

PANROLL ENGINEERING VERSUS VALUE ANALYSIS

By Louis E. Garono, Chief Engineer, U. S. Army Chemical Corps Engineering Command

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Rather than use value engineers as an overhead group with all the bad feelings generated by pushing ideas down through the organization as criticism of design, it appears much better that this organization operate as follows: Those people who have know-how in plastics, mechanical engineering or gadgeteering could be assembled as a part of the engineering department for design review. After the prototype has been made, this group reviews the prototype in detail, looking at each part for necessity, functionability, and the material out of which it is constructed. Then the group makes its recommendations to the people who normally would do final drawings or the final model of the particular item.

The item then goes to the drafting room where it is drawn up for final purchase and specifications and becomes established. After this model has been made, and the first group of items procured by an outside contractor, all ideas of the contractor or manufacturing group should be collected and assembled by the same study group. Changes are recorded on the drawings so they will be ready for the next order. In this way, any new ideas are collected and made available for immediate use. This puts the whole organization on the value analysis team and doesn't single out a bunch of smart boys.

Now this kind of operation is not going to show the enormous savings normally credited to value engineering, and no particular person or group is going to get credit for saving hundreds of thousands of dollars by simple mechanical changes. But this method does make for a smoother organization and will pick up many more savings than a flashy high level value analysis organization.

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It means that in the past Navy was building ships for a life expectancy of 20 to 30 years, and that they have all of a sudden realized that ships are no longer good for that time.

Value engineering might be a useful gimmick to shock the engineers at the various shipyards into changing to a modern concept of using materials and design for normal life of the product. While the idea may be new to the chemical or appliance business, where items are normally engineered for a life of about five years. Corrosion data indicates how long heat exchangers will last, whether it is economical to use monel steel, and what it will cost the plant to shut down if a heat exchanger is lost or how much damage it will do if a shutdown occurs.

To get down to the facts, value engineering to date seems to be almost entirely in mechanical engineering. Also, in developing any item, there is never a perfect end item. Almost all appliances, automobiles and even houses know an evolution with new techniques, new materials and new methods of assembly that never stops.

This again is the economic problem of how perfect you want the item and how soon you need to put it on the market. This, as I understand it, is product engineering.

A good example of this is the typewriter -- originally a mechanical monstrosity. As we look back on it, the original model was hard to operate, inaccurate, would not make a presentable letter and certainly was not streamlined. As engineering talent and dollars were invested, the typewriter became more presentable, a motor was added to make it easier to operate, adjustments allowed for more or less copies, special carbon paper let it operate more effectively.

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In conclusion, I believe value engineering is nothing but another name for effective product engineering. I believe it can be done more effectively at a lower level than that proposed by value engineers. I mean to say that the high grade talents of these value engineers should be assigned to equally important work as product engineers, to make the savings without all the ballyhoo.

The only place I can see engineering being applied to this new art of value engineering is in what is commonly known as payroll engineering: Have a new job set up, make it glamorous, indicate enormous savings, get a high rating from the personnel analyst, set up a new department. If this is the kind of engineering the value people are talking about, they have accomplished their purpose admirably.

VALUE ANALYSIS - WORTHWHILE OR WASTE? Two Sides of the Coin On What Has Been Variouslly Termed Payroll or Payoff Engineering -- It depends on Your Point of View ... by L. D. Miles, Manager - Value Service, General Electric Co.

Mr. Garono's comments represent the views of many responsible people whose understanding and whose decisions decrease or increase the amount of armament which the Nation secures per billion dollars.

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Mr. Garono--and others he typifies--seeks truth. In speaking out beliefs which many others share, he has hastened the day of truth and understanding.

A few years ago, I shared Mr. Garono's belief. I felt that, if we could continually increase engineering competence and, at the same time, increase the reliability and adequacy of information at their finger tips by improving the guides, aids and tools which help them in their design and development work, most non-contributing costs would be prevented or eliminated. It took overwhelming proof to force a change in that viewpoint.

The first shock came when the newly grouped value engineering techniques were first used on a highly competitive consumer-type product. Engineers, oriented toward special ideas, special materials and special processes for high quality at low cost, had designed and developed it. During three years of production, special engineering, manufacturing and purchasing penetration had cut 10% of cost.

