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Official Magazine of the
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and
NATIONAL ASSOCIATION OF SUGGESTION SYSTEMS
and
NATIONAL PROPERTY MANAGEMENT ASSOCIATION

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IS CONSUMERISM REAL?

Consumerism is not dead, but it is being killed by consumers as surely as it might be if there were legislation to provide the fatal blow. This land, where ravenous consumption of materials, products and services is an everyday event, seems to be immune to the necessity for controlling the quality and price of the consumed items. And, if the American public continues to buy overpriced, poor quality junk from our assembly lines, that’s what we’ll continue to get, ad infinitum. The consumer revolution has never been needed so desperately as it is in today’s marketplace.

Zero Defects?
Have you purchased a new, 1974 automobile? Have you rented or leased one of these impossibly poorly made symbols of the industrial assembly line? The last two I rented, from previously reputable giants of the automobile rental industry, were so filled with defects that it was a chore to drive them, rather than the pleasant experience it used to be. Both of them, from two of the “big three,” had been driven less than 5,000 miles when I, unfortunately, rented them. After a few minutes of driving, it became obvious that neither car had received even a modicum of mechanical care after assembly, prior to delivery, or since being placed into operation. (At the recent SAVE conference in Los Angeles, Gene Peretti, president of ASPI, and I were issued a total of five cars before we got one that ran.)

Timing and carburetion were improper, which caused poor starting, low power, rough idling (and stalling) and very low gas mileage. The inside surfaces of all of the windows were coated with a “bakeoff” of the plastic parts and materials. The seatbelts jammed in a semi-extended position and, when they finally released, the shoulder harnesses were installed in such a way as to behead the wearer if he were to be involved in a major accident. Elements in light bulbs were burned out — new light bulbs! The engine-transmission combinations of both cars “hunted” during operation, or “drove” all of the time. One of the cars had a pronounced sway in the front end, which necessitated constant steering. The brakes on the other car squealed and grabbed. If these automobiles are examples of American technology, then woe be unto us when the going gets tough.

Technological Junk
Discussion of these examples of poor quality and performance with attendees at the Annual Conference of both the Society of American Value Engineers and the American Society for Performance Improvement indicated that this phenomenon — no quality — was an accepted fact of life by most new car buyers. This set my thought pattern to consider that today’s technology might, in fact, be called a “junk technology,” for at no time in our history have defects been so pronounced in our society’s staff-of-life, the automobile.

For my part, you can be sure that two large, car rental agencies and two of the big three automobile producers will receive no more of my business. Each will receive a letter of complaint which lists the quality defects. Each will be asked to share in refunding my expenses. At a later date, I will share with the readers of PERFORMANCE the responses and actions taken on the part of each of the four companies concerned.

Price Gouging In Practice
Another example of poor performance can be placed on the desks of the executives of some of the major hotel/motel chains in the nation. While in Los Angeles, local telephone calls dialed (direct) from the room were charged at thirty-eight to seventy-three cents each. The same calls could have been dialed from a pay phone in the lobby for ten cents each. Calls outside of the small circle encompassing local calls, which cost fifteen cents from a pay phone, were charged by this motel at seventy-eights cents to just over a dollar each. This large motel chain will be billed for overcharges and a report on the results will be made in a future issue of PERFORMANCE. This episode of price gouging has cost the affected motel chain at least one customer. (These are the same hotels that bombard our societies with literature on the merits of holding our meetings at their convention center.)

Prices for rooms at many motels and hotels are unreasonably exorbitant. Consumers of hotel/motel services should utilize the many low-cost chains that are being built around the nation, and boycott anyone that charges more than $12 single and $15 double (all children free). Charges of more than those proposed cannot be justified by the costs of acquisition, taxes and operation, but only on profit and reserves for unwarranted and unnecessary expansion, as each chain attempts to drive out its competition.

The Big Ripoff
On the subject of price gouging, it seems strange that there is no shortage of fifty-five to sixty-five cents per gal-

Continued on page 31
GD WOMEN TOP MONEY WINNERS

Only sixteen percent of the total work force at the Ft. Worth Operation of General Dynamics are women. Yet, they swept top honors in the Suggestion Program last year. Virginia Fisher and Ann Long were the top money winners for their outstanding suggestions. All told, 572 employees received over $93,000 in awards. Mr. R. E. Adams, vice president and general manager of the facility, presented citations from the National Association of Suggestion Systems to Ms. Fisher and Ms. Long.

INDUSTRIAL PROPERTY MANAGEMENT COURSE

Class 160(b)
February 1974


SAVE PRESENTS DSA FOR GOVERNMENT

The Society of American Value Engineers Distinguished Service Award for Government was presented to Major General John W. Morris, director of Civil Works, U.S. Army Corps of Engineers, at the annual awards dinner held at Los Angeles, California, April 30. General Morris accepted the award, "...on behalf of all of the Corps of Engineers' employees who have made the Corps a recognized leader in this field."

General Morris pioneered Value Engineering within the Army Corps of Engineers in 1964 while serving as the Tulsa District Engineer. He and his staff established administrative and training criteria which became a model for the rest of the Corps. The Corps VE program has evolved from a dedicated effort by a handful of part-time Value Engineers to a progressive, innovative, productive organization capable of effecting maximum savings through the application of VE methodology. Total VE savings to date exceed $250 million and are the result of both in-house studies and contractor VE change proposals.

Continued on page 31

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TEAMWORK AND GROUPDYNAMICS — DEVELOPING A MOTIVATING POSITIVE ATMOSPHERE

By Axel Peter Ried, Dipl.rer.oec.
President of Krehl + Ried, New Management Methods Consulting Co.
Karlsruhe, West Germany

NATURE AND MEANING OF TEAMWORK

Everywhere in economics, teamwork is being more and more understood as an efficient instrument of leadership and used as such. A team is a group that can be grasped easily — a face-to-face group. The criteria of a team are as follows:

- small number of members (5-7)
- no distance
- immediate communication facilities
- common goals and motivations
- striving after common achievement of goal
- more importance given to success of team than to individual success
- affirmation of cooperators within the team

Compared with individual work, a team offers an advantage with respect to achievement. The sum of the performance is higher than that of individual work regarding both quantity and quality. This is partially due to the so-called spirit of team. It goes without saying that, in this connection, the structure of the team from an interdisciplinary point of view has considerable influence.

A team integrates all aspects of the different sections within an enterprising company. Owing to mutual complementing, limits of responsibility, rigid structures of thinking and resistances are overcome within the team. This does not involve an addition of knowledge and experience only, but also an involution.

GROUP DYNAMICS

Investigation of behaviour has shown that groupdynamical effects are produced in any team. These are the consequences of the following factors acting in unison:

- numerical
- ecological
- sociological
- technological
- operational/organizational conditions

Common motivations, aims, interests and standards of behaviour are thus created and become apparent, quantitatively and qualitatively, in form of human relationships and role-interchangeings, as well as functional transfers on behalf of every single member of the team.

Groupdynamical effects created by the cooperation within the team even touch the private lives. Moreover, every team develops its own code of behaviour. This code is made up of the following characteristics:

1. Never work too much, otherwise you are a “duty-breaker.”
2. Never work too little, otherwise you are a cheat.
3. Never tell any superior what might have negative results for a colleague, otherwise you are a sneaker.
4. Never try to keep social distance; in case you are a controller, for instance, do not behave as such.

In addition to developing a code of behaviour, groupdynamical effects also give rise to various interactional constellations. In particular, these might be as follows:

1. Cooperators who helped each other with their work.
2. Cooperators who interchanged work.
3. Cooperators who participated in common games.
4. Cooperators who were friends.
5. Cooperators with strained relations.
6. Cooperators who quarreled over opening and closing windows.

