Date for Evidence to Readers Digest that First Person Story is Accurate

Why Invent a Profession

By James L. Schuler

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In the May-June 1955 issue of this Journal, Mr. Alvin Brown explained "How to invent a profession". The humor of this article was refreshing. But it touches only the fringe of a really fundamental human problem. I refer to the problem of why new professions are invented. Do we need new professions and, if so, why? Professions, like people, are born. They grow—they contribute they become middle aged they get old. Rarely do they die. But frequently they show signs of old age.

The subject of "Why invent a profession" covers many of the problems from toddling to tottering in professional growth. It explains the advent of such new professions as Value Engineering, Value Analysis, Statistical Analysis, Operations Research, Mathematical Programming and Industrial Engineering. It explains the advent of older professions such as Electronic Engineering, Electrical Engineering, Civil Engineering and Naval Architecture as well as Law and Medicine.

The dynamics of the life of a profession start with a need. This need is frequently the result of the mental rigor mortis of people in existing professions. The old profession will fail to fill a need because it is newer than the profession. The needs of society change even as society itself changes.

Along comes a man with a creative spark and a less-calcified attitude. He sees a need and notes the gap between existing professions. He conceives a solution and his one per cent inspiration is done. He begins to supply the ninety-nine per cent perspiration required to satiate the need. This creative man deserves a good deal of credit because he is the "spark plug". He invents a profession to do a job. It works well for a time.

Then, when everyone is aware of the need, these ideas filter down to the working level. They eventually become entombed in text books and are preached to the next generation. This generation, on the average, is average. If there had been no wheel, they could not have invented the wheel. If there had been no language, they could not have invented a language. If there had been no electricity, they could not have discovered electricity. They don't invent they use. This relieves the new engineer because he couldn't re-invent the five basic machines. He can accept his inheritance. He can drink in the wisdom distilled from prior creative minds. If he is creative, he can create something new on the foundation of previous creations.

You cannot tell anyone how to invent a profession. Like all creative endeavors, only a few people are capable of real invention. These few don't need instruction. Conversely, all of the directions in the world won't help those who are not creative because you cannot teach people how to realize that a problem exists. The first symptom is a man banging his head against a problem. Soon he either learns to live with it or he sets out to change things. One tool for changing things is the invention of a new profession.

The crux of the discussion, therefore, is why not create within the old professions. Why invent a new profession? Why think up a new name? Why use new words? Because new words get old. Because old words are often spoken without clear thought behind them. Because a person has to think when he deals with a new term. New terms are used to denote a new facet of a problem. This is a tool used to fight the natural human tendency to enshrine the past. It is good to learn from yesterday but it is a grave error to worship it. So, knowing full-well that by tomorrow, today will be yesterday, the creative man sets out to right the wrong.

The creative engineer usually sets out to save some money. He is not really interested in the money for itself. Money is merely a convenient way of measuring. If he saves a dollar he is really saving a dollar's worth of human effort. This saving may reflect itself in a higher standard of living on a fuller, happier life. It will result in enhanced human value.

Time does not stand still. The process of aging goes on. The symptoms of advanced age are obvious in the older professions. Medicine and Law are good examples. By giving every sore thumb and broken toe nail a latin name, the medical student studies latin instead of how to cure diseases. A lawyer studies res adjudicata rather than the fundamentals of justice between humans. In short, the average professional man spends far too much time pawing over the dry bones of his profession when he should be thinking of ways to give it a blood transfusion.

When a creative individual brings forth a new idea he may integrate his approach into an old profession or he may decide to establish a new profession. In either case he should be embraced hospitably not derided or belittled. Every truly great man in history was considered radical because he was ahead of his time. But times change swiftly even if men do not.

As professional men, we should strive to keep our professions moving. We should neither deride nor fear new names, new languages or new ideas. If we must deride, then deride stagnation.

How to Invent a Profession

By Alvin Brown

Do you want to Do Things and Be Somebody? Do you want to Sublimate your knowledge and Rise Above the common level? Well, why not? You, too, can invent a profession. Just follow this blueprint:

1. Detect some phase of industrial operation that might be improved. This first step is easy. Industrial operators are human and have their share of human frailties. Moreover, they are usually anxious to improve their work, and therefore easily persuaded of their faults.

2. Attribute the fault to all industry. Don't say, Some companies could reduce their material costs, or, Some companies don't fix the responsibility for economy. Speak of the "comparative neglect of materials problems in the past" and say that "the engineers typically expect the buyers not to bother them."[1] Obviously, a fault shared by everyone can't be cured by mere urging to do a better job. It will be recognized that something drastic is called for. This is the cornerstone for a new department of knowledge.

3. Invent a name. Here we reach a highly critical step. Semantics is the handmaiden of this undertaking, but the name in particular demands a delicate touch. Avoid unfamiliar words; rather, seek a new combination of familiar words. Thus, "operations" and "research" are common-place separately, but together they achieve an esoteric quality. "Research" is a very dynamic word. No one will suspect that they mean merely the thinking a man ought to do about his job. "Value analysis" hasn't quite the same force, but yet it is an intriguing junction of two otherwise familiar words. "Mathematical programing" implies a world revolving in the perfect order of the sidereal system.

4. Invent a language. Here you face a real test of your ingenuity. All your work will be wasted if you can't rise above the common language of industry; the facade of novelty can crumble at a touch of the familiar. Don't say, Buy good enough materials at the best price, but instead, "In effect, the notion of highest quality as an absolute standard is rejected and replaced with a practical idea of the quality best suited for the price range and design problems of a particular company's products."[2] Don't say, by getting someone to do the details, an executive has more time to use his judgment; it is much more in keeping with the dignity of a new profession to say, "operations research will affect the executive's job by making him more conscious of intangibles. By presenting him with a comprehensive analysis of the quantitative factors it will focus his attention on those areas where his judgment is of prime importance."[3] Of course, you'll never speak of what makes a customer tick; you'll say, "when the scientist looks at these same figures, he seeks in them a clue to the fundamental behavior pattern of the customers."[4] And it just won't do to give each factor in a problem its proper weight; you must "combine and sublimate such otherwise inconsistent goals to a higher unified and consistent goal."[5]

5. There are, nevertheless, certain standard words that readers expect to find in literature of this character, without which you may not achieve a ring of true authenticity. Thus, you are expected to speak of "techniques" rather than methods, and if you feel obliged to use the latter term in any form, be sure you say "methodology." Then it is indispensable that you "integrate" something or somebody; you had best call your profession an "integrating process." Decisions must never be carried out; they must be "implemented." It will be good if you can work in "automation" somewhere and thus get the umbrella of the forward-looking who are no longer content merely to mechanize. If any of your ideas sounds a trifle weak, just say it is "practical;" that always convinces a business man. When anything needs to be adapted to something else, don't make the mistake of using that word; don't say "geared," either, for that will stamp you as just a little out of date; the only possible word today is "tailored."

