

"HISTORY OF VALUE ENGINEERING"

A I E

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S A V E

New York, 3/14/64

General Electric Company
L. D. Miles

WHAT DID IT MEAN?

Earliest Value Engineering experience started telling us something. For five years we didn't hear it. Finally we heard.

But--how and why did value engineering start?

A supervisor stormed into the office saying, "We've got to have 5000 steel bolts a foot long by Friday." When phoned, the sales manager said, "Not a chance in the world." But, "Instead of bolts--if you can use studs with two nuts, we can ship them; and they will cost you 10% less." For making cable reels they were equally suitable. We were "forced" into better value.

A thousand cartons didn't come in. An SOS flashed to our Experimental Packaging Laboratory, "Make up a hundred cartons for tomorrow's shipments." Quickly a design was made up, drop tested, bump tested, and vibrated. It protected its product better than the former carton and instead of 30¢--cost 20¢. Again we had been pushed into better value.

Small Alnico magnets were used in a control device. The machine for grinding the faces broke down during an urgent demand for controls. Quick tests proved that for this application performance was equally good without the grinding and costs dropped 20%. Again we were forced into better value.

Nearly each time any circumstance caused knowledgeable men to stop and think, good results grew.

What was it telling us?

"Unnecessary cost is a people problem."

Research started. Objective: Learn what must be supplied to our system to identify lots more unnecessary cost much sooner.

Of a dozen surprising "finds" on the first product researched, one was three springs. The sales manager of a responsible company making springs was given the device, the springs, and the spring specifications. He was asked to have the application studied and quote on the most suitable springs for the applications. He said, "No, I won't do it! You have spring designers who have specified these... if I lose their good will, I'll lose all of your spring business."

Again we were being told that "unnecessary cost is a people problem".

Later, assured of engineering concurrence, the supplier suggested specifications and quotations which reduced this yearly spring cost from \$43,000 to \$23,000 with an improvement in operation.

My boss called. He said that one of the managers of work on this product had just been in to see him--had pointed out that the product had just been thoroughly studied by engineering, manufacturing, and purchasing people and requested that we terminate our work on it immediately "in order to end a senseless duplication of effort." My boss said, "Keep up the good work--sounds as though you have something good starting."

We were again being told that "unnecessary cost is a people problem".

"WE ALREADY DO IT"

A manager called saying, "I've heard a lot about value engineering--it sounds good. But--we have such an excellent cost reduction activity which includes manufacturing, engineering, and purchasing that I don't believe you could do us a dollar's worth of good."... "Maybe you're right--we are willing to prove it one way or the other."... "How would you do it?"... "You send to our office a complete device, and a sample of each part that goes into it--also, present costs, a set of drawings and labor planning cards--and, while we're at it, send along an engineer--for six weeks. We'll rest our case on the evidence." The next day we called saying, "When and how do we start?" Two days later, the job was underway--Results six weeks later! Forty-six parts with total cost reduction of \$101 on each assembly.

One part costing \$4.15 could be made somewhat differently and purchased for 15¢.

Five parts averaged 50¢ each less from better suppliers.

On fourteen parts, vendors' standards or near standards were found in lieu of special parts saving \$3.50.

On six parts, the purchasing ideas brought forth resulted in engineering changes saving \$8.

On ten parts involving purchasing and manufacturing, \$14 was saved.

On ten parts involving engineering and manufacturing, \$19 was saved.

On five additional parts, manufacturing, engineering, and purchasing changes brought \$50 saving.

What did it tell us? "Unnecessary cost is a people problem."

Our research differed from much research--it sought out better systems for reaching economic objectives, while keeping all performance capabilities of the product. It dealt with performance and with cost. It was establishing performance/cost relationships.

On another research project, tests showed that a 1/8" copper tube would result in identical performance to the 1/4" tube used, and save \$1000 per week in material cost. The engineers approved it--changed the specifications. Eight weeks later the 1/4" was still being used at \$1000 extra per week! Why? Because a minor tool change costing \$350 was needed and "the schedule showed a 20-weeks' wait for any tool change"... \$20,000 worth of "wait" to do a \$350 job! One more week and it went in.

Again we were being told, "unnecessary cost is a people problem."

IN FIVE YEARS WE LEARNED

At last we learned--

we don't have a technical assignment,
we have a psychological assignment.

Different "people" approaches are needed... different techniques, concepts, understandings which will cause people to see differently, to think differently, and yes, on occasion, to do differently.

Aside from the effect of normal people's attitudes, habits, practices, and frailties, much unnecessary cost further gets into products or processes because:

Ideally, a product or process is...

... engineered by engineers who, as of that date, know all existing applicable science.

... drawn, detailed, and specified by draftsmen who know all available standard components, relative prices, alternate usable materials.

- ... planned by men who know the fastest and finest tooling and whose ingenuity produces the best jiggling and fixtures consistent with the expected volume.
- ... manufactured by people who know and use the topmost manufacturing ideas.
- ... purchased by buyers who know exactly the best suppliers who by their equipment, ingenuity, personnel and management will provide best material at lowest cost.

Actually, none of the five will be that good.

Through what means can new, more appropriate, more timely thought and action be generated?

THIS ONE STAYS

Search for a cornerstone on which to build a new structure of thought disclosed a familiar one. . . FUNCTION. It traditionally supported some thought structure. It shared its influence on results with habits, attitudes, rules, practices, etc.

The function emphasis, now becoming better and better known, first started by tottering all of its "helpers"--habit, attitude, custom, practice, etc.-- from their positions. Thus did the environment for new thought come forth.

No cost but for customer function!

Only two types of function allowed!