Of particular interest in this connection is the discovery of the so-called socio-dynamic effect by J. L. Moreno. This effect consists in the fact that, with an increasing degree of popularity within a team, a person creates a positive role of attraction and leadership and reinforces it.

Groupdynamical effects exercise an influence on the team result. This influence may be negative and positive; it may entail that some members of the team:

- develop extremely well within the team and get especially active;
- loose their security within the team and eventually frustrate;
- cooperate within the team showing interest, but do not place themselves especially in the forefront;
- cooperate within the team showing no interest and no engagement whatsoever.

Summary of the groupdynamical effects:

1. Mental interactions
2. Informal hierarchy and role distribution
   2.1 informal leader
   2.2 adviser
   2.3 scapegoat (Omega-type)
   2.4 optimist
   2.5 pessimist
Role Analysis by Th. Scharman

<table>
<thead>
<tr>
<th>Role</th>
<th>Role Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. With reference to effect of achievement</td>
<td></td>
</tr>
<tr>
<td>Principal who is conscious of tasks and aims</td>
<td>puts aims - demands summary and survey - decides, urges for execution - leader who is &quot;orientated towards achievement&quot;</td>
</tr>
<tr>
<td>Controller of reality</td>
<td>criticizes objectively - puts partial tasks - clarifies and judges - endeavours to be objective</td>
</tr>
<tr>
<td>Expert</td>
<td>replies to technical questions - knows what's what - gives information</td>
</tr>
<tr>
<td>Man with ideas</td>
<td>has sudden ideas - &quot;thinks aloud&quot; - suggests solutions</td>
</tr>
<tr>
<td>Interrogator</td>
<td>asks for information - requests clarification</td>
</tr>
<tr>
<td>&quot;Mood-Maker&quot;</td>
<td>exercises influence on the mood of the group in a positive and negative way, but always with reference to the task</td>
</tr>
<tr>
<td>Opponent</td>
<td>refuses the task - is &quot;against on principle&quot; - calls everything in question - rejects teamwork on principle</td>
</tr>
<tr>
<td>One who diverts</td>
<td>behaves himself inappropriately</td>
</tr>
<tr>
<td>Co-operator</td>
<td>works willingly and inconspicuously, but without any own initiative, needs instruction</td>
</tr>
<tr>
<td>Passive partner</td>
<td>&quot;fellow-traveller&quot; - indifferent to success or failure - no relation with respect to task</td>
</tr>
<tr>
<td>2. With socio-emotional reference</td>
<td></td>
</tr>
<tr>
<td>One who assists</td>
<td>reacts positively with respect to suggestions - appreciates others - affirms others, possibly as &quot;second man&quot; - &quot;emotional leader&quot; - appeals to &quot;spirit of team&quot;</td>
</tr>
<tr>
<td>Mediator</td>
<td>searches for balance - helps co-operation - reduces tensions and difficulties - mediates - appeases</td>
</tr>
<tr>
<td>Witty fellow</td>
<td>&quot;joker&quot; - is mainly concerned with satisfaction of socio-emotional demands, less with task</td>
</tr>
<tr>
<td>One who refuses</td>
<td>refuses contact - becomes aggressive and even &quot;personal&quot; - does not follow suggestions - against &quot;teamwork&quot; - conscious individualist</td>
</tr>
<tr>
<td>Indifferent</td>
<td>is not interested in socio-emotional contacts within the group</td>
</tr>
<tr>
<td>Isolated person</td>
<td>timid - does not meet with approval</td>
</tr>
</tbody>
</table>

2.6 grumbler or "Lord Almighty"
2.7 normally active cooperators
3. Effect of identification and of a "We" experience
4. Common values and standards
5. Own image as seen by the team (positive autostereotype)
6. Functionalization within the team
7. Reciprocal motivation
8. Increased creativity
9. Reciprocal incentive for achievement

Observations make evident again and again that the effect of real teamwork occurs after a certain settling time only. If absolutely necessary, owing to groupdynamical effects, the team structure has to be modified.

**ORGANIZATIONAL INTEGRATION OF TEAMWORK**

Teamwork should not be considered a competition for the work done in the different departments or by different individuals. Teamwork as an instrument of leadership should be understood as a substitution, complement and help for the existent practice.

Properties of the organizational integration of teamwork are as follows:

Teamwork as a neutral service with common responsibil-
the aim of fulfilling a pre-defined task and achieving the goal determined. The selection of the team members is effected as per functional aspects and human factors in particular.

Human factors which are required in teamwork are as follows:
- personal adaption
- recognition of thoughts of other individuals
- positive attitude towards the cooperators
- acceptance of changes
- disposition for putting aside personal ambition
- initiative for common tasks
- judgment without emotions concerning own works and ideas
- impartiality and open-mindedness
- acceptance of standards ruling team behaviour

It is self-understood that these factors are not applied to team members only, but to the team coordinator particularly. It is a "must" for him:
- to be appreciated by the team both from the professional and the human point of view;
- to define and represent the standard of efficiency by his own personality;
- to maintain objective and personal contact with all members of the team;
- to adopt the working aim and the standard of efficiency to such an extent that, more than all other members of the team, he personifies the consciousness of a "We."

ANALYSIS OF BEHAVIOUR
A team has to be developed throughout a certain period. That is why the analysis of behaviour is indispensable for the care of the team. The analysis of behaviour is realized by:
- analysis of the individual by himself
- analysis of the team by each individual
- analysis of the team by the coordinator
- analysis of the coordinator by the team

The analysis of behaviour is indispensable in order to:
1. recognize the team structure
2. ascertain modifications of the team behaviour
3. check modifications of the team behaviour positively
4. initiate means for developing a positive team atmosphere
5. maintain the positive working atmosphere within the team
6. provide the possibly highest motivation of each member of the team on a long term

The analysis of behaviour has to be understood as a permanent duty of all. It is not possible, without a permanent analysis of behaviour in the above described manner, to guarantee a long-term team motivation and to assure that frustration and "wear and tear" phenomena do not occur or are ascertained and eliminated in time.

The sociometrical test is useful for the analysis of the team structure by measuring the attractions and repulsions which exist between the cooperators of a team.

Figure 2 Sociometrical Test by J. L. Moreno

<table>
<thead>
<tr>
<th>Attraction and Repulsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) o—o—o</td>
</tr>
<tr>
<td>b) o-------&lt;------o</td>
</tr>
<tr>
<td>c) o+++-++&lt;------o</td>
</tr>
<tr>
<td>d) o—&lt;-------o</td>
</tr>
<tr>
<td>e) o+++-++&lt;------o</td>
</tr>
</tbody>
</table>

PERFORMANCE
### Measuring of Attitude

<table>
<thead>
<tr>
<th>Attitude</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pleasant</td>
<td>:______</td>
</tr>
<tr>
<td>Friendly</td>
<td>:______</td>
</tr>
<tr>
<td>Rejecting</td>
<td>:______</td>
</tr>
<tr>
<td>Helpful</td>
<td>:______</td>
</tr>
<tr>
<td>Unenthusiastic</td>
<td>:______</td>
</tr>
<tr>
<td>Tense</td>
<td>:______</td>
</tr>
<tr>
<td>Distant</td>
<td>:______</td>
</tr>
<tr>
<td>Cold</td>
<td>:______</td>
</tr>
<tr>
<td>Cooperative</td>
<td>:______</td>
</tr>
<tr>
<td>Supportive</td>
<td>:______</td>
</tr>
<tr>
<td>Boring</td>
<td>:______</td>
</tr>
<tr>
<td>Quarrelsome</td>
<td>:______</td>
</tr>
<tr>
<td>Self-Assured</td>
<td>:______</td>
</tr>
<tr>
<td>Efficient</td>
<td>:______</td>
</tr>
<tr>
<td>Gloomy</td>
<td>:______</td>
</tr>
<tr>
<td>Open</td>
<td>:______</td>
</tr>
</tbody>
</table>