Then two men were assigned to use special value techniques on it. Their work identified another 25% of the cost as contributing neither to performance, safety, life, nor to any attractiveness or features desired by the customer. This re-kindled design work, now aided by value consultation. Within a year, a product was provided at half the original cost, containing all original performance and features. It was simpler, more reliable, and, suprisingly contained no materials or technology unavailable five years earlier.

Still, this could be "chance." Anything can happen once.

Next, an industrial product used in yearly quantities of a few thousand and made on a job shop basis was selected. It had been in production several years. Design engineering, manufacturing engineering, and purchasing men, in a depth study, had just completed modifications, changes and re-designs which showed 40% of present costs to be non-contributing.

They eliminated this. The product was ready for factory tooling. Three men, trained in value engineering techniques, applied them to the product. It was startling to find that 60% of remaining cost was identified as unnecessary. The simpler, more reliable and lower-cost alternative means for accomplishing the functions also improved appearance and customer features.

But how could these techniques apply to military products, where unknowns in performance must be pierced with every new design; where the big question in development often is if the product will perform its function at all; and where, due to short time, we must go into production with the first apparently practical solution?

To find out, a military product was chosen which had been in manufacture a year. Problems, costs and other valuable information were known; still the

design was current. The function evaluation techniques were used on each assembly, sub-assembly, and component. It was found that individual functions could usually be done for between one-half and one-tenth of the cost.

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These "Value Audits" were embarrassing to engineering and manufacturing people who had done their best "the first time." They wanted better value the first time, not embarrassment from better answers after the drawings and plans were complete.

From this need, the value specialist was born. He is a trained and experienced engineer. He is further trained in the special value analysis and value engineering techniques. He accumulates vast specialized knowledge vital to his profession. When invited at the proper time and to the proper extent into the research--development--design--manufacturing--cycle, he contributes tangible, usable knowledge which shortens engineering time, provides simpler, lower cost, more reliable solutions which in military work decrease product cost by one-half to two-thirds.

Since his use is change--his benefits must be learned. Perhaps a few parallels will help.

A few decades ago, tax reports for most companies were made out by the general accountant. He had many other duties. It was a part of accounting training to provide to all accountants enough information on tax practice so that any of them could appropriately prepare the tax statement. This was when the significance of taxes was like a wide variety of other expenses.

But, as taxes increased, the need for a higher degree of excellence in preparing tax statements increased. During the transition period, accounting managers felt they could increase the tax content in regular accounting courses and qualify any good accountant to prepare a good tax statement. Later, they saw that because of special techniques, knowledge and experience needed to hold down unnecessary taxes, this plan was costly, inefficient and ineffective. Tax consultants were specially trained and used.

Parallels exist in most fields of engineering. Designing jet engines, for instance, wouldn't be considered without design engineer using the services of specialists in high-temperature metals, bearings, special lubricants, etc.

In this country today, we are in the transition stage value-wise. The degree of value secured by previous systems is often being found unacceptable. New developments are forcing improved value in the military. Attaining value is now a specialized field. Competent value engineers and consultants are required to minimize needless costs, just as tax specialists are needed to minimize unnecessary taxes.

During this transition, vastly better value in military gear is changing from something desirable to something absolutely vital.

Innovation is necessary. Something better is required. In this type of situation, experience is often a deceitful guide. "Experience teaches us how

to solve yesterday's problems." But--today--we don't have yesterday's problems.

Industry and government has learned how to use consultants--the tax consultant, the metallurgist, the computer specialist, etc. They will soon learn how to use the value consultant. The United States, then, will receive at least twice as much armament for its defense expenditures.

by Louis E. Garono, Chief Engineer, U.S. Army Chemical Corps Engineering Command

I am extremely interested in Mr. Miles objective approach and his basic theme, that of seeking truth. I hope, and I am sure, that this airing of opinions and positions will hasten the day of truth and understanding.

I sincerely believe that while both of our positions have elements of truth, the truth that I am seeking is fundamental rather than expedient.

When the recriminations have subsided, and I hope they have in this search, I think there will shake out several key facts which we all must recognize. In substantiation of the value engineer's position, I think one of these sets of facts which we must admit to concerns itself with the recognition that the result of any engineering design can always be improved.

