

Although Japan probably leads the world in highly skilled VA/E Professionals, all of us need to teach new people, this may help. ...Larry Miles...

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## CONSERVATION OF RESOURCES THRU VALUE ANALYSIS METHODS

Although I wrote this paper several years ago, I found that it gave "new-comers" to the VA Methodology surprising ease of understanding, so I'm providing it. Because of inflation, costs will be more timely if doubled.

Even without the physical examples, I've found that it communicates some valuable concepts.

First of all, Value Analysis is a system very much like performance analysis which we all know how to do. Instead of studying performance, we study value so that, learning more about it, we can know how to do something about it. We want to remove nonfunctioning costs --- labor or material that are not working and should be conserved.

We found that people know very little about value. We'll first talk a little about value analysis so we'll be thinking alike. We'll see immediately that we're talking about conservation. For example, if an engineer has designed a pitchfork, -- I'm a Nebraska farmer -- that uses a dollar's worth of material and labor, and by inspired design after reading, perhaps, "Esquire", he comes up with an equivalent design and performance for 75¢. Has he raised the value of the pitchfork, or has he lowered it, or has it been changed at all? If a purchasing organization is buying an electric razor for \$10. and a young buyer thinking first of function could negotiate an \$8. contract, has he lowered or raised the value, or affected the value at all? What do we mean by value?

We were startled to find that most people don't know. And we've had to come up with a formula or two. The principle formula is that value is the lowest cost at which an essential function can be reliably provided. And it is always established by comparison. I thought you might like to experience some actual examples so I am going to talk about some actual examples and actual prices.

Now, the first thing you'll think after you've seen about six of these is, how careless can we be? I want to assure you we're talking about American industry, in general, not alone our Company. We're all the same kind of human, and we're talking about what can be done everywhere to conserve.

This is one of our control devices. It was the first thing really used in Value Analysis. It was a beautiful working device but cost so much we were losing some of the value. The spring cost \$7,000. a year. It holds the cover on back of the refrigerator. It's phosphorus bronze which has

35¢ worth of bronze is to give it anti-fatiguing properties -- yet it doesn't come off the device six times in 25 years. Is that quality? It's waste! A spring bronze that would snap off ten thousand times without failure could do the job for \$3,000.

Next, a cover -- a beautiful plastic cover like any good engineer likes to design and our plastic department likes to make. It costs 4¢ apiece: \$40,000. on a million refrigerators. This is for covering the controls so the butter won't get in it. How else would you cover that for a lot less than \$40,000. a year? The laminated plastics people said, make it by the yard and it costs 1 1/2¢; \$25,000. of conservation.

Soon it was found that nearly every part in this product yielded to that type of thinking, and cover with any change of quality, getting exactly the same performance for vastly lower cost.

Now, in order to get a lot of breadth, I have chosen parts at random from all sorts of products. I'd like to have them all big so you could see them, but they're too heavy to carry.

Suppose I first state the reason why this existed. In their own minds, people don't use unnecessary materials or labor, but in nearly every case we looked at there was unnecessary use of resources. Let's see why. Here's one of them. You might call these popular ideas or conceptions. In this one the deciding person has the wrong information and says, "Plastics are one thing I would never use in this kind of a job" (throwing article on floor). But, it will work just as well when you pick it up. It can take abuse in some cases better than steel, and provide insulation as well as strength.

Another one? "We want to make it ourselves." Here's a coil that costs \$1.40. Now, there are specialists all across the country set up to make this coil for 39¢, not \$1.40. Many times we just don't think of the right idea at the right time.

Here's a three-piece assembly, a cover latch welded onto a product -- costs 45¢. How else would you do it? It's good engineering and good covering. Here's the idea; a simple wire form, weld this on = 11¢; 2/3 of the cost gone.

Again there's the feeling that "the tools cost too much -- we can't do anything about it." Parts like this go on and on in a factory, perpetuated by the habits of the people in the area. Sure this is a nice job, and the part costs 45¢. Now, somebody gets the courage to find out how much do the tools cost and what would the part cost made from material half as thick. Instead of 45¢, it costs 38¢ and the tools cost less than \$500; which will be liquidated in three months.

The things I'm showing you may sound impossible - but they aren't. This goes on in many manufacturing operations. Perhaps it isn't thought out carefully in the bosses office. He wouldn't have the information to know these answers, so I'd like to show you what does go on and then let's wind up with some thoughts of what we can do.