### Group Atmosphere Scale

Describe the atmosphere of your group by checking the following items

<table>
<thead>
<tr>
<th>Atmosphere</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friendly</td>
<td>:8____</td>
</tr>
<tr>
<td>Accepting</td>
<td>:______</td>
</tr>
<tr>
<td>Satisfying</td>
<td>:______</td>
</tr>
<tr>
<td>Enthusiastic</td>
<td>:______</td>
</tr>
<tr>
<td>Productive</td>
<td>:______</td>
</tr>
<tr>
<td>Warm</td>
<td>:______</td>
</tr>
<tr>
<td>Cooperative</td>
<td>:______</td>
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<tr>
<td>Supportive</td>
<td>:______</td>
</tr>
<tr>
<td>Interesting</td>
<td>:______</td>
</tr>
<tr>
<td>Successful</td>
<td>:______</td>
</tr>
</tbody>
</table>
Check-List for Team Observation

1. Behaviour of every single team member (TM) on first team meeting
2. Who sits beside whom
   - within the team
   - during coffee time
3. Who talks to whom
   - how frequently
   - in which tone (question, instruction, friendly, in authoritative manner)
4. In which tone do the TM talk to secretaries/ principals/ Co-operators when these are present/ on the phone
5. Modifications of Behaviour
   5.1 TM stops to say anything, for instance:
      - one who was always criticizing and giving negative comments, suddenly keeps silence
      - TM stops to follow systematics, for instance, disagrees with way of cost calculation etc.
   5.2 A TM starts to talk after having been "silent"
      All the time before
      - has his problem been attacked?
      - has his prejudice disappeared?
      - has he suddenly understood the total context?
6. Mood/ Engagement change from one team meeting to another
   - positively  □  Reason: □
   - negatively  □  Reason: □
5.4 Has the team all of a sudden differing opinion with respect to a certain problem or to the goal aimed at?
   - which opinion:
   - reasons:
6. Who are team members with negative attitude
   - names:
   - reasons presumed:
7. General Observations
   - who is late, often makes or receives phone calls, leaves during the pause?
8. Who never says anything, who is unable to have a task transferred upon him?
   - names:
   - reasons:
9. Do two or more TMs endeavour to achieve an informal role as a leader?
   - names:
   - characteristics of behaviour:

Figure 5 Use of Krehl + Ried Check-Lists

Presuppositions for conducting an analysis of behaviour are as follows:
1. Capability of estimating one's own behaviour and that of other members of the team.
2. Training of observation.
3. The number of persons to be observed should not exceed five to eight, since, otherwise, clear statements are no longer possible.
4. Free atmosphere in which positive and negative aspects can and shall be mentioned.
5. Realization of the positive thought with the will not to increase problems ascertained, but to solve or eliminate them.
6. Intention of the team to achieve a positive work result.
7. Principal motivation of team members for teamwork.
8. Comprehension to the point that it is not the aim of the analysis of behaviour to criticize individual members of the team, the coordinator or the team, but to assure the operability and good work results in the sense of team care on a long term.

Continued on page 30

Figure 6 Another Possible Check-List

Check-List for Ascertaining and Analysing Team Behaviour

1. Which strength and weakness has our group shown in the course of the past teamwork with respect to solving problems and fulfilling the tasks?
2. Which were the biggest obstacles which arose within the team and had to be overcome?
3. What can we do as a team at such a time in order to improve the operability and efficiency of performance?
4. At what level is confidence within our team?
5. Have cliques been made up within our team?
6. Has every member of the team the chance to utter his opinion?
7. Are the different intermediate decisions taken by common agreement or in majority decision?
8. Are the goals of the team evident?
9. Are the goals of the team understood and accepted by all its members?
10. Do we work intensively and constructively as a team?
11. Are there any rivalries between co-operators of the team?
12. Are argumentations more objective or more emotional?
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P.S. If you need help in showing and telling, contact—The Exhibit Committee anyway.

May 12, 13, 14, 1975
Years ago, when the wagon trains moved Westward across our great country in search of new opportunities and a better life, there were many drop-outs. The way was fraught with danger and the hardships were many. There were no well-marked superhighways dotted with pleasant rest stops and snack bars. Instead, there were rivers to ford, sometimes requiring miles of frustrating searching before a shallow spot could be found through which the wagons could be dragged by men and horses.

The procurement and preservation of food was still another problem. And, of course, there was good old Mother Nature supplying the wrong weather at the wrong time. Small wonder that some of the wagon party decided they had enough and settled en route to their goal. They started their farms, raised their families and, generally, went about the everyday business of staying alive, victims of an unfulfilled dream. Those were the settlers — content to drop out of the mainstream of life, content to be mastered instead of being masters.

Then there were the pioneers. They went the entire route, surmounting all obstacles and disregarding all portents. They fulfilled their dreams; they reached their Western goal!

As Suggestion Plan managers, into which classification do we fall — Settlers or Pioneers? If we're settlers, we are content to administer our programs with little or no imagination or pioneering spirit. "If it is working, leave it alone," is the usual watchword. The settler-type Suggestion Plan manager can operate a very successful program, until... what? Perhaps until management thinks that the return on investment from implemented suggestions is too small; until the volume of submittals drops off; until the quality of evaluations or investigations reaches a point at which few suggestions are being implemented, much less awarded; or, worst of all from the Plan manager's viewpoint, until someone with an uncanny sense of timing says to management, "You know, our Suggestion Plan could be a world-beater IF...."

A Suggestion Plan pioneer could fill the ellipsis in the preceding sentence. In fact, a pioneer does not wait until that unhappy time arrives and he is forced to change operating methods and/or try to justify the program, including his management of it.

A few simple charts, designed to highlight key facets of a Suggestion Plan, will show trends, both favorable as well as adverse, as they start to develop. Naturally, the establishment of goals for each of the facets being charted is a prerequisite. Otherwise, either a steady-state condition or a smaller-than-normal incremental increase might not be recognized, immediately, as an adverse trend. A reverse-slope line is not the only indication of the development of a potentially deleterious condition.

Of course, a successful, pioneering Suggestion Plan manager does not wait for trends to show on charts or for a few terse words like, "Get out there and DO SOMETHING!" from his management.

The pioneer is prepared. He is continually seeking and devising new ways to improve his program. He has public-
ity campaigns mapped out and ready to go, and he uses them at strategic times.

An improved award schedule is on hand, awaiting the propitious moment for a well-planned presentation to management. New suggestion forms have been designed—perhaps the only change from the current style is the use of a different-colored printing ink or a band of color on the top sheet. Inexpensive, desirable giveaway promotional items, imprinted with a Suggestion Plan message, are used or are ready to be used as “thank you” items when suggestion form acknowledgment copies are sent to suggesters.

The pioneer will know the areas of his company where problems exist. He will be ready, willing and able to recommend and conduct spot-suggestion promotions to help those areas solve their problems.

If his company’s management has decreed that supervisory-type employees are not eligible for cash awards, “They are expected to make that type of suggestion contribution to their company in the normal course of their duties because they are considered to be part of management,” he is not deluded into thinking that what you expect is, necessarily, what you get.

Rather, he develops and sells to management a Suggestion Plan concept which will encourage that type of employee to submit suggestions. Hopefully, this concept will be based on the existing program so that confusing and devious rules, choices of suggestion forms, and elaborate processing will be avoided.

This is not an all-inclusive list of pioneering Suggestion Plan techniques—rather, it is a starting point from which settlers and potential pioneers can advance.