6. Now you are ready to go to your public. And first, of course, you must tell them what your profession is. But be careful! It's not wise to give it too precise a definition. Don't be so incautious as to say, "In a larger sense, value analysis is just a special name for good procurement."[6] That would give you away. Besides, if you give a good broad definition, maybe it will cover some fields of activity you haven't thought of Try for an approach like this: "It is not our purpose to engage in any inconclusive battle over definitions of the concept."[7] If you can succeed in discussing your subject without telling anyone what it is, then you've nothing to worry about; you're in!

7. Next to the name, the most important thing is to convince people that this is no old stuff you are giving them. Grasp this nettle firmly. Fling it at them: "There is a new concept in management. It is called operations research."[8] "Mathematical programing is not just an improved way of getting certain jobs done. It is in every sense a *new* way."[9]

8. A touch of Gestalt won't do any harm. See if you can evolve something like this: "Operations are considered as an entity. The subject matter studied is not the equipment used, nor the morale of the participants, nor the physical properties of the output; it is the combination of these in total, as an economic process."[10]

9. You must let industrial managers know they are dumb, but this requires a deft touch, as you can imagine. You have to do this, because, if they aren't dumb, you can't make a case for taking over part of their job. But you can't let them know *how* dumb. So take it gently. By saying something like, "Many executives believe that a comprehensive, objective, quantitative analysis of the

[1] Stanley S. Miller, "How to Get the Most Out of Value Analysis," Harvard Business Review, January-February, pp.123, 128.

[2] Miller, ibid., p. 123

[3] John J. Caminer and Gerhard R. Andlinger, "Operations Research Roundup," Harvard Business Review, November-December 1954, p. 136.

[4] Cyril C. Hermann and John F. Magee, "Operations Research for Management," Harvard Business Review, July-August 1953, p. 101.

[5] Herrmann and Magee, ibid., p. 106.

[6] Miller, ibid., p. 131

[7] Caminer and Andlinger, ibid., p. 132.

[8] Herrmann and Magee, ibid., p. 100

[9] Alexander Henderson and Robert Schlaifer, "Mathematical Programming," Harvard Business Review, May-June 1954, p. 73

[10] Herrmann and Magee, ibid., p. 101

factors affecting a major decision would be very useful to them,"[11] you can suggest to them that they have been underprivileged. Or perhaps you can flatter them a little (not too much) by pointing out how "the initiation of a value-analysis program depends on top management, and the continuing supervision of value is a top-management responsibility."[12] Top it off by admitting that your program will naturally have its greatest appeal to "soundly-managed companies."

10. Be modest about your accomplishments—but not too modest. Remember, as a scientist you are entitled to deference. Drop a name or two — nuclear physicists are good company to be in. This will let you take a lofty tone. "The scientific method, in its ideal form, calls for a rather special mental attitude, foremost in which is a reverence for facts."[13] Don't permit any inference that you would care to associate with lesser fry. "Operations research people are scientists, not experts."[14]

11. Now we come to the crux of our project. No door to this new profession must be left open to the uninitiated. Ordinary operating men mustn't get the idea that they can do the thinking about their problems. "Mathematical programming is not a patented cure-all which the business man can buy for a fixed price and put into operation with no further thought."[15] So you must say, "committees are most successful when they are supported by permanent groups to implement their decisions."[16] Or better still, just take it for granted that this will be an exclusive affair by a remark like this: "The O. R. team should be attached to the operating line in a staff capacity."[17]

12. Now for the final brick in your edifice. No one can be allowed to get the notion that this important work might occupy any menial position in the company structure, where jealous underlings might deflect your light. Now is the time to tell top executives that your place is right at their elbow, putting your hand to the same plow. "The O. R. team should not become a part of an existing service department," because the results of its thinking might get merged in factual (sic) investigations by other staff men. No, sir! "The O. R. team should be attached to a high level of management."[18] They may keep their titles and draw their salaries, but you'll be close at hand doing their thinking for them. "It must be established at least at a level where decisions can be made and where there is access to the executives."[19] *At least*, you understand!

[11] Caminer and Andlinger, ibid., p. 136.
[12] Miller, ibid., p. 125.
[13] Herrmann and Magee, ibid., p. 101
[14] Herrmann and Magee, ibid., p. 108
[15] Henderson and Schlaifer, ibid., p. 75
[16] Miller, ibid., p. 131.
[17] Caminer and Andlinger, ibid., p. 133.
[18] Caminer and Andlinger, ibid., p. 133
[19] Herrmann and Magee, ibid., p. 110.

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A Reply to Prof. Wayland P. Smith's Article

"Travel Charting—First Air for Plant Layout"

By James L. Lundy,
Instructor, University of Minnesota

Professor Smith's appreciation of travel charting as an analytical tool is no greater than mine. However, in his enthusiasm, Professor Smith has marred an otherwise informative presentation with the inclusion of one step which would make the travel chart lie to the unwary user. The problem arises in step 5.2 of the first example in which an attempt is made to calculate handling efficiency for a process layout.

In order to minimize the length of this discussion let us accept Mr. Smith's basic assumptions made in section 1. I point out that this is done for simplicity, (and Mr. Smith apparently had simplicity in mind in the origin of these assumptions) for the assumptions themselves could be subjected to considerable study and analysis. For example, wherein did the factor "twice" arise in the statement "Back-tracking will be considered *twice* as bad as moving work forward." Why not "three times" or "four times" or, better yet—why not equal? Is direction of movement so important in a process layout?