People are just naturally used to doing things in a certain way in a certain area. Here's a U-bolt costing 90¢ apiece. What is it worth? What does it do? What do you think a U-bolt like that is worth? A dime? That's right -- 9 to 12¢. Again, people who make the decisions just simply decided wrong, and this is done every day. Let's take the case of a pulley on our dryer. It costs 60¢. Other ways were carefully considered. The facts are that a die cast pulley for 22¢ instead of 60 does the job, stands all the load, lasts just as long, leaving a savings for conservation of something like \$20,000.

Now, I wonder why all of this is. Why is it that people trained in Value Analysis can pick up part after part and see unnecessary use of materials and labor? Probably it's because decisions can seldom be made on facts. Decisions are made on what people think the facts are, and at the time the decisions are made, people rarely have all the facts they need. Then, about a week or month later there's new information but they don't know it. So, our devices are made on part of yesterday's information. Another thing is the inability to recall. Even though a man knows something that would apply, he can't think of it at the right time.

Let me show you a few more examples. In this particular case, the manufacturing people didn't know about the process. Here is a little steel shaft for an electric blanket, costs 7½¢. They had quite a lot of burring trouble. There is a process where the thread can be cast on that costs 1½¢ instead of 7½¢. We got away from the burring problem, made \$24,000 a year savings. Why didn't we do it before and save the labor and steel? The manufacturing people didn't know about the process.

It so happened that this screwed into a little brass nut. It adjusts the electric blanket as you turn it. This brass nut is designed as they always have been. Surely there must be something better. Cast a little nut in nylon, it holds the shaft a little better and nicer; so instead of 3½¢, it becomes 7/10 of one cent. Of course, cents mean nothing much, any more than they do to us personally at the bank. So, you have to think of it in terms of a year's supply of cents, and that little part is \$14,000. worth.

I often wonder why so much of this stays in our production, and so I want to tell you a special story. It's hard to get it out; here's one reason why. Here is a part that is a stud to hold a cover on the bottom of our disposall. The motor and all are fastened together. It has a nice appearance with cover and dust cover. This stud cost 15½¢ and we use hundreds of thousands of them. Here's the problem: what does this do? It has threads on each end and a spacing segment in the middle. It holds together and spaces something. Wonder how much that function is worth? Is it worth 15½¢? I doubt it. Wonder why it's costing that? Here's the reason. When the engineers needed a product, they went to the manufacturing men and said let's work out an automatic process to make this, and they built a machine ten feet in diameter with fourteen stations around it. Standard steel was brought in, notched around step by step, milled, stamped and machined. When they started they didn't know how to make some of the stations, so they called in engineering, etc., got an appropriation request in to management for \$40,000. They pushed that through and got the machine working. Now they sit back and look

at it -- isn't it wonderful! All we do is feed in steel and out comes the stud. Now comes one of these fellows studying value. He says that doesn't look too much different than a spike to run over a roll threader for a penny and a half, and a 1/2 collar to do the spacing. He gets in touch with specialists and here it is. An assembly as you see it costs  $2\frac{1}{2}\%$  instead of  $15\frac{1}{2}\%$ . And the big quantity saved \$52,000. a year.

Here's another example. This is an arc chute. They had the engineering, manufacturing and purchasing people work together to use a standard material and the machines they had available. They worked on bending, stripping back and shaping -- golly, what a job. They got it all worked out and it worked. It's really fine but it costs \$6.80 apiece. And here comes a value specialist. What does it do and how else would you do the job? If he's any good as a value analysis specialist, he has hundreds of pieces of information and is used to recalling them. He says how about a shell molded part? It's a nice process, doesn't cost too much for tools. Sure enough -- call in the foundry and here it is. Those are \$6.80; this is \$1.80, saving \$5. apiece.

I have another case like this. This is another stud spacer. It cost 8¢. A different value specialist says, gosh, all we need is a nail with a head near the end, and in the middle. I wonder if this can be done. It turns out a half dozen heads can be put on a nail if you want it. This cost 8/10 of a cent, instead of 8¢

Here's a stud we use in millions in porcelain insulators. It has a two-step angle that cements in concrete. The engineers felt nothing else would work, but didn't know the big yield in case something else would. The value specialist put the angle in one and got a rough bid from a supplier. It was 18¢ to 14¢, and 4¢ on a lot of millions amounted to \$60,000. a year.