Settlers’ roots run deep. In fact, it sometimes seems they are anchored to the status quo. Here is a checklist designed to cut a few roots and get the settler-type Suggestion Plan administrator out where the action and the problems or potential problems are:

- Talk to five people about the Suggestion Plan each week. These are employees who have never submitted a suggestion, or who have not submitted one in the past six months.
- Always carry a supply of inexpensive, giveaway Suggestion Plan reminders; leave one with each employee to whom you talk Plan. Key or luggage tags and ballpoint pens are examples of those items.
- Check all promotional posters each week to be sure that they have not fallen victim to the local “artists”; that each location that should have one does, and that they are current. Outdated posters are worse than no posters at all—they give the impression that the program is stagnant or dead!
- Check each week to be sure that there are plenty of suggestion forms available in all of the places where they should be.
- If someone else empties suggestion boxes for you, check a different box every third day to be sure that the suggestions are being picked up.
- If employees request outdated posters for their personal use, be sure to deliver the posters personally and promptly. Often the posters are taken home, thus providing additional leverage for an employee to submit suggestions.
- Personally deliver not less than two non-adopt answers to suggesters each week (assuming that you have them), and discuss them with the suggesters.
- Each week, talk with at least two supervisors about the Suggestion Plan. Ask them for their opinions and suggestions for improvement. Follow through on what you find out.

These suggestions could open new vistas for alert Suggestion Plan managers. Try them...see for yourself...let them work for you.

Settlers, start pioneering; pioneers, pioneer a little harder! You can make your Suggestion Plan fulfill your management’s dream and yours, too.
Profitable Property Management

CHARLES T. PAGE has over twenty years’ experience in Industrial Property Management. He has served as a consultant, designed and implemented equipment management systems, and trained managerial personnel for many of this country’s leading aerospace, defense and research organizations. He is extremely knowledgeable in structuring control systems for optimum equipment utilization with minimum variable costs to maximize return on capital investment. He has conducted courses at several colleges and universities on computer-based information systems, basic and advanced industrial and capital property accounting, and industrial engineering.

Mr. Page has been national president of the National Industrial Property Management Association and a president of the North Texas Chapter of the National Property Management Association.

By Charles T. Page

Can you isolate your real cost of doing business by area, section or group? Do you know what your support equipment costs are, and how they are allocated? If your answer is no, then you had better ask yourself, “How recently have I really looked in-depth at our Property Management System?”

Property Management provides a method of identifying operating costs into small enough segments so that these costs can be applied to groups, sections or operations that will reflect each operating unit’s real cost of doing business.

All too often, operating costs are lumped into general accounts and applied equally across the board to all operating sections, or allocated by some mystical formula that hopes to reflect some degree of fairness to all. This usually results in some operations being undercharged while others are being overcharged. You can correct this by establishing a Property Management System to identify these costs. Once you have reliable cost data, you can expand your system to include information for capital equipment justification, operations improvements, make or buy decisions, or checking profit areas. There also are many other areas where these cost figures can be used, depending on your operation. The basic system does not tell you if your costs for a particular operation are competitive, but the system does provide the vehicle to do so.

Before we get too deeply into this subject of costs and profit, there are several things we need to understand. Property Management is a viable dynamic process that changes daily. In effect, the system must be designed to manage these changes. Yesterday’s utilization is different today. The location input yesterday may be changed today. Depreciation, insurance, taxes, maintenance and calibration all affect these daily operating costs. Once costs and flow are systematized, refined and optimized, the benefits attributed to property management accrue automatically.

One of the more important factors in controlling costs is to provide complete visibility of assets. With visibility it becomes possible to have the right item in the right place at the right time. Without visibility of assets, it becomes difficult to keep track of property and, in fact, if you can’t locate it, you might as well not have it. Visibility also assures prompt redistribution, reutilization or disposal of all idle/excess property. Such property, unless effectively managed, is a continuing burden on program costs. The central problem is to maintain a degree of visibility which will enable individual departments and equipment managers to quickly ascertain the existence, technical performance, location and availability of items to support a planned task. Engineering personnel will attest to the difficulty they now encounter in their search for equipment due to the lack of satisfactory equipment reports that will provide reliable, descriptive, performance and location data. All too often, it
ends up in initiation of procurement action; within the system if possible, outside the system if necessary to get the job done.

Normally, a considerable effort is expended in long-range planning, budget preparation, approvals and capital appropriation processing. The missing link usually is an accurate equipment reporting function. If factual information is made readily available, it will assure adequate justification for procurement or permit immediate disapproval in favor of other, more necessary items. The long delays now experienced between the need and fulfillment of the need is very discouraging to engineers and technical personnel required to accomplish the project. Millions of dollars are spent for motivation while unintentionally designing corporate roadblocks to successful accomplishment of a project for lack of necessary tools.

The Property manager can contribute substantially to the profit picture in the areas of production-related functions, i.e., material handling and facilities-related functions such as property taxes, plant rearrangements, etc. He can do this by increasing true profit awareness at the operating department level. The majority of operating managers do not normally concern themselves with the fact that possession costs average twenty-five percent of total investment. The industry average (see Figure 1) indicates that an acquisition cost of $1,000 actually approximates a total commitment of $2,365 assuming a seven-year useful life. Profit-responsible people – profit managers – are required to manage the full gamut of resources – MEN, MONEY, MACHINES, MATERIALS and MARKETS. These profit managers normally do their job by assigning/delegating budget responsibility to operational-functional elements – budget managers. They then seek to aid and assist the budget managers in meeting objectives.

A review of delegated responsibility of budget managers indicates they have adequate or reasonable demands placed on them for management of:

- men and materials
- machines (only in the form of acquisition budgets)
- money (in the form of aggregate dollars for the above)
- market responsibilities appropriately reside in specialized functional areas.

A further review suggests that management of machines is currently restricted at both the profit and budget manager level to the justification and acquisition phase—acknowledging, of course, the use and methods contribution of industrial engineering. The result appears to be that the costs of ownership and operation disappear into the accounting function and are not managed directly.

The reason for this state of affairs is valid. Heretofore, the necessary data to manage machines (equipment) in the post-acquisition phase was not organized, expensive to extract from records and generally not available. The computerized Property Management Systems, now developed or in development, remove these historical roadblocks. This leads to the hypothesis that, given an opportunity to expand management prerogatives, budget managers will act or react to increase profitability. The management of equipment and operating costs provides such an opportunity—provided that each organizational profit area has one hundred percent responsibility of their own resources, then excess and obsolete equipment can be surplused which will increase utilization of the balance. After all, handling and storage are costs. What better argument is there for reduction?

If we are to optimize a Property Management Program, we must first broaden our horizons and stimulate our thinking in terms of very basic fundamentals. Realistically, it is beyond the province of this brief article to cover exact details of implementation for any single organization. Specific implementation of these basic principles will vary in details, degree of sophistication and methodology; depending upon such factors as size of organization, size of inventory, mix of property categories, and the degree to which the organization can effectively assimilate the substantially constant fundamentals.

In today's business world, taxes, the problems of size and complexity, and the concern of the investor have placed a premium on management's ability to effectively gather the best information, not only on past expenses and performance, but also the accurate projection of future ones as well.

Over the years, many property record systems have been
adjusted to reflect changes in accounting theory, in technology, in management objectives and changes required by the Internal Revenue Service. As a result, a corporation's property records often do not truly reflect its investment.

Methods of property control within your organizations range from simple composite accounting to detailed unit control. Since composite accounting naturally lacks detail, most companies have found it necessary to install, by item, a manual property record for control. But all manual systems have several notable weaknesses:

1. Data retrieval is difficult
2. Maintenance is time-consuming
3. Information is costly to obtain

Recognizing these weaknesses, most companies have mechanized their records, usually by converting existing records to a computer medium. But look at what existing records too often consist of.