The important assumption is that the effectiveness of the layout is a function of the aggregate weights times distance. As Mr. Smith pointed out earlier in the article, some factor other than weight might be better for particular cases, but let us accept this as a valid assumption in light of the simplicity desired.

If we also assume (as Mr. Smith does) that the process sequences for individual parts are unalterable and that distances between work stations are equal, we are able to agree that 100 per cent efficiency in movement will be achieved when we minimize the sum of all weights x unit moves. A unit move is defined as a move between two adjacent work stations. A given weight going from A past B to C would thus accrue two unit moves. This 100 per cent efficiency value is 402.2 in the example given by Mr. Smith.

Smith's efficiency formula is

$$E \text{ (in per cent)} = \frac{402.2 \times 100}{X}$$

where X is the actual aggregate of weights x unit moves. The breakdown of this calculation lies in the invalid procedure used to figure unit moves. Mr. Smith says to find X by ". . . summing up all the numbers [meaning weights] which are the same unit distance away from the diagonal and multiplying this value times the unit distance from the diagonal." *This calculation is valid only if we assume that our plant is to be laid out in a straight line.*

Along these same lines, Mr. Smith says that when the headings are properly rearranged on the chart, the 100 per cent efficient situation will appear with all numbers located in squares adjacent to the diagonal. This also is dependent on the use of a straight line layout.

A simple example will illustrate the weakness of his efficiency analysis.

Part No.	Movement in Weight-Distance Units Per Mo.	Sequence
I	100	A, B, C, D
II	200	A, C,
III	300	C, D, B

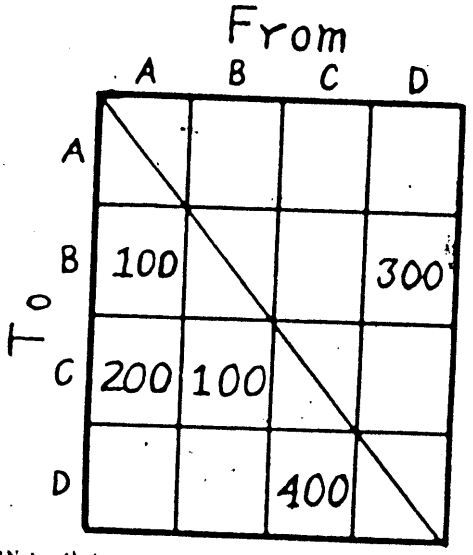
The theoretical 100 per cent efficiency movement value is

$$(100 \times 3) + (200 \times 1) + (300 \times 2) = 1100$$

Smith's efficiency formula would then be

$$E = \frac{1100 \times 100}{X}$$

Transferring the data to a chart, we get the following*



*Note that no special penalty is awarded to "backtracking" in this example

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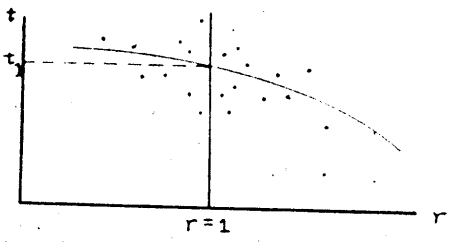

Figure 1. Standard Time = at_1

curve) on the scatter diagram.

(9) Locate the point $(1, t_1)$ of intersection of the regression curve and the line $r=1$.

(10) Multiply the t coordinate t_1 of this point by the allowance factor a obtained from a separate ratio-delay study.

Figure 1 illustrates the above method.

Conclusion

The initial results of this investigation have been presented in the hope that they may stimulate further analysis of this and other phases of work measurement.

It is recognized that deviations from the prescribed steps may be necessary in practice. For example, a large number of sample points, though desirable for high reliability of the estimate, may involve excessive cost. Nevertheless, the intent has been to develop a statistically sound technique to estimate standard time.

It should be noted that the proposed model replaces the narrow definition given in equation (2), where the speed rating factor r multiplies the observed time t, by the more general notion of relating r and t by means of the pair (r, t). Thus performance rating could be used instead of speed rating provided normal performance is first defined. In any case, the relation between r and t, as reflected by the scatter diagram, need not be linear. Thus the proposed statistical model has the advantage of being more general, in addition to being more realistic.

INVENT A PROFESSION

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So there's your program. Ah, but haven't we overlooked one thing. We should give this blueprint a name, shouldn't we? A couple of good workaday words that will make a striking combination. How about Profession Synthesis? And of course we'll abbreviate that to P. S.

But that's only your affirmative program. You'll need to prepare a defense, too. The skilled strategist looks both ways. Not that you need have any apprehension about industrial executives. They'll buy it. You can be assured of this when you read that "Few executives felt they understood the highly complex and technical nature of O. R.", yet nevertheless, "In general the feeling is that operations research is becoming an integral part of progress in business."[20]

[20]Caminer and Andlinger, ibid., pp. 134, 136.

No; but some snide member of a competing profession (you can't keep on inventing professions without getting some overlapping) may take a potshot at you. You must be prepared.

Suppose it is suggested that the operating man ought to be encouraged to do his own thinking rather than have someone else do it for him; suppose it is suggested that doing his thinking for him "constitutes a threat to the initiative of the operating personnel."[21] Well, your answer to that one is plain enough. You will say that the operating man has had his chance to do his own thinking, and he hasn't done it, so he should get out of the way and let somebody think who can and will — and, besides, he couldn't ever do your kind of thinking anyhow.

Then suppose your critic comes back with the query, Well, is there a new kind of thinking? Don't you still get the facts, appraise them, and reason from them to a conclusion? Have you got a different way of thinking?—Here you must be gentle with your heckler, and, if you pity his innocence, don't show it too much. Just tell him he probably won't understand, but you do your thinking with probabilities and binomial distributions and sensitive parameters, plus a dash of electronic computing. Better go easy on sampling because he may know something about that.

