

## "UNDERSTANDING VALUE ANALYSIS"

(Originally given at the ASTME conference in New York City, March 19, 1963 under the title of "A Definition of Value Analysis With Its Philosophy, Techniques and Operation"...by L. D. Miles, Manager - Value Service, General Electric Company, Schenectady, New York)

I will show that Value Analysis is a system, specifically arranged, composed of...

many known parts,  
a few modified ones, and  
a few new ones,

...for the accomplishment of one sole purpose  
--the identification of unnecessary cost.

Basic truth is often best communicated by allegory.

A truck brought to my home, four boxes. In them I found wire, mahogany, castings, screws, paint and assorted fastenings. Each of the elements has a score of good uses. Each is a needed element in its own right. Wire may dry clothes, carry communication, hang bridges, keep the hogs out of the cabbage patch. Mahogany may support the table, make molding patterns or adorn the president's yacht. There is nothing new about them.

Later, I return to find that these elements have been put together into one system. This system is now called a piano. In this system, every element is appropriately arranged, in view, and readily at hand to make possible solely one purpose--the performance of good music. The new value came, not from the amount that is new or not new, but from the fact that all of the materials were properly arranged, were at hand, could and would now be used for one purpose and would promote accomplishment at very high efficiency.

Studying its history, I found that, when first created, the system was short some tones. Search found some little-known--but very satisfactory wire and brought it into place. Need, then, caused a few new wires to be developed, and put into place.

Another interesting find was that, while some of the wires from the fence, the clothes line, etc. which permanently accomplished their other functions well, when used for this purpose, were a little off tune, quickly lost their tonal accuracy, required great skill to use, or required skilled tuners constantly. The result was that some existing wires were modified.

Now, using largely existing materials, modifying some, and adding a few new ones, then arranging all in an efficient system for accomplishing one specific purpose, new horizons in music were within reach of many more people.

Still, major problems existed. Some liked the low sounds and some the high. Not knowing how to use it, and often, several using it at once, audible mayhem resulted.

Slowly, then, there developed understanding and skill in using it. It was found that for some music, certain keys were used and for other, other keys. From this beginning emerged training. Later, it became obvious that only with much talent and some training or much training and some talent could the normal capabilities of the system be utilized.

Wisdom and understanding grew, as the system found its place in its culture.

1. Music can be made by many methods.
2. A wide range of music can be efficiently made on the piano.
3. Depth training in piano and its use are essential if its capabilities are to be utilized.
4. Very irritating sounds often result when the untrained applies vigor to the keyboard. The nearby environment revolts against the creation, and, if possible, tosses it out.

By comparison...

1. Value Analysis or Value Engineering is an arrangement of techniques, some old, some modified, each with its own specific usefulness, and some new, for the accomplishment of one specific purpose--the efficient identification of unnecessary cost--before, during, or after the fact.
2. The system has large capability.
3. Its capabilities can be recognized by all, but only utilized by those with depth training and developed skill.
4. It is an abomination when in an environment where the system is not understood or when it is used by those untrained or unskilled.
5. All parts necessary to accomplish almost any of its type of task are included; however, only the parts needed are used to accomplish any one specific task.

Perhaps a further allegory will be helpful. A small box containing three score of buttons, a dozen wires and a half dozen sticks was delivered to my desk. These are standard materials, useful for many purposes. Soon, as I watched, I saw these buttons and wires and sticks arranged into an abacus. It was now a specific system for one specific purpose--that of making computations. I then learned that in contests between our most-up-to-date electrical equipment with trained operators and the abacus with trained operators, it is just touch and go to determine which is faster. This simple

system of buttons and wire and sticks will carry out computations accurate within one up to one hundred million. Again, what is it? It is a specific arrangement or system containing exactly what is required to accomplish one specific purpose with overwhelming efficiency when used by a trained and skilled operator who knows how to develop all of its potential.

We may ask, "But what are some of the keys on the Value Analysis piano?" A segment of the keyboard covers each of the following and dozens of others...