Years ago, when these companies were first required to establish some form of property records, they opened up their file drawer and took out invoices. The information from the invoices was transferred to a Property Record Card. Little thought, probably, was given to organization of these cards, or to adequacy of the information. Later, this conglomeration of unorganized and inadequate information was transferred to some kind of a tab card unit record system.

Finally, this maze was transferred to a computer which was programmed to develop the same type of reports to be compared in the same old fashion as under the manual system. Little thought may have been given to the information needs of management, to the ability of existing records to meet these needs, or to the capability of computers to handle an integrated system. Scientific methods are needed in today's business world and a method, no matter how sophisticated, is only as good as the information fed into it.

It is relatively easy to recommend an overall approach to a profit-oriented system. It is sometimes difficult to develop the real-life details of input, required computations, and output required to get the new system functioning. The basic steps required for planning a computer-based, fully integrated, master property control system are:

1. Define objectives and get agreement that the specific measurable results or outputs are worth the time, effort and cost of change.
2. Establish responsibility and authority. Nail down the responsibility for getting the job done and be realistic by providing the necessary people to do the work.
3. Develop the action plan and try to pick out specific interim milestones to measure accomplishment. Pick these events at short intervals so that schedule slippages will have early warning points for measurement.
4. Develop the timetable for accomplishment. Assign realistic time values and a budget. Show target dates, considering available manpower, and try to show the interdependence of events.
5. Summarize the plan and commit people to a regular progress report and review procedure.

One of the problems of installing a total system is in knowing how to approach the project. Often it's the point of view and perspective that count in recognizing and appreciating requirements for use. The technique to be used will vary to suit the particular set of circumstances. Probably first and most important is to "know your organization."

If you were designing a system for a small, forty-man machine shop, the boss would have an immediate answer for every type of question you could ask. The fact that you are designing a system for a much larger organization simply means that you must have all of these same answers.

Obviously, the basic objective is usable cost data to determine cost per square foot; or cost per employee; cost per product line or similar data. The best place to start is with your current inventory records. Determine those items you wish to include and verify with the using department. There is a strong possibility that you will have to perform an inventory. Regardless of whether you take an inventory or feel satisfied to use your current inventory, each section must agree to accept responsibility for his equipment and understand that no relief in accountability will be made unless properly documented. Then, when he loans or gives a piece of equipment to another section, he will make sure accountability has been transferred.

There are several costs associated with possession. In the charge rate example (Figure 2), the rates used were established as a percentage of the acquisition costs. There are some common costs which can be applied to the three categories shown: office equipment, equipment requiring calibration (including maintenance), and all other equipment. Calibration costs are applied only against calibrated equipment. Office equipment maintenance costs are applied only to office equipment. However, general maintenance costs were applied to all other equipment.

The remaining costs are the annual cost divided by the appropriate acquisition cost x 100 to give an annual percent charge. The daily rate is calculated as the annual rate divided by 365 days. This daily rate is the daily percentage multiplied by the acquisition cost for each piece of equipment times the number of days in possession of that department. To place a lower limit on the minimum cost that could be charged, an acquisition value of $150 was selected. Once you have calculated your charge rates, you can apply them to your inventory lists and arrive at the cost/day, cost/employee, cost/product. You now have a cost of doing business that can be reported in any one of many ways.

If you have a large volume of portable equipment, which is not always in constant use, you can send it to a central warehouse for storage and rent it back during the time when you need it. Your costs would then only be charged during actual possession. There are two essential elements required. One, you must have portable equipment that can be turned in and withdrawn when required and, secondly, you must have a computer available to automatically calculate the daily rate, the days in possession and the monthly cost to each department.

Computer reports can be disseminated each month. The report for the division vice president and company president should show total cost by operating division. The report to division managers would show individual department costs for comparison. The section reports would show all costs per item charged to that department. These reports are distributed to the department manager and to the section manager responsible for that property. These reports, in proper format, assure increased attention towards more efficient utilization.
Measurement of utilization, as a step towards increased profits, leads to the realization that simple, across-the-board measurement criteria cannot be applied to this highly complex and variable phenomenon. Evaluation of the efficiency of resource usage, if anything, requires more sophistication than the basic process itself. Rule-of-thumb measures applied to our current, highly dynamic environment are thus likely to yield rule-of-thumb results.

Within the total equipment mix, the highly portable, general purpose equipment presents the bulk of the utilization problem. In today's organization, this equipment resides in two basically different environments: Production and R&D. Therefore, there is no single measurement method which is totally applicable to these environments even within a single organization.

Within each measurement method, there are a variety of data collection techniques available. A combination of approaches is usually necessary for a total utilization program across all organizations and categories of property involved. These approaches can be simplified since the production problem largely consists of more-or-less fixed fabrication equipment, while the R&D items are usually highly mobile.

Improving the overall utilization of fabrication equipment involves three basic steps — more realistic pre-acquisition planning, increasing the shop workload, or reducing the amount of equipment. All of these steps are difficult to face, considering the probability of widely fluctuating workloads, vigorous competition for new business and the need to maintain a competitive facilities base.

In today's economy, management must carefully analyze the three basic variables affecting overall utilization. These are sales, investment, and system efficiency. Each interacts with the other; a change in one will affect one or both of the others. Property Management can substantially affect both property investment and system efficiency by increasing visibility of all equipment through total management responsibility in resource utilization.

Each organizational profit area, with today's limited budgets, is required to accomplish profit results at each level of management. Engineering, manufacturing, services, laboratories and support functions each must have complete responsibility of their own resources for profit performance. Then, and only then, will excess or obsolete equipment be rapidly surmounted and increased utilization of the balance be effected.

The engineers and scientists quite naturally often resent the attempts of outsiders to assess the productivity of themselves or of "their" property. Management, however, secretly suspects — and sometimes rightly so — that the engineers overly exploit the technical mystique in requesting capital dollars to buy the latest, most exotic instruments which the equipment manufacturers are dangling before their eyes. Property Management is often at a disadvantage when it comes to accurately assessing the need for more equipment. The solution to this dilemma suggests a system where the technical dimension is carefully integrated with the other dimensions of the property function — economic, financial, accountability and physical.

Every indication is that sales and profits will continue their upward climb during the coming year under the impetus of a pickup in output and continued high inflation.

<table>
<thead>
<tr>
<th>COST CATEGORY</th>
<th>ANNUAL COST - $</th>
<th>ACQUISITION COST - $</th>
<th>ANNUAL CHARGE RATE %</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEPRECIATION</td>
<td>2,115,513</td>
<td>17,900,929</td>
<td>.0016</td>
</tr>
<tr>
<td>TAXES</td>
<td>129,422</td>
<td>97,900,599</td>
<td>.0034</td>
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<tr>
<td>INSURANCE</td>
<td>89,000</td>
<td>17,900,929</td>
<td>.0036</td>
</tr>
<tr>
<td>PLANT ENGINEERING</td>
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<td>38,674,000</td>
<td>.0009</td>
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<tr>
<td>PROPERTY MGMT</td>
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<td>73,865,000</td>
<td>.0005</td>
</tr>
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<td>OFFICE EQUIP/MACH</td>
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<td>.0036</td>
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<tr>
<td>CALIBRATION</td>
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</tr>
<tr>
<td>TOTAL</td>
<td>5,289,248</td>
<td>1,225,000</td>
<td>.0022</td>
</tr>
</tbody>
</table>

**Figure 2**

This may or may not prove to be a valid barometer. In general, the industrial products' manufacturers just cannot foresee a business slowdown ahead. Many companies have increased their capital expenditures as much as forty percent. The problem of availability is forcing most manufacturers to plan far ahead. It therefore becomes increasingly important for the property manager to have a completely dynamic and viable system, with the latest management techniques, which can be applied to increased management attention, scientific utilization surveys, equipment pools, streamlined property groups and factual information. The minimal extra cost of total efficiency is completely offset by the reduction in such variables as insurance, taxes, calibration and maintenance. A safe estimate is that, without such a system, your previous total inventory maintenance cost approximated over one-half of your total investment for corporate assets.