Use function--performs a "use" the customer wants.
Esteem function pleases him and causes him to buy "this" one.

Any other cost is unnecessary cost.

Soon more techniques were clustered around function--naming precisely, naming in two words, naming with a verb and a noun, dividing into basic and secondary and tertiary; forming into functional groups; finally and very significantly, evaluating each function and each group of functions by comparison--determining their dollar value.

While mentally at sea in this labyrinth of functional thinking, the old mental guideposts got lost and new thought was produced based upon--"What function does the customer want? and How can we get it for him?"

A host of supportive approaches and techniques--such as, search techniques, evaluation techniques, creative techniques, and task progression techniques--was added as need showed itself during the research assignment. Now a fairly complete system which recognized and dealt with the "people" factors and identified unnecessary cost more efficiently was in being.

SO NOW WHAT?

Such remarkable results were produced by this approach that when they were shown to the vice presidents they said, "Train 1000 men per year."

Then began the depth experiences of the "learn it" and "do it" seminars, at first four weeks full time, which reached both men's minds and emotions.

Typical quotations of experienced men from management, engineering, manufacturing, and purchasing...

"The benefit gained by this seminar cannot be measured. It opened our eyes and changed our way of thinking."

"It was terrific. I've never gotten so much good in so short a time--it has changed my thought habits."

"In the past three weeks, my mental processes have gone through a 'change of life'. The entire seminar was a masterpiece."

"I had hoped the seminar would help us reduce costs. Now I see how vast the possibilities are."

OOPS!

But we were soon due for another surprise and shock. These trained men went back into an environment which didn't know what had happened to them.

Men in the environment did not understand the new additive.

"What men do not understand, they discredit."

So now we saw the operation of the great law which governs people's reaction to the new...

First, ignore it--it will probably go away and die.

Second, oppose it if it shows vitality--for it may affect our way of life.

Third, accept it--and contend that we always did believe in it.

From 1948-1953 was the "ignore" stage.

We were now in the 1954-1958 stage of opposition. From all sides came invective, ridicule, depreciation, derision!

"The Value Engineering system is 'to do it wrong first, then change it'."

"Value Engineering is effective only in fringe areas and dark corners."

"Value Engineering is a crutch organization."

"Value Engineering work means lower quality."

"Value Engineering is an organized system for finding fault with existing functional work."

"The purpose of Value Engineering is to 'needle' each man and keep him cost conscious."

"If a man was good enough to evaluate our engineers' designs, we would put him on design work."

TIME AND MAN MARCH ON

But strong and knowledgeable men saw its performance and its potential. They spoke out in its support.

Men in the Bureau of Ships looked it over, found it good, and started supporting it. Other government agencies followed.

Consultants who were teaching it for us saw the monumental industry and government need for training and started broadly providing it. The melting pot of industry took large numbers of men with training from us to our customer and competitor companies.

So it moved into the third and final phase--that of growing acceptance.

An independent investigator, working under a foundation grant a few months ago, said,

"A uniqueness in the value engineering concepts, approaches and techniques is that they recognize the influence of psychological factors upon unnecessary costs, are trying to understand these influences, and to deal effectively with them."

Since history ends one second ago, I might add that today tens of thousands agree that, like the benign elephant, value engineering is a much needed servant. However, some have felt its ears and say the elephant is flat; others, its tail, and say the elephant is round; and still others, its tusks, and contend it is sharp.

Time and work will jell a common language.

THE END OF THE BEGINNING

Meanwhile, to me it has become a complete system--an arrangement of techniques--some old, some modified, some new, which deal with people's minds, attitudes, habits, and actions by causing different thinking. . .

FIRST--through the use of the function-based approaches--by making crystal clear each function the customer wants;

SECOND, by establishing the value--appropriate cost--of each function by comparisons;

THIRD, by causing the required knowledge, creativity, and initiative to be used at the proper time to accomplish each function for that cost.

As we conclude this history of value engineering, and look to its future, let's bring into clear focus. . . that it is not the doings of a few drips of water up on the mountain at the headwaters of the mighty Amazon, but the doings of the torrents of drips that join it along its course that determine its destiny.

AIE - SAVE New York City..... 3/14/64..... L. D. Miles
About 200 men, basically manufacturing engineers
and managers of manufacturing engineers
45 min..... 100%

Thank you, Marvin

So many new - larger opportunity

In Nebraska - pushed up rocks

What's under the rocks?

How do we get them off sooner?

Pushed up from below.

VE - same

bolts - cable reel

cartons

ground magnets

Not technical - but people

Study

How do they grow

same seed

same soil

same fertilizer

Plastic cast \$320 M - 270 M

Manager said STOP

people problem

but we didn't know it.

Springs

same job

people problem

1 - Task to learn what could be done

2 - Implement it

people problems prevent both

example of

1 - stainless pin - engineer said don't know why we are here

2 - 1/4-1/8" cu tube

\$350 tools

How to get different thinking

Function

Traditional

Traditional helpers

No cost but function

No function but 2

use

esteem

Refrig.

Motor

Cluster other tech. around function -- ident. -- name, etc.

Evaluate

Lose old thought guideposts

Page 2
AIEE-SAVE
3/14/64

VP 3 - 1000 men
60 days full time
mgrs. afraid not to send men
tremendous results
quotations

People problem and we were getting with it

But

1948 - 53

1953 - 58

Men discredit
environment

Negatives

Quote

Then

1959 on

BuShips

Others

Other industries

Consultants to teach

Foundation study

Elephant

ear

tail

tusk

Common language

Definition - to me

Military - rest of world

Conclusion - _____