- ... industrial engineering practices,
- ... work simplification,
- ... manufacturing engineering,
- ... economic design techniques,
- ... depth process knowledge,
- ... supplier specialty knowledge and technique,
- ... good buying
- ... etc.

Each of these groups of keys has its contribution to make and the answer to the problem of securing appropriate cost in any specific system or device may lie in any one or several of them.

A complete definition of Value Analysis then is, "Value Analysis is an arrangement of techniques which...

- ... makes clear precisely the functions the customer wants,
- ... establishes the appropriate cost for each function by comparison,
- ... causes required knowledge, creativity, and initiative to be used to accomplish each function for that cost."

It is seen that some of the techniques--the keys on the piano--are for the purpose of clarifying functions and some are for establishing appropriate costs by comparison. It will also be seen that some of the techniques "cause" the required knowledge, creativity, and initiative to be used. It is in this area that it was necessary to develop some modifications, some extensions, some specialization in techniques used by engineering, by manufacturing, by purchasing, by marketing, and others, in order to develop maximum potential in the elimination of unnecessary costs.

It is productive to study the causes of unnecessary cost. They may well be divided into seven categories. The decisions which allow too much unnecessary cost to remain may be the decisions in any one of the seven areas.

The action of the Value Engineering system is to identify which of the seven areas holds the solution to each specific integer of unnecessary cost. The necessary knowledge, creativity and initiative can then be used exclusively where needed and to the extent needed to end the cost problem.

The seven areas are:

1. Management Organization.

If the organization is not best suited to the task to be performed, it can only produce poorer performance in the product or extra cost. If poorer performance results, tests will normally follow and it will be promptly corrected. If, however, higher costs result, they often continue.

2. Marketing Concept--customer functional understanding.

The customer purchases a product to accomplish functions for him. These are exclusively "use" functions and "esteem" functions. To the extent that the customer has not been caused to clearly understand and communicate just the functions he wants to buy and pay for and to the extent that this information is not basic to the engineering and manufacturing processes, extra cost remains in the system or product or service.

3. Engineering Concept and Approach.

After the functions which are to be provided to the customer are determined, the effectiveness used in establishing the engineering concept which will be detailed and implemented introduces either positive or negative factors in the cost area which remain regardless of actions of any others. Much unnecessary cost is often allowed to remain because the work in the engineering concept stage was not optimum.

4. Engineering Detail.

After the concept, that is, the basic approach for accomplishing the functions is established, this must be implemented by choice of materials, shapes, assemblies, methods, functions, tolerances, etc. Appropriate cost can also be lost in this work area.

5. Manufacturing Concept or Approach.

How much or how little automation? How much to make? How much to buy? What machines and factory layout? If this manufacturing conceptual and planning work is not competitively done, appropriate cost can be lost.

## 6. Manufacturing Operation.

That appropriate cost will be lost in a carelessly, loosely, inefficiently operated factory is so obvious that it needs no elaboration.

## 7. Purchasing or Materials Procurement Work.

A significant amount of cost is normally spent by purchasing. To the extent that purchasing recognizes its potential to contribute to profits, staffs itself with competent buyers and negotiators, buys function as nearly as practicable, assumes a major role in getting a wide variety of solutions, for the needs of the engineer, from the available supplier market, it is eliminating the possibility that significant unnecessary costs are lost in this area.

## CONCLUSION

Value Analysis is a system, a complete set of techniques, properly arranged, for the sole purpose of efficiently identifying unnecessary cost, before, during, or after the fact. Some of the techniques are familiar, some modified, some new. The effectiveness in utilizing this system depends upon the understanding, training, and skill of the value engineers, as well as the understanding of all business people in the environment in which it operates.

Value consists of appropriate performance and appropriate costs. Good engineering techniques, measurements, and tests normally are used throughout the performance area. The technology of Value Analysis or Engineering is growing toward a similar degree of measurement, of test, of definiteness in the work of achieving appropriate cost.