Now you are at a danger point. Chances are your cynic will rally with the suggestion that that sounds like mathmatics to him, and isn't this new concept of yours just a greater use of mathematics? and why not let the operating man do all the thinking his experience and training qualify him for, and you just offer your assistance as a mathematician? This is a canard that must be squelched immediately, for it strikes at the very foundation of your new profession. Repudiate any suggestion that your profession has any affiliation with market research, quality control, industrial engineering, statistics—or common sense. Be a little indignant if it is called a new sales or product gimmick. Leave no doubt that "In truth, operations research is none of these thing."[22]

If the doubter still doubts, it is now time to become austere. You must make an appeal to the man's instinct of conformity. Manage your answer something like this: "Management must also, at times, have an almost implicit faith in the ability of the operations analyst. This faith will come easier once management gains more knowledge of the new tool."[23] You can be sure this will hold him, and you won't have to explain how he can get knowledge by relying on faith.

Your greatest danger, however, will come from yourself—from the still voice within you. You may hear it whisper, What ever happened to Technocracy? Pay no attention. You have one abiding assurance. Even if you have n ing new but a name, still, if it's ta about enough, you'll make some of t old mossbacks sit up and think a l more before making their snap decisi

Now you're all set.

Good luck!

[21]Miller, ibid., p. 130.

[22]Hermann and Magee, ibid., p. 100.

[23]Caminer and Andlinger, ibid., p. 134.

A REPLY

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Now we calculate the efficiency of straight-line layout as Smith would it. X is found to be 600 weight unit 1 distance unit + 500 weight unit 2 distance units or 1600 weight-dista units.

$$E = \frac{1100 \times 100}{1600} = 69\%$$

By rearranging the table to A C B, X will drop to 1400 and E will t be raised to 78 per cent.

But why confine ourselves to t unrealistic linear layout as shown bel to the left? By using the right ha diagram we can present a schema layout which gives a more satisfacto basis for determining X.

A B

A C D B

C D

We can consider all the movement fr A to B, then B to C, etc., and set up t calculation for X as follows:

$X = (100 \times 1) + (200 \times 1) + (100 \times 2)$
(A to B, A to C, B to C)
$(400 \times 1) + (300 \times 1)$
(C to D, D to B)

$X = 1141$

$E = \frac{1100 \times 100}{1141} = 96\%$

The only "inefficient" movement seen to be the movement of 100 weigh units from B to C (1.41 distance units, .41 distance units more than the min mum possible). If diagonal aisles ar not allowed, we would have a distance 2.0 units between B and C, which woul lower our efficiency slightly.

In conclusion, let me say that trav charts are of great value in helping th layout engineer decide which departmen should go where in a process-type layout If Mr. Smith's type of layout efficienc index is desired, however, make a sche matic floor plan to determine distanc units—don't count squares in a tabl If greater refinement is desired, mak a rough area allocations to scale an scale off distances. Let's not be con fied to straight-line layouts!

THE CRITERIA

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the consumer desires. Here, again, it should be stated emphatically that the mere fact that this interdependency of the three areas of engineering is not fully recognized and exploited in school

Payroll Engineering Versus Value Analysis

by Louis E. Garono

Chief Engineer
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MUCH has been said about the new field art or profession of value engineering, but as I see it, there is very little new in the method of analyzing a problem. This is the analytical approach to design work that every decent engineer should use seven days a week.

Most value engineers believe their department should be directly under the Executive Vice-President and that they should be able to move through the organization looking over everyone's shoulders and generally disrupting organization channels.

All examples of savings and improvements used in literature on this subject indicate that the value engineers studied the finished product and then made improvements on this end product.

Is it not much more logical that these people be placed in the established engineering department where they could either review initial design or use their talents to design or eliminate items prior to original purchase?

This would mean that the first million items would not be built with an expensive component and there would not be a full series of expensive spares in the spare parts system to support a component that should have been eliminated in the first place.

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: These people who have special know-how in plastics, mechanical engineering or gadgeteering could be assembled as a part of the engineering department for design review. After a 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.

It may seem odd that enormous amounts of money can be saved as indicated in the recent article "Who Needs Value Engineering?" by RAdm Richard Mandelkorn, telling how $18 million was saved in shipbuilding in the first year.

This means only one thing: That the Navy's attitude has changed abruptly —that the Navy is taking a closer look at their need for brass valves, portholes, and many nice but not necessary items for equipping ships.

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 some industries, it certainly is not 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 applicances, 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.

Some people believe we have a satisfactory piece of equipment. But the real product engineers don't see it this way. They see the typewriter as a piece of equipment that will take dictation and give you a perfect letter, no misspelled words, punctuation in the right places, grammer unscrambled so that poor dictation will come out in perfect English, and ideas clearly defined to eliminate misunderstanding between dictator and reader. It will take a long time for this to happen, and there will be more product engineering and more dollars spent in the meantime. It may prove, as the value engineers say, that the typewriter as we know it is outmoded, and a new piece of equipment may take its place. This is still product engineering; but I believe value engineering will gain all the credit for eliminating the typewriter and dollars saved with perfect letters.

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?

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.

What we do not understand, we ignore or discredit.

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, surprisingly 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.

Functions costing—$127 for $32; $20 for $8; $4.50 for $.50, etc.

Conclusive proof. More studies followed—with similar results.

Embarrassing Audits

Value techniques developed by private industry under pressures of competitive markets produced similar results in the military. But how could they be applied? When? And by whom?

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.

Parellels 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.

In the period of 1840, Dr. James Esdaile, a surgeon, found that hypnotism was effective in eliminating pain, allowing surgical operations. He found amputations and other surgical work of the most serious type could be conducted without pain to the patients. He also found that recovery was much more rapid than when the patient was forced to endure the pain. He demonstrated this to some of his medical peers. He was ostracized, driven from the Association.

He went to India where he set up a hospital, taught a dozen native people to do the hypnotizing and, for a decade, performed surgery by this means while constantly inviting members of the medical profession, government bodies, and others to view it and examine it in every detail endeavoring to secure its acceptance by the medical group. In spite of all of this accumulated evidence, he continued to be the subject of suspicion and ridicule and the use of hypnosis, then called mesmerism, was not accepted. In 1850 he decided that the only way to force this humane improvement in medical practice was to take it to the public who, in turn, would force the medical profession to use it. Hence, the book titled, "Mesmerism in India" was written and copyrighted in 1850.

Of course, then came Freud about fifty years later who provided a reasonable explanation for what Esdaile had learned and practiced. Now, another fifty years later, the medical profession is starting to study in earnest the use of hypnotism. Thousands of doctors are now studying it.