By using the newer concepts of computer storage and retrieval, which have been proven to be successful, the Property Management System will have maximum flexibility, thereby insuring maximum ease in adding, changing or deleting data. There should be no restrictions as to the type of information to be processed by the system. A wide variety of unstructured factual and textual data can then be extracted into a form that is compatible with the user's needs. Indexing in depth will provide for many differing reports' generation. It also can be programmed to update and edit information already stored in the data base. Inquiries used to retrieve information are submitted by the user in natural language and the interrogators are coded for search instructions. The resultant output may be obtained in the form of either analog graph, statistical tables, or complete detail about the selected record. All facets of life cycle control can then be delineated in procedures printed in simple cookbook style to clarify both policy and practice, as a brief consolidated communication for use at the work level.

In conclusion, a Property Management Program can be designed to meet the needs of any company. It can be designed to give you whatever information you require for each operation. There is no set package program to be used by all companies. By starting out with some rules of logic, you can determine what you want the program to do and, depending on the type of cost data available, you then can develop your own system and start supplying your section, department and operating management with real cost data. They will take it from there.
By C. R. “Chuck” Samples  
Drawing by Jay Mullins

If you think employees work “for” you as a manager rather than “with” you, reading this may provide you with some valuable ideas.

This article has been made possible by those Boeing Aerospace Company employees who are participating in the system now to be described.

Saw blade life increased one hundred percent, sealant use reduced thirty percent, suggestion system activity increased well above one hundred percent, safety hazards were identified and removed, job interest improved. Sound like a management activity report? A year-end report on an efficiency drive? These are only samples of the improvements that have been made by BAC employees when they are encouraged to take an interest in their job. This is not a selection of items from a long-term effort, nor is it a one-time happening. In the BAC Operations organization, these events are occurring with satisfying regularity as involved employees continue to improve their job, their organization and the company. PEPS is making the difference...People working through Participative Employee Problem Solving.

The system promises no accolades, no ceremonies and no fanfare. Participants are offered only a chance to turn their capability and energies toward solving problems that impact their operation.

Involvement is replacing indifference, synergism replacing cynicism. The system is the avenue through which employees can work problems in concert with their supervisors — working together to make their company a better, more satisfying place to work and a much tougher competitor.

As managers, we participate daily in the decisions and activities which affect our company’s function. We often hold meetings on matters concerning “our own little world” and deliberate on situations affecting our employees. We make decisions based upon our own knowledge, and never really consider the vast storehouse of knowledge available from our employees. We act as though, “if we haven’t thought of it, it doesn’t exist.”

Many different programs have been developed to tap this vast reservoir of knowledge and include the employee in the decision-making process. What is needed is a system which can survive work or budget fluctuations, and PEPS is that system. It is not the total answer, nor the cure-all for the company’s ills and pains. It is one workable approach which appears to have broad application.

Participative Employee Problem Solving, or PEPS as it is more commonly known, was designed and developed to allow employees to participate in decisions involving their immediate work areas, support functions and operating systems. Presently, PEPS is in its infancy and much is yet to be learned about its application and total potential. If the results attained so far are any indication, we have a good system going for us.

PEPS was conceived in mid-1972. We were determined to improve employee efficiency, motivation and participation. We searched extensively for something to do the job. A consultant was engaged to present a concept of what we felt we were looking for. Thirty members of management, from all levels and functions, were asked to attend a two-day presentation and evaluate it. The results were mixed reactions, such as:

“Just another program.”
“Too costly.”
“It’s been tried before.”
“I think it is great, but...”

These comments were not encouraging, but we continued to look for an answer. What we found was an organizational development program called SEARCH (System Evaluation Applied to Renewal and Change).

This program was developed and marketed by BAC Industrial Relations Education and Training. SEARCH proved to be the base upon which development efforts could be built. With the aid of our own Industrial Relations Education and Training organization, we identified the requirements, objectives and criteria which resulted in PEPS. A brief description of these elements will enable you to understand the basic operations. PEPS was designed to tap employee dedication and creativity by providing (1) a chance to be heard as an individual and a member of a team; (2) a work climate which stimulates interest in the overall organization operation; and (3) a system for participating with other employees in planning, problem solving and work improvement.

The objectives we established were these:

1. Provide environment and skills for employees to solve problems.
2. Provide methods of management to create a problem-solving environment.
3. Reduce operating costs by improving methods and people utilization.
4. Make the organization a better (more satisfying) place to work.
5. Make our company a “tough” competitor.

Participation is voluntary and team members are not required to continue at any point. We do try to get a group which is representative of the functions in a department and try to get a team of six to ten persons. Complete openness is a must — participants know beforehand what the objectives are (those just described) and care is taken to avoid any feeling of “being used.” Participants participate because they want to; no rewards or incentive are promised and this is explained at the outset. They receive some publicity as warranted, they improve their group problem-solving techniques, and they learn more about the company and about the various problems analyzed.

The problems to be solved are those identified by the team members. The only restrictions are those problems relating to items subject to negotiation by the respective bargaining units. It is very important to note that the team must identify a solution which is workable and cost effective. The teams work under the following guides, which we call norms.

Win-Win Situation
Criticize Ideas — Not Persons
Avoid Assumptions
Feelings are Facts

PERFORMANCE
PERFORMANCE

Only Stupid Question Is the One That Isn’t Asked

Everyone in Group is Responsible for Group Progress

Be Open To Ideas of Others

Focus On Current Problems

Focus On What Impacts This Shop

The teams meet once per week as long as they have problems to work. A meeting place with privacy is selected and the only visual aids used are flip-chart paper and possibly a chalk board. The team selects a problem to solve by vote, and they work one problem at a time.

The problem is analyzed by answering the questions on a problem-solving guide. This guide not only assists in problem analysis, but also helps in developing group problem-solving skills as the whole team is required to follow the guide step by step. The results are very easily transformed into a letter or a presentation which is communicated to those persons involved in the problem and/or solution.

The presentation mode of communicating the problem and solution is preferred, as face-to-face communication allows questions and clarifications. The team selects a member to make the presentation and the appropriate persons are invited to hear the analysis and recommended solutions.

The identification of costs is key to any solution, and these costs are identified by the team members where possible. Once the magnitude of the problem is known and the root cause identified, the solutions are not difficult to select to improve the situation.

Not all solutions are accepted (for various reasons), but where the problem cost is great, a solution usually can be worked by joint effort of the team and persons involved. It’s important for the team to reach a successful conclusion of the first problem analysis to reinforce their convictions of what they are doing and to be assured of management endorsement of their effort. For these reasons, the first problem to be worked usually has the special selection criteria of being easily worked, significant in impact and quick to resolve.

The responsibility for the early success of a team belongs to the “facilitator,” who meets with the team for the first fifteen sessions. The facilitators in the PEPS System are from Industrial Relations Education and Training and are able to assist the team in becoming established while relying on the team’s technical expertise for the problem solution. The facilitator must be careful to avoid leading the team, relieving them of their responsibility for a problem solution. The facilitator role is best done by a person from outside the organization to avoid the normal allegiances to the organization’s internal operation. The facilitators also help the team understand what happens in group problem-solving and provides the added reinforcement and direction necessary when a team goes astray.

These teams have expressed a keen concern for progress and have performed in a most responsible manner. Their biggest concern is to make fruitful use of the time for problem solving. The participation of the team’s supervisor(s), at the team’s effort after the implementation period, is difficult without a supervisor’s recognition of the value and his periodic participation. Certain problems simply require the participation of management to help in understanding the problem and gathering data or specifying sources of data. The team is encouraged to use the supervisor’s expertise in these matters and to include supervision on a periodic basis at least. A team operating with this relationship is a great aid to both management and to the organization.