Mr. Miles cites instances of major improvement which I do not doubt took place. My criticism of the value engineering field is not that these cost improvements should not be made but that they should be made during design or certainly no later than design check-out in a mass production environment.

Another truth that Mr. Miles and his associates recognize, as do I, is that the increasing complexity of our technology necessitates the use of specialists or consultants, as he calls them. Mr. Miles brings out that engineers must use high temperature specialists and all sorts of other highly specialized people in fields of design and that, as he goes on to develop, the value specialist is in this category.

I agree that value is a very important part of an engineering job, and I will also agree that in certain applications, value knowledge may be highly specialized and consultants required by the primary design or product engineer. I leave Mr. Miles at this point and, at the risk of being called unfair, feel that his argument for the use of specialist consultants substantiates my position.

The key is the word "consultant" which means to me that the primary design or product engineer is asking specialist advice as he does in the other technological fields and takes it or leaves it as he sees fit, the point being that the prime decision belongs to the man best able to make it the primary risk-taking, decision-making, design or product engineer.

This man is the only man equipped, or who should be equipped properly, with cost versus function in all of its ramifications. Decisions based on cost alone obviously would be inappropriate. Decisions on cost integrated into the other engineering aspects are engineering decisions and this integration can only be performed in a knowledgeable manner by a person or group

with a complete understanding of the development and product engineering and the other stumbling blocks along the way.

If the man making value decisions is this well equipped, we have duplicate competence. If he is not this well equipped, it's proper for him to advise someone who is equipped but not to make primary decisions.

I think I have belabored the subject sufficiently to be in a position to summarize. I agree with Mr. Miles and the value engineers that value is a consideration. I will even go so far as to agree that, in some instances, value might be an appropriate consulting or advisory function.

As a fundamentalist, however, I refuse to be convinced, and have not seen any plausible argument which will convince me that value considerations after the fact by specialists without the rounded out background of the responsible design or product engineer are desirable or even proper. If this after-the-fact value consideration is rounded out by complete engineering knowledge, I can see nothing but duplication.

I can think of no answer to this problem other than that it lies in the lap of the manager, not the engineer.

If the manager sanctions an environment where after-the-fact inadequate or duplicative value decisions are being made, I think he is a bad manager. If he sanctions an environment which will permit what is called an engineering job before the fact without value considerations thus leaving room for these considerations later, I think he is a bad manager.

I refuse to believe that there is any room for a field of value engineering or value analysis other than as a specialist consultant to the prime decision-making engineer. If the value engineers will admit that this is a proper dimension for their field as advisors to the primary engineer, I will welcome them to the fold and believe that good management will make a place for them and use them.

Beyond this, I feel the managers are permitting unhealthy expedients to develop which could become Frankensteins and destroy them and their organizations.

My beliefs in this area of fundamental engineering are also extended to the many other fringe specialties equally necessary to a good engineering job such as quality engineering, inspection engineering, reliability engineering, human engineering, etc. The manager's problem is the same in all these fields and I believe strongly he must recognize them and take steps to control the cancerous growth of these fringes.

(Besides Mr. Miles' reply, we feel the following excerpts from a letter by James L. Schuler, Assistant for Naval Architecture, Office of Value Engineering, Bureau of Ships represents a good sized segment of opinion on Value Engineering in the services.)

Mr. Garono . . . (has) expressed doubts about the need for Value Engineering. His doubts have led him to make some criticisms which have been made before. These criticisms can be answered by repeating some of the basic concepts on which a Value Engineering program is based . . . Successful cost reduction depends on

emphasis and re-emphasis. It also depends on developing attitudes based on understanding the urgent need for action to cut cost. . .

A review may be a healthy thing. . . Value Engineering studies help save the dollars that are lost in the cracks between the organization chart . . . Value Engineering is needed in every place where competition, based on cost, exists.

The Value Engineer states and restates that the credit (for money saved) belongs to the man who makes the decision. That man is the line engineer. He takes and keeps the responsibility. He deserves and gets the credit.

I'm sure we are all in favor of cost reduction. Value Engineering is not the only way. It may not be the best way. But it is a proven technique. In the hands of skilled management it can do a good job. If the tool fails, don't curse the tool—use it properly.

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Payroll Engineering Versus Value Analysis

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