In 1845 Horace Wells, a dentist in Boston, while attending an entertainment in which nitrous oxide was used to cause people to "act funny" noted that one of the persons received a serious and bloody blow on his shin, still said he couldn't feel it. He seized upon it as a means for alleviating great pain which then accompanied extractions, dental surgery, and the like. He found, to his great delight, that it was a boon to mankind and did greatly reduce the horrible distress and physical pain at extractions. In 1846 he engaged the amphitheater of the Massachusetts General Hospital and invited doctors who would be interested, to its capacity. He had a subject and was preparing for an extraction. The shout of "quack" issued from someone in the crowd and became a roar. He left the amphitheater a dejected figure feeling in disgrace and a few days later committed suicide because of his failure to convince physicians and dentists of the efficiency of nitrous oxide in minimizing pain.

ELEMENTS OF PLOT

Drama consists of a character in conflict.
"A" desiring "B" is opposed by "C". This is Conflict.

These lists are merely to serve as illustrations. Each student should compile lists of his own -- making them as extensive as possible at the outset and continually adding to them.

A. CHARACTERS	B. OBJECTIVES	C. OBSTACLES	D. SOLUTIONS
actor	Possession of:	Pitted against:	argument
author	ability	authority	artifice
badman	car	beauty	bargaining
banker	courage	education	courage
builder	education	experience	cunning
bum	health	law	discovery
carpenter	home	logic	disguise
clerk	honor	money	espionage
conductor	love	power	force
contractor	map	seniority	hypnotism
dancer	power	stature	gimmick
debutante	pride	Being:	influence
doctor	strength	blind	law
editor	wealth	broke	logic
educator	Relief from:	crippled	money
engineer	ailment	despised	persistence
fireman	bad habit	dishonored	persuasion
foreman	captivity	homely	prayer
governor	deformity	ill	pursuit
grafter	fear	stupid	psychology
gravedigger	hardship	suspected	Sacrifice of:
hunter	loneliness	soft-hearted	child
inventor	peril	Lack of:	freedom
judge	persecution	ability	friend
juggler	scorn	courage	happiness
king	suspense	clothing	health
lawyer	temptation	influence	honor
miner	threat	freedom	life
musician	Revenge against:	knowledge	love
newcomer	accuser	loyalty	loved one
nurse	arsonist	proximity	pleasure
overseer	blackmailer	tact	position
playboy	community	understanding	possession
prospector	gang	Held to:	pride
reporter	homewrecker	contract	revenge
salesman	killer	dream	sleep
scientist	life	duty	wealth
slave	rival	honor	threat
soldier	slanderer	oath	tip-off
tailor	slavedriver	obligation	understanding
taxi driver	tattler	promise	vigilance
undertaker	teaser	tradition	wits
virgin	tradition	vigil	writing

During treatment consider each character in terms of both female and male ... time past and ... consider settings in foreign lands ... can be sub...

THE MORPHOLOGICAL APPROACH TO PLOTTING

from the
CREATIVE WRITING WORKBOOK
by Fran Striker

ASSEMBLING MATERIALS:

On Worksheet 1 fill in the following:

Character (A) — the protagonist
Objective (B)
Obstacle (C)
Solution (D)
Setting. This includes time and atmosphere as well as place.
Name of protagonist
Name of antagonist

DEVELOPING MATERIALS:

Synopsize story on Worksheet 1
Describe main characters on Worksheet 2
Describe setting on Worksheet 3
List items requiring research on Worksheet 4

Time out to circulate and do research

Write a step outline. This is the major task. Include the opening incident (narrative hook) and every step of plot development. Give some description of characters; block out all the action. Some dialog may be included.

Enter type of story on Worksheet 1

Ideate. Study the outline. Brainstorm to find a better opening, a better "tag" (ending) and better bits of "business." Deepen characters and cut out anything that is stereotyped. Make sure your plot builds interest to the climax. Be sure the story follows the formula for its type. This outline may need several rewrites.

State your theme on Worksheet 1
State your single effect on Worksheet 1

Write first draft of story. Check to see that it proves your theme and points to single effect. Check it against "Reasons for Rejection." Take out clichés. Tighten structure. Polish dialog.

THE WRAP-UP:

Write second draft and polish. Lay it aside to "cool" for a week. Read it objectively. Polish again.
Final typing. Proofread, then off to market.

REFERENCE

Elements A
Elements B
Elements C
Elements D

Exhibit A

Exhibit B

Text

Text
Text

Text

Text

WORKSHEET NO. 1

(Numbers correspond to steps on facing page)

1. The protagonist is (A) _____
2. His/her objective is (B) _____
3. He/she is apparently unable to attain this objective because of (C)

   _____
4. The obstacle is surmounted by (D) _____
5. Setting:
   Place (locale) _____
   Time _____
   Atmosphere (tone) _____
6. Name of protagonist _____ nickname _____
7. Name of antagonist _____ nickname _____
8. Synopsis:

14. Type of story (check one)

    Character story ( ) Incident story ( ) Setting story ( )

    Thematic story ( ) Multi-phase story ( )

15. Statement of Theme _____

16. Single effect _____

from Electronics Weekly
Aug 5 1962

TOMORROW'S THINKING

★ A NEW science in manufacturing theory has been successfully developed in America in recent years. The technique of value engineering and analysis, as it is known, can be applied to all forms of manufacturing industry.

Value engineering works from a minute analysis of the function, materials used and manufacturing methods employed in the fabrication and assembly of component parts and sub-assemblies. Any given unit is examined in terms of the function it performs against the cost of manufacture.

Results are secured by integrating the function of the unit in the most economical and efficient manner possible. This process involves the redesigning of sub-assemblies and component parts in a radical way by the utilisation of new materials and achieving reductions in the manufacturing cycle.

The designer's part in applied value engineering is to see that [illegible] Conventional thinking [illegible] have always done it this way" — are removed to allow the newest materials to be used to permit the component par assume its most efficient sh

The science of value engin ing is a young one, but importance is stressed by speed at which it has grown

Many leading companies appointing specialist val engineers responsible at man ing director level to their sta In America this process h been carried further than this country and many lar firms operate value engineeri programmes.