The implementation phase is the technique used to start the system within the organization which desires it. It is not a single event, but a series of elements aimed toward getting the system to sustain itself. It is not a non-productive period nor is it intended to be aimed totally at being productive. The most important single point is that the organization endorses the system and accepts the responsibility that it is their system and not something imposed by an outside organization.

After the system is implemented it is designed to operate without outside assistance. It also has some immunity to budget problems since it requires very little time.

What are some of the benefits of the PEPS system — to the participants as well as our operations? Let me share a few quotes from the participants of the first PEPS teams:

“Persons involved now have a line of communication never before utilized. I feel the program should continue because of the apparent willingness of all persons and organizations I have contacted, to try to improve operations and conditions that will improve an end product at minimal cost. At the same time, morale will get better.”

“The PEPS System (1) provides a sounding board for employee problems not currently given by supervision; (2) provided a tour to give overall picture of hardware use; (3) shook up Safety so some tools were altered and improved; (4) may have changed some thinking about worker/supervisor attitudes, a forward-thinking attitude, through friendly, adult analysis.”

“Gives individual people time to discuss mutual work problems.”

“Creates better understanding between groups of their mutual problems.”

These are but a few.

The benefits we in Operations find: sensitivity to safety and wasted resources; a minimum of five times our investment in increased areas of productivity; the increased acceptance and improvement in BAC factory utilization of the company Suggestion System; factory supervision’s increased participation in the Cost Improvement Program by a factor of three.

To me, the important benefit is the common understanding of all participants in improving our skills, environment, utilization, interest and communications by working as a hard-hitting team with confidence and determination.

The key factors I see in the success of PEPS are:

Participations are volunteers

Teams identify the problems and solve them

Management commitment is a must

PEPS is a system not a program

Low-keyed publicity and no promised awards

The system is not a cure-all, it may not work in every environment. It is a system as effective as you make it, and as rewarding as you desire it to be. The system resists second or third party participation. It requires your efforts on the front line — where the action is.

Commitment to and participation with our teams is a very rewarding experience for me.
By Riley A. Murray, P.E.
U.S. Postal Service

The FAST technique developed by Charles Bytheway of Sperry Rand is an excellent way to rapidly determine functional relationships; however, unless certain facts are considered, you also can wind up developing functional relationships that lead to erroneous conclusions and misdirected effort.


The first step noted in constructing a FAST diagram is, "Prepare a list of all the functions by assembly or system, using the verb and noun technique." The second step is, "Write each function on a small card. Select a card with the function that you consider to be the basic function. Determine the position of the next higher and lower function cards by specifically answering the following questions:

"How? How is the function accomplished?
"Why? Why is the function performed?
"When? When is the function performed?"

In using the function selected, you apply the logic question to determine the functions to the right and left of it.

I don't find anything fundamentally wrong with those instructions, although I probably would phrase them differently. The problem comes from interpretation of those instructions and is due to a "hangup" in using the verb and noun technique for function definition.

The verb and noun definition of function is the most important tool the value engineer has at his disposal. But, we have been misusing it! And, in our teaching of the verb and noun definition, we have been following the "path of the calf" or playing follow-the-leader.

Verb and noun definitions for the following items are examples with which you are familiar and have accepted:

Pencil — makes marks
Refrigerator — preserves food
Screwdriver — drives screws or provides torque

I hope it doesn't upset you too much, but those items cannot perform those functions. A basic fact has been overlooked. That fact is, an item does not perform a useful function except as a part of a system.

In case you have doubts about that fact, the proof is simple to demonstrate and makes use of one of Roy Fountain's methods of attacking a problem: "Hang it on a rope."

Imagine the pencil, the refrigerator or the screwdriver suspended in space without external force or attachment and ask yourself the question, "What does the pencil, refrigerator or screwdriver do?" The obvious answer is "nothing," except occupy space.

You might be wondering how it is possible, after all these years of attributing functional performance to items which can't perform the function, that we have been successful with such a technique. It could be dumb luck, but I am inclined to think our subconscious was at work. While we were saying, "Define the function of the component in two words," we were subconsciously defining the function of the component's system. When we listened to our subconscious, we selected the system functions that describe component function.

Having decided that the present system of functional analysis left things hanging, it was necessary for me to develop something else to do the job; because it doesn't do any good to be critical of something unless you can offer something constructive to replace it.

The something else I propose is a method of functional analysis that I call FACTS. Today, everything has to have a catchy acronym, and FACTS is the acronym for Functional Analysis of the Component Total System.

In developing FACTS, I started with the pencil I left hanging in the breeze and the "makes marks" function which has had general acceptance. The next step of the "hang it on a rope" technique is, "If it hangs there and won't perform the function, what do I have to add or change to make it work?" The results led me to the first step of the FACTS approach.

FACTS Step One: List all the components for the lowest order functional system containing the component in question.

If we want the pencil to "make marks," we need something for the pencil to make marks on, and something or somebody to use the pencil in making the marks.

The lowest order functional system I could think of was a pencil, a piece of paper and a child.

Following FACTS Step One, the lowest order system components are:

The second step for FACTS then naturally followed:

PERFORMANCE
List the functions the components perform in the system.
For reasons which will be obvious later, I list the function to the left of the system components.

System Component Function System Components
makes marks child
provides marker pencil
receives marks paper

Many people use pencils, so I looked at a couple of others, a carpenter and an author.
For the carpenter, my FACTS looked like this:
System Component Function System Components
makes marks carpenter
provides marker pencil
receives marks board (lumber)

However, when I applied FACTS to the author, pencil, paper system, the “make marks” didn’t seem appropriate. In the case of the child and carpenter, it’s possible they wanted to use the pencil to make marks, but I couldn’t see the author’s functional definition as “making marks.” A more appropriate functional definition was “record ideas.”

At this point, I decided to hang the author instead of the pencil, and try the FACTS Steps 1 and 2 starting with:

Systems Component Function System Component
record ideas author

When I added those components that would enable the author to perform the function “record ideas,” I found I had a number of alternatives for “how.” Three of the system component alternatives were:

1 2 3
author author author
pencil typewriter tape recorder
paper paper tape

It was now obvious that the system function is determined by the system operator, with the other components providing the support functions that determine “how” that system function is to be accomplished.

The example with the author also clearly shows how a value analysis study can be severely limited by directing effort at the component’s function in the system, rather than to the function of the component’s total system.

To pinpoint the direction, the functional analysis should take a third step, which is added to the FACTS procedure.

FACTS Step 3:

a. Determine the system operator and the system func-
tion, assuming the operator has the desire and capability to perform that function.

b. List all the system components in assembly sequence order, placing the operator in the first order position.

c. Show the component functions in the system in functional sequence order.

Using the three alternatives of the author example and applying FACTS Step 3, the FACTS would be:

- System Component Function: record ideas
- System Component: author
- System Component: typewriter
- System Component: tape recorder
- System Component: paper tape
- System Component Function: provide method
- System Component: pencil
- System Component: typewriter
- System Component: tape recorder
- System Component: paper tape

As previously noted, the system operator’s function determines the system function. In this simple system, the author’s System Component Function, “record ideas,” is also the system function.

While most value engineering studies are more complicated and may involve subsystems, the introduction of subsystems is not a problem for FACTS diagramming.

It is only necessary to ensure that the system, subsystems, assemblies, and components be listed in an assembly breakdown.

To demonstrate the application of FACTS for a more complicated system, I selected the overhead projector that was used as an example for FAST diagramming in Larry’s book. There are some communication gaps in the explanation of the FAST diagram for the overhead projector; for instance, the function selected was “show diagram,” with the answer to the question, “Why do we show diagram?” being, “Teach students.” I can only assume the teaching of students is to be accomplished using the overhead projector.

