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ORGANIZATION FOR VALUE ENGINEERING

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Gentlemen:

All of us in industry recognize the enormous accomplishments of your groups during recent years. We come with a spirit of humility to describe for you some of the things we have been doing. We hope that some of them will allow you to move your jobs forward even faster and better.

In the work of research and development, all of us would like four improvements:

1 - Shorter time of development.
2 - Lower cost of development.
3 - Greater reliability in operational product.
4 - Lower cost of manufacture for the resulting end product.

We will discuss with you a system which can contribute to three of the four objectives...

One-third less development time.
Greater reliability.
Twice the weapons per dollar due to halving of manufacturing cost.

It is in the very nature of the operation that the cost of production quantity, rather than the development cost, should be of greatest significance to the nation.

For the R & D management, there are now two equally binding objectives:

Meet technical or performance specifications.
Meet end product cost specifications.

A product lacking either is under-designed. Managers organizing for R&D will now look to utilizing the competence and the organization which secure both.

One of our leading managers of engineering a short time ago said to me, "Why is it that we always under-design no matter how many engineers we assign to a job? What environment can we create for our engineers which will minimize this situation?"

Let's address ourselves to this question.

First, from a viewpoint of end product cost, new products are almost totally old. It is a rare development in which the area of total newness comprises more than 10% of the end product manufacturing cost. Enclosures, servo-mechanisms, instrumentation, etc., utilizing known technology, absorb at least 90% of this cost. For the moment, it will be productive to set aside the 10% product cost which will go into new technology and face the task of removing large dollars from the 90%.

Secondly, our experience has proven that shorter development time in producing reliable developments - economical to manufacture - is limited far more by lack of the new idea than lack of a new material or process.

R & D organizations might then be arranged for searching, locating and providing the necessary new ideas which will reduce costs where they are greatest--the 90% in the cost area utilizing known technology and hardware.

If the challenging objectives of one-third less development time, more reliable products, and one-half the end product cost are to be achieved, you gentlemen will expect to utilize some very different strategy.

We have had some astounding results in some test cases where we have assigned one value engineer to each design engineer. Simpler, more reliable, lower cost solutions to technical problems did come forward in a minimum of time. Both engineers stated that they had never worked in such a productive atmosphere, and they quickly became very proud of their new achievements in the cost field.

Hard-pressed management of R & D work will immediately ask, "What does this value engineer do?" A short re-definition of the multiple assignment which the R & D engineer now has will be helpful. He must secure certain technical performance and he must secure certain cost performance. His technology, tests, and measurements guide him toward suitable technical specifications. The value engineer maintains that appropriate performance but, at the same time, develops alternatives which will provide appropriate costs or, we might better say, appropriate quantities. He utilizes his technology to provide to the design engineer alternatives of large economic value. He lengthens the engineer's reach and shortens development time by bringing "ready done" solutions not only into the area of known technology but often into some of the areas of new technology. As the engineer reaches out, secures and applies new technology in the technical area, so he reaches out, locates and develops practical alternatives in the cost area.

But it is asked, "If I want R & D work to go faster, why wouldn't I just hire another engineer--have two engineers on--not one--move it twice as fast? Why would I hire a value engineer?"

I guess it's a matter of quantity of special technique and knowledge.

Why would you hire a metallurgist or vibration specialist to work with the engineer instead of just hiring another engineer? Because you have learned that his knowledge and his approach get the engineer to the better answers sooner.

Abundant evidence has accumulated--much has been shown today--much more could be shown which speaks for the usefulness of this special knowledge and skill.

The value engineer is not a specialist in this sensitive area, but an "extreme generalist." He does not know steels in depth, electronic circuits in depth, vacuum castings in depth or any other specific traditional technology. What he knows and uses in depth is a system for identifying function, for evaluating functions in dollars, and for starting a chain of activity which will produce, from vast and diverse resources, the economic solutions to the problem, often "ready to use."

Is he a crutch? Is an advanced mathematician a crutch--is a specialist in servo-mechanisms a crutch--or the efficient way to accomplish the objective?

Seldom is a large task appropriately accelerated by increasing numbers of workmen using the same tools. This certainly holds true in R & D especially when economic specifications have forced increased emphasis. If 500 machine gun troops cannot accomplish a mission, 1000 may do no better. A pattern of resources, not set by a past system but dictated by the realities of this situation, is called for...perhaps only 200 machine guns, 20 bazookas, and one observation plane.

You might well ask, "Do you mean that if I am using 500 engineers in R & D work and I want to increase their productivity as you have outlined, I must hire 500 value engineers?"

Certainly not.

Select fifty. Make certain that they represent your average pattern of abilities, some being among your most productive men. Have them trained in the technology of value engineering. Assign them to engineers who are responsible for important areas of functional performance. Learn how to integrate their benefits into the organization. Then, on a basis of known performance, "grow" the changes in organization to provide an effective technical and economic development group.

Later, train more value engineers as needed. Meanwhile, provide suitable information to the remainder of the organization so that they will understand the value engineer, his mission, how he goes about his work and how together they can secure better results faster.

You will be gratified to find that the development moves more than twice as fast and that end results are more reliable and much lower in cost.

A word of caution may be in order. Research and development management, anxious to try this approach quickly, may be inclined to select certain individuals with rather general training and experience, assign them the name and the work area of the value engineer and put them to work. This must not be done. Already significant techniques, approaches and special knowledge have been developed in the value engineering field. Provide them training in this first.

Again, the manager's work will be different when he has a suitable number of value engineers.

His work must include...

planning the economic or cost results expected of each value engineering man or group;

providing to them the tools their technology requires;

pacing them;

directing changes as new influences arise;

progressively measuring their work, progress and results;

suitable periodic reporting to upper levels relating to them.

If I may be allowed a small exaggeration to make a large and important point, I would say, "Look at rules and guides which are organizing your work, with a jaundiced eye." A rule must be used only when it fits the specifics. A rule based upon the statistics of the past might well state, "Clothe these 1000 men in suits which are size 40 regular, with 32" sleeves and 32x32" trousers." This would streamline procurement, greatly reduce fitting costs, but--what a shocking appearance these men would present and how clumsy they would be in their work! The problem is, the rule did not fit the specific situations taken one by one. Perhaps as we both accelerate our development of weapons and double, when needed, our quantity per dollar, each manager will want his men to prove, before using a rule, that it fits the situation.

The realities of design and development have taught us that lower cost--or increased quantities--is often lost at the first of a group of four or five design and manufacturing decisions which must be made in series. Given a function

to perform, excepting in the newest of technologies, usually there are several design approaches. The design approach taken at this point may determine whether the product can be had for $500 or will require $5000.

Next, choices of materials within the chosen design approach again set minima on resulting end product cost.

Next, choices of processes again set cost minima.

Finally, choices of manufacturing, set-up, and arrangement operating within the framework the previous decisions have provided, establish the cost.

At each of these decision points, the value engineer provides the R & D engineer with alternatives related to cost which allow him to make the decisions which will allow lower end product cost.

Time is shortened because of the abundance of "ready to use" solutions provided throughout the entire process by the value engineer.

Reliability has been improved because these alternatives have so often provided the best and simplest means for accomplishing the specified functions.

In conclusion, together let's face the task of accomplishing our developments in two-thirds of the former time, achieving greater reliability and arriving with end products which will be built for h alf the former patterns of cost.

To accomplish this, let us set extremely high standards and expect them to be met. Let's use the required contributions from value analysis and value engineering sufficiently to achieve these standards.