Well, again, there are processes that people don't know about. You know the problems of making brass die castings. Brass is such a high temperature material it chews up the dies. But we're making progress in high temperature materials; so, here is a brush mounting on a motor or generator. It cost \$28. Wonder what it's worth? Well, a study shows it can be made as a brass die casting, and here it is. The finished part went from \$28. to \$1.80. Is that material conservation?

One of the reasons we do things the way we do is "habit." We pretty much hold to the guidarails and look to see how we did it yesterday, and how much do we have to change it to get it done today. Our evaluation technique comes in and does not follow those guidarails. On the G. E. refrigerator, it took us 25 years to get from the old tombstone type to the cabinet type that sets over the counter. Either the competitors start doing it first, or it's some kind of an accident, or it's Value Analysis. Those are the only three ways. In this case, our laboratory developed a terrific insulation and tried to use it on the tombstone design. It was very thin, and costly, but it picked up a lot of space in the same size. (Incidentally, "tombstone" design is mine; they don't call it that.) They found the design was not efficient. A stylist said just make the kitchen cabinets like that. Nobody said, "it's no good," fast enough, so he made one out of plywood and that's the over-the-counter model you see now. He

called in sales people and engineering and they said it looks pretty good; wonder what folks would think about it. It happened that there was an appliance show in Chicago. Someone said let's put it in the show. The engineers said, "nothing doing," and the sales people said "put it in;" so, of course it went in. I was talking with the engineers afterwards. It was the hit of the show and they had orders for ten carloads of them with the price left open. What wonderful opportunities when we can overcome habit.

Take an airplane carrier. Design it with retractable superstructure. So many planes and men are lost this will give them a better break. But it is rickety; it is terrible. Then one day, out at lunch with a couple of Englishmen who didn't build carriers one said, "why is it you insist in landing the planes right into the parked planes." We can't think of a good excuse. So, we tried turning the landing strip at an angle. Now, if a plane goes in the water, the pilot will probably come out alive. Before, if they missed, he was probably dead. There's no reason why we couldn't have done that 25 years ago. Take a look at our modern carriers; you'll see the canted deck, eight degrees from the line of the carrier. It was done; conservation, if you please.

Now, just one or two more stories. Here is one on the fluorescent ballast. We frequently think we've done so much work on a thing there can't be any more done. That was true of this. We made three million of this style a year. A specialist looked at it -- one thing bad was we lost 47% of the silicone steel in the punching. At the end of a month and a half, using other specialists, he had a design to give the same magnetic slice and took a nickle apiece out, all of it a saving of silicone steel.

(5¢ each)

Then we went back to the engineers. They said if somebody who doesn't know anything about that can do that, let's do a real job on it. I wish you could see the new one. The problem was the air gap around the corner, and it meant close work with everything just right. The engineers thought of the simple idea, merely punch a hole in the center punching to get the air gap. So, it's now just that way. The parts nest together perfectly with no loss. The only loss is the hole punched out of the center. That's something like 20¢ apiece; \$600,000. of conservation came out of their work.

I hope you see how we truly believe the more people think about conservation, the less wasted work and materials will go into the national defense projects. We feel in the competitive line, the limited purchasing power customers have, and the competition, will keep us all doing a pretty good job; but when it comes to national defense we have to face this as citizens. The time we really need millions of these things will be the time we're far shorter of manpower and materials than we are now. Now is the time to do it right.

We often don't conserve material because we don't set a high enough standard. Here is a small segment in a refrigerator condenser, a large gadget on the back of the refrigerator -- steel tubing welded to steel sheet. The engineering manager

said, "I want you to get exactly that same performance for half the cost." Well, it's taken us 22 years to develop this. The young fellow went and looked things up and went home. He came back the next day, went to the boss and said, "You didn't understand what you were assigning me; the material alone costs a little more than half." The boss said, "Now I see you understand your assignment." The young fellow said, "Well, the first thing I thought was, if I can't use that material, I've still got to have a piece of tubing to carry the fluid. If I could fasten tubing to a piece of chicken wire" --- and that started him thinking. We made appointments with four or five fence companies. He wound up, in a couple of months, with a new one which is made of wire and tubing and which is more efficient by a few per cent, and which costs within a few cents of half.

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