destruction test in Schenectady so a couple of months ahead he signed up the destruction pit ---

He returned by way of Troy to pick up a couple of shirts at a discount. A couple of months later 30% was deducted from his expense account because he didn't return by the shortest route.

Now this happens all over where we have checkers. I just throw it up to you fellows who can do something about it. Don't allow figure checkers to demoralize wonderful fellows who put their heart and soul into doing a job. The effect on this engineer -- Never again etc.