Indeed, the US Departme of Defence now requires sup pliers and contractors under taking contracts of 100,00 dollars and over to apply th techniques of value engineerin to products or assemblies t be manufactured.

It is inevitable that the process will be extended to Britain, and the foretaste that was received at the London presentation recently by Value Analysis Inc has [illegible] people answer that "should come quickly

ABRIL — 1960
Vol. 1 N.º 8

O Dirigente Industrial

REVISTA DE ADMINISTRAÇÃO, PRODUTIVIDADE, EQUIPAMENTOS E PROCESSOS

- Como planejar ou modernizar sua fábrica
- Dirigentes também devem ser treinados
- Aumente sua produção com música funcional
- Grampeamento concorre com solda e rebites
- Suas máquinas precisam mesmo ser trocadas?

Conheça função e valor de cada peça

KNOW THE FUNCTION AND THE VALUE OF EACH PIECE

Um Artigo Especial sôbre Análise do Valor

(Página 47)

Obtenha o mesmo valor pelo custo mais baixo

Nova técnica permite eliminar qualquer desperdício, desde a compra de materiais até a fase de embalagem dos produtos — Meio de reduzir ainda mais os custos

Se sua indústria está modernamente equipada e se a produção utiliza os equipamentos com a máxima eficiência, V. pode ser tentado a cruzar os braços, julgando que nada lhe resta fazer para reduzir os custos.

No entanto, na opinião de técnicos em produtividade, é *agora* que sua emprêsa está realmente madura para adotar uma nova técnica, a análise do valor, e conseguir ainda mais 20% de redução nos custos.

Afirmam as companhias que já utilizam a análise do valor que, de fato, ela não substituiu os métodos tradicionais de simplificação do trabalho. Pelo contrário, entra em ação exatamente onde termina a influência das outras técnicas e permite realizar sensíveis economias mesmo após terem os custos sido bastante reduzidos.

De acôrdo com a experiência da General Electric S.A., de Santo André, SP, uma das pioneiras do método, êste aplica-se a qualquer tipo de indústria e, quando bem conduzido, torna-se poderoso instrumento para melhorar a posição dos produtos no mercado, com relação aos competidores.

Princípios básicos

A análise do valor prende-se ao conceito de que o valor é relativo.

Se uma peça é produzida por 10 cruzeiros e, através de novo método, passa a ser fabricada por 5, terá sido alterado seu valor? Provàvelmente, não. Portanto, o valor de um objeto ou serviço sòmente pode ser determinado por meio de comparação. Por exemplo: o valor de um ventilador não pode ser determinado pelos seus elementos de custo, mas sim pela comparação com outros equipamentos aptos a exercer a mesma função, que é movimentar o ar.

A nova técnica é portanto, antes de tudo, uma avaliação da função de cada objeto. O analista seleciona uma peça e começa a observá-la. Será ela a mais apta a exercer aquela função? Depois de efetuada a comparação com outras peças que poderiam satisfazer o mesmo objetivo, êle procura estabelecer *o valor de uso* de cada uma das peças examinadas. A escolha recairá, lògicamente, naquela de mais baixo custo.

FÔLHA DE ANÁLISE DE VALOR

Nome da unidade	Usada em
N.º do desenho	Quantidade por produto
Produto	Quantidade por ano

PRESENTE	PROPOSTO

	Material direto	Mão-de-obra	Material indireto	Custo da modificação
Custo atual	Cr$	Cr$	Cr$	
Custo previsto	Cr$	Cr$	Cr$	Cr$

Economia anual prevista: Cr$ _____

COMENTÁRIOS —

OUTRAS SUGESTÕES —

Responsável pelo projeto _____

Data: ____ / ____ / ____

Preenchida devidamente pelo especialista, a Fôlha de Análise do Valor propõe para cada peça de um produto recomendações que visam ao seu aperfeiçoamento

Uma das regras básicas, todavia, é não reduzir a qualidade do produto. Durante a análise, são conduzidos testes para apurar se a eliminação de qualquer pormenor não afeta, de qualquer maneira, as características do produto final.

Na opinião do sr. Frank P. Fleming, gerente de materiais da GE de Santo André, e responsável pelo programa de análise do valor, esta técnica é em sua essência, um verdadeiro estudo criativo de cada item da produção, com o objetivo de relacionar o custo com o valor da função ou do serviço prestado.

Quem faz o trabalho

As emprêsas usam diferentes maneiras de conduzir a análise do valor. Uma firma inglesa, por exemplo, designou uma equipe de técnicos para estudar em pormenores cada um dos produtos mais importantes. Um dos técnicos é o analista do valor.

Outras companhias, e entre elas a GE, mantém um analista permanente. Além de conduzir as pesquisas, êle é também encarregado de treinar novos elementos que poderão assistí-lo em seus trabalhos.

Na prática, o analista de valor observa vários produtos ao mesmo tempo, mas habitualmente concentra-se num produto de cada vez. Além de necessitar de treinamento especial nos métodos de análise — afirma o sr. Fleming — êle deve possuir sólidos conhecimentos sôbre o tipo de produção da fábrica. Em outras palavras: será preferìvelmente escolhido entre os engenheiros e técnicos que já trabalharam nas linhas de produção.

Como conduzir a análise

De acôrdo com a experiência do sr. Sérgio Alayon — há dois anos analista da GE — o primeiro passo é decompor um produto ou operação em suas partes componentes. A seguir, cada parte será objeto de uma análise separada, visando a apurar: o que representa, qual a função, o seu custo e o que poderia substituí-la por um custo menor.

O programa de trabalho, simples e formal, divide-se nas seguintes fases:

1 — Coleta de informações — obtenção dos fatos.

2 — Investigação e pesquisa — idéias e sugestões.

3 — Análise do problema — determinação do objetivo.

4 — Programa de ação — escolha de um método.

5 — Execução do plano — solução do problema.

6 — Conclusão — resumo e dados adicionais.

Na primeira etapa dos trabalhos, o analista procura obter desenhos, características e, se possível, uma amostra de tôdas as partes que pretende estudar. A seguir, prepara uma lista dessas

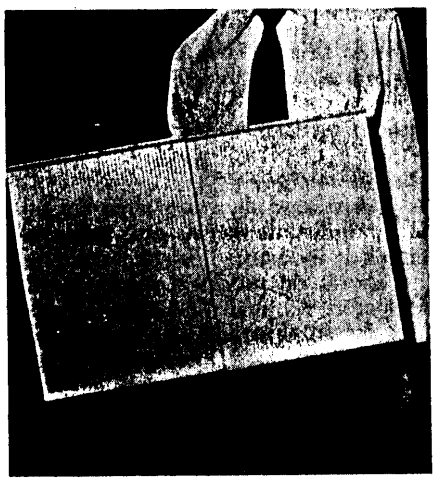
partes, indicando ao lado tôdas as operações necessárias à sua fabricação, ou dados relativos à sua aquisição. Passa, então, a apurar o custo de material, mão-de-obra e despesas de fabricação, anotando-os também na lista.

É de grande importância que tôdas as informações sejam de boa fonte. Com frequência, homens não diretamente responsáveis pelo assunto que se deseja investigar podem fornecer informações incorretas.

Finalmente, possuindo tôdas as informações, o analista pode iniciar sua pesquisa. Segundo o sr. Alayon, é neste ponto que a análise deve assumir a forma de *pensamento criativo*.

O que é *pensamento criativo*? Os técnicos em análise do valor o definem como "ausência de pensamentos negativos". Trata-se, em outras palavras, de pensar em possíveis soluções sem passar imediatamente a julgá-las. A maioria das pessoas, explicam êles, quando tem um problema a resolver não se contenta em procurar uma solução: após tê-la achado, passa a examinar os prós e contras e, com grande frequência, encontra motivos para rejeitá-la.

Para um trabalho criativo, êste procedimento não é correto. O analista deve servir-se largamente, e sem preconceitos, das idéias suas e de todos aquêles que poderão ajudá-lo. Deve encorajar o uso da imaginação, sem levantar objeções antecipadas, que agiriam como freios inibitórios. Sòmente assim, comparando sem reservas o que existe com tudo aquilo que poderia fazer o mesmo serviço, a análise dará resultados positivos.



Pela análise do valor, foi verificado que uma peça plástica pode ser usada vantajosamente em lugar do vidro, na tampa da caixa de frutas da geladeira

Aplicando os testes

À procura de idéias e sugestões, o analista deve responder a perguntas dêste tipo:

- O que isto representa?
- Qual sua verdadeira função?
- Quanto custa?
- Que poderia ser usado em seu lugar?
- Quanto custaria?

A simples resposta a estas perguntas poderá levar o analista a obter uma solução.

De acôrdo com a experiência de várias indústrias, um outro meio eficiente consiste em fazer passar cada parte em exame por uma série de testes. A não ser que a peça seja aprovada em todos êles, haverá com certeza uma maneira de reduzir seu custo. E, quase sempre, o próprio teste sugerirá onde e como reduzir o custo.

Eis aqui alguns dos testes mais comumente usados pelos técnicos da análise do valor:

1 — O uso dessa parte, material ou serviço, é realmente necessário para completar o produto?

Apesar dessa pergunta parecer óbvia, a resposta pode ser surpreendente. Na fábrica de geladeiras da GE, por exemplo, as caixas de embalagem, até alguns meses atrás, levavam parafusos de ferro zincado. Na casa do comprador, após a abertura da caixa, o parafuso não tinha outra função. A análise do valor mostrou, primeiramente, que a zincagem era desnecessária. E foi logo eliminada. Todavia, o analista não se deu por satisfeito. Não existiria uma outra peça para fazer o mesmo trabalho? Assim, não tardou a descobrir que um dos parafusos niveladores da própria geladeira poderia ser utilizado na caixa de embalagem, até a casa do comprador. Lá seria removido pelo entregador e colocado em seu lugar definitivo. A sugestão foi aprovada e o parafuso original foi eliminado.

2 — Todos os detalhes dessa parte ou serviço são necessários?

Às vêzes, as peças são mais complicadas do que é preciso, para cumprir com eficiência a sua função. A simplificação, todavia, não deve remover pormenores que, apesar de aparentemente desnecessários, agradam ao comprador.

Com grande frequência, a eliminação de pormenores se processa combinando suas funções com aquelas de partes adjacentes. Sempre na GE, um bom exemplo da aplicação dêsse

princípio é o caso dos calçados de borracha do compressor da geladeira. Antes, os calços eram comprados na medida oferecida pelo mercado e colocados em número suficiente para alcançar a espessura desejada. Agora, uma única peça, de borracha extrudada e especialmente desenhada, reduziu o custo dessa parte em mais de 70%. E ainda, fazendo um serviço melhor.

3 — Poderia qualquer outra coisa fazer trabalho igual ou melhor?

Pode também acontecer que o resultado da análise aconselhe o uso de uma peça mais cara do que a original. O motivo, naturalmente, é uma eficiência superior e maior duração, o que por sua vez significa economia com relação à vida do produto. Porém, o mais comum, é procurar resposta a esta pergunta com o intuito de achar uma peça que possa fazer um trabalho igual ou melhor por um custo mais baixo.

Os técnicos da GE, substituiram recentemente a tampa de vidro da gaveta inferior da geladeira por uma tampa de plástico. Durante a análise do valor, foi também investigada a aceitação do comprador. Concluiu-se que a tampa de plástico, além de ser mais barata, é preferida pelo consumidor por ser menos exposta a rupturas.

4 — Poderá essa peça ser fabricada por um método mais simples?

Geralmente, o analista de valor não entra em pormenores técnicos. Limita-se a investigar a possibilidade de processos mais econômicos. Caso frequente é o das peças metálicas totalmente usinadas, que passam a ser fabricadas por processos de fundição, que não requerem usinagem. A eliminação destas operações não sòmente reduz o custo como acelera a produção.

5 — Poderá ser usado um produto padronizado?

O uso de peças padronizadas, como parafusos, porcas, rebites e outras, pode resultar em sensível diminuição de custo. Muitas peças pequenas, que estão sendo fabricadas com desenhos especiais, podem ser fàcilmente substituidas por outras de fácil aquisição no mercado.

6 — Outro fornecedor poderá fazer preço melhor?

Não se trata sòmente de investigar entre diferentes fornecedores, o que é normalmente feito pelos compradores. Mas de verificar, também, se algumas partes que estão sendo fabricadas na própria companhia, poderiam ser compradas a um custo inferior.

7 — Estará alguém obtendo isto por menos?

Às vêzes, o mesmo fornecedor pode estabelecer diferentes preços. Vale a pena verificar se existe alguma maneira de se obter um desconto. A quantidade, por exemplo, influi no preço. Pode ser compensador aumentar o estoque para comprar em melhores bases.

8 — Está sendo usado equipamento adequado ao valor da peça?

É possível que equipamentos caros estejam sendo usados para produzir peças de função limitada, ou de pouca produção. Se necessário, os engenheiros poderão redesenhar a peça, permitindo assim o uso de máquinas simples. Em uma indústria de Campinas, por exemplo, um analista do valor descobriu recentemente que grade de proteção de um motor produzido em pequenas quantidades, estava sendo feita de arames soldados. Utilizava-se, para a operação, uma máquina especial de solda. A mesma grade passou a ser feita de chapa estampada numa prensa comum.

De sua sala, o sr. Fleming supervisiona o programa de análise do valor na GE

Não raro, durante a aplicação dos testes, o analista defronta-se com fortes objeções por parte de elementos da própria emprêsa. Na opinião dos técnicos, tais reações são normais e devem ser contornadas com atitudes positivas, com tato e boas relações humanas. Mas, também, com a mesma convicção de que elas podem ser eliminadas. Em muitos casos, superar os objetos é sòmente questão de bom senso. Algumas delas podem ter fundamento, mas outras são simples reflexões de tradições, experiências, hábitos ou, até, atitudes pessoais.

Onde investigar

A análise do valor pode ser iniciada, indistintamente, em todos os setores da indústria, tais como compras, engenharia de produtos, processos de fabricação e outros. Todavia, na opinião do sr. Fleming, é aconselhável concentrar os pormenores nos materiais, que frequentemente chegam a representar quase 80% do custo do produto.

Quanto ao campo de ação, é pràticamente ilimitado: peças de todos os tamanhos, de grande e pequena produção, processos antigos e métodos novos. O que importa é criar uma fôrça, dentro da organização, que lute contra a inércia do hábito e das tradições.

Na indústria, muitas atividades se reduzem a trabalho de constante afinamento, para melhorar o que existe. A análise do valor, pelo contrário, é o remédio para virar as costas ao que está sendo feito e procurar novos caminhos.

Atuando em todos os setores da indústria, ela pode parecer, lògicamente, uma duplicação de esforços. Todavia, através de seu uso é possível individualizar custos desnecessários em cada produto. E sua crescente afirmação e êxito repousam nesta inegável e comprovada realidade, e não numa questão de lógica.

Os resultados

O sr. Karl H. Pearson, gerente da seção de custo da GE, de Santo André, compila mensalmente um relatório das economias realizadas através do programa de análise do valor. Afirma êle que, com o decorrer dos anos, as economias estão-se tornando cada vez mais sensíveis. Sòmente no setor de chapas, a análise e revisão das bitolas, características, medidas, métodos de preparação e de acabamento, permitiu à companhia realizar uma economia anual de 4 milhões de cruzeiros.

Na opinião do sr. Pearson, as indústrias brasileiras podem esperar da análise do valor resultados ainda superiores aos alcançados em outros países. Isto porque o nosso desenvolvimento industrial processa-se a ritmo acelerado e muitos produtos ou materiais, até há pouco tempo difíceis de serem encontrados, aparecem sùbitamente no mercado.

Uma outra prova do êxito alcançado na GE é a intensa atividade do treinamento. Atualmente, catorze técnicos estão fazendo cursos especiais sôbre análise do valor e, até o fim do ano, mais trinta elementos serão treinados.

O simples fato de conhecer melhor os custos sugere que alguma coisa deve ser feita a respeito. E, os engenheiros e técnicos não tardam a descobrir, na análise do valor, um insubstituível instrumento para alcançar êste objetivo: providenciar melhor funcionalidade pelo mesmo custo, ou obter a mesma funcionalidade por custo mais baixo.

Principais etapas da análise do valor

1 — Coleta de informações

A — Obtenha tôdas as informações; quando possível, também as amostras de peças ou conjuntos; informações a respeito de desenhos, especificações, características técnicas, métodos de produção e custos.

B — Aprenda, com os engenheiros técnicos. Faça perguntas, escute e procure obter bons conhecimentos técnicos do produto estudado.

C — Decida qual o esfôrço que irá despender em cada item, de acôrdo com seu custo e valor.

2 — Investigação e pesquisa

A — Analise cada solução possível do problema.

B — Consulte qualquer pessoa que possa ajudá-lo.

C — Experimente sistemàticamente vários materiais, processos e máquinas.

D — Encoraje o livre uso de imaginação.

E — Anote tôda sugestão, mesmo a que possa parecer pouco viável.

3 — Análise do problema

A — Estime o custo de realização de cada idéia.

B — Desenvolva cada idéia, dando atenção especial ao custo eventual e às possibilidades de realização.

C — Investigue mais a fundo as idéias que provocam objeções. Examine os prós e contras, antes de abandoná-las.

D — Determine um objetivo e desenvolva por completo as idéias mais promissoras.

4 — Programa de ação

A — Divida seu trabalho em etapas progressivas.

B — Escolha a quem consultar em cada etapa.

5 — Execução do plano

A — Determine com clareza a principal função do item analisado. Discuta com especialistas.

B — Experimente com persistência as possíveis soluções, até chegar a uma conclusão prática e aceitável.

6 — Conclusão e resumo

A — Redija a sugestão final, indicando tôdas as possibilidades de realização.

B — Inclua na sugestão os seguintes dados: croquis do existente e do proposto; consumo anual; material, mão-de-obra e outros custos; custo da modificação; descrição da função da parte.

C — Envie cópias da sugestão a todos os possíveis interessados.

D — Anexe todos os dados e informações adicionais que possam melhor esclarecer a sugestão.

E — Conclua o mais depressa possível e passe a examinar outra parte.