The FAST diagram shown in Larry’s book is shown in Figure 1.

If I hang the projector components, and hang the “transparency” and “power” noted in the FAST diagram on a rope, I still don’t have a workable system, so I applied the FACTS technique and listed the components for the overhead projector shown in the diagram, plus the other components, subassemblies and assemblies necessary to make workable subsystems, starting with the system operator—the teacher—and the system function, “teach students.” The FACTS diagram is shown in Figure 2.

Ask any reporter and he will tell you that a complete story must have all the facts on who, what, when, where, why and how. The FAST technique omits who, what and where. FACTS supplies them.

By combining FAST with FACTS, we can have the complete story for a functional analysis of any scope. Fill in the outline (Figure 3) and you can write your own nonfictional reports.

My conclusion is that our value engineering functional analysis procedures, in general, and the FAST technique, in particular, have failed to consider two basic facts:

1. An item or thing does not perform a useful function except as part of a system.
2. The system function is determined by the system operator, assuming the operator has the desire and capability.

Although this paper is entitled FAST vs. FACTS, it requires only slight modifications to include who, what and where in the FAST technique to make it FAST with FACTS.
NASS ACTION '74

By Francis Knautz, President
National Association Suggestion Systems

NASS, Action '74 is a well-organized program of membership promotion designed for the Suggestion Program administrator. The benefits to you, the administrator, of an expanded NASS membership are obvious. Greater idea exchange, group action and unity to mention a few. More members for NASS means more and better Association programs to help you manage a more effective Suggestion System. More members for NASS will give greater recognition to the qualified administrator.

Now, more than ever, an organization needs a Suggestion System, one that yields results. What are those results? Suffice it to say, for each $1 spent, $4.93 is saved. That is the average net return of reporting NASS organizations last year! I believe, with the help of all members in gaining new members for NASS, we can look forward to a year where NASS will mean even greater opportunities for professional growth and satisfaction, and for the organization to achieve even more effective use of the imagination and innovative skill present in all employees.

NASS is fortunate in having a highly qualified and capable board of directors. Listed are eleven members of the Board who are the Membership Committee. They work constantly to maintain and gain new memberships for NASS. They also are “on call” to all NASS chapter presidents and the headquarters staff, to assist administrators and organizations in any problems being encountered in existing Suggestion Programs or in the development of new ones.

Go for more in '74. Last year was a real turnaround one for NASS. In 1974, let’s all make a commitment to help produce a significant increase in our membership.

FRANCIS C. KNAUTZ is director of personnel for Chicago Transit Authority and has been in Chicago transit for more than thirty years. In his present capacity he is chief negotiator with the nineteen unions with which Chicago Transit Authority deals. He is responsible for employee relations, wage and salary administration, industrial relations, employment and placement, training and public safety, and college recruitment departments as well as the Employee Suggestion System. In addition, he directs Chicago Transit Authority’s special investigations department.

Complete and return to: NATIONAL ASSOCIATION OF SUGGESTION SYSTEMS, 435 No. Michigan Ave., Chicago, Ill. 60611

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Organization ____________________________________________________________
Name and Title of Individual to Receive Mailings ____________________________
Address ______________________________________________________________
City-State/Province _____________________________________________________ Zip Code ______
Type of Business ____________________________ Number Employees _________
Please Check: □ New Member □ Renewal
* □ Member — Annual Dues (Subscription) $75.00 plus $25.00 Registration □ Affiliate — Annual Dues (Subscription) $60.00 plus $25.00 Registration □ Associate — Annual Dues (Subscription) $75.00 plus $25.00 Registration □ P. O. Enclosed
* The registration fee is a one-time charge to set up records, membership processing, etc.

Name of Executive Officer of Company, Division or Agency ____________________________
Title _________________________________________________________________
Signature _____________________________________________________________ Title ____________________________
NASS BOARD MEMBERSHIP COMMITTEE

THE NAMES OF DIRECTORS APPEARING ON THE MAP INDICATE THE GEOGRAPHIC AREAS ASSIGNED TO THE MEMBERSHIP COMMITTEE

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Texas
VALUE ENGINEERING APPLIED TO PURCHASED ITEMS

By Hideo Wakashima

(Editor's Note: This is the last in a series of three articles which indicate the success of a management-directed program in Value Engineering in a profit motivated industry. The first two articles appeared in issues 19 and 20 of PERFORMANCE.)

The Japan Steel Works, Hiroshima Plant, is one of the better-known plants in Japan where management is actively promoting Value Engineering, having obtained excellent results, a considerable reduction of costs and a remarkable revolution in cost-consciousness and value of the entire work force. This paper attempts to explain the results of this management support and cites examples of the application of the Value techniques to purchased items.

INTRODUCTION OF VE

In 1967, the general manager of the plant introduced VE and formulated a basic annual plan. Based on his realization that the most effective reductions in cost would be obtained by applying VE at the design level, he established a plan to train all design personnel of the facility during a four-year period.

During the four years, nine VE workshop/seminars and nine on-the-job training courses were conducted at the plant, during which time 134 VE task force project teams were organized and displayed considerable activity and success.

There are 306 Value engineers — 201 in the Design Department — in the plant. In terms of proportion, the number of Value engineers is twelve percent of the total number of the employees.

At the beginning of the program, the VE staff and Value engineers, identified by VE badges, were sometimes looked upon coldly by the employees. Many employees used to say, "What is VE? Does VE stand for Vacation Enjoyment?" But the VE staff endeavored to disseminate VE among the employees by writing a VE Plan, a synop-

sis of the results of the VE workshop/seminars, and an explanation of the basic annual plan in the monthly bulletin published at the plant, which was read by all of the employees.

As a result of the work of the staff and the increase in the number of trained Value engineers, VE has spread among almost all of our employees, including female employees and the employees of our subcontractors. VE has attained the stage of permanent establishment at JSW, Hiroshima Plant.

VE FOR PURCHASED ITEMS

At the completion of the basic VE plan, all employees of the Supply Section, including one in a supervisory position, were trained as Value engineers.

At approximately the same time, the so-called "dollar shock" and upward revaluation of the yen occurred and, as a measure to cope with the recession caused by this situation, cost reduction was selected by top management as one of the most important items of the Management-by-Objectives Program.

The employees of the Supply Section were directed to drastically reduce the cost of purchased items by applying VE techniques. Since all of the design personnel had been trained in Value Engineering during the basic annual plan, and because almost all of the specifications for purchased items had been thoroughly checked by the application of the VE techniques at the design level, it was thought that there was hardly any margin remaining for further cost reduction by the Supply Section personnel. However, we did not give up hope.

A personal experience that I had remembered from several years previous, concerning our system of inquest of prosecution cases, gave me some personal encouragement that we should not give up hope in our quest for further cost reduction. Under this system, the members of the inquest are chosen by lot, by drawing from the principal polling records of the area. They are simply laymen regarding legal matters, whose duty is to reexamine the cases that are dropped by the prosecutor’s office. This system of review is not very well known but, according to the records of the previous year, a national average of some 8.5 percent of the cases that had been dropped by the prosecutor were determined to warrant indictment, and were forwarded to the Public Prosecutor’s office.

Given encouragement by the above statistics, instead of giving up hope, we resolutely approached our challenge to make VE work in reducing costs of purchased items.

PROCEDURE FOLLOWED

We attempt to apply the following systematic techniques in our review of purchased items:

INFORMATION COLLECTION.

Catalogs are collected on similar items from information provided in advertisements in various industrial newsletters and technical magazines. We not only request catalogs and data, but also indicate that we are interested in purchasing higher value, lower cost parts. Literature from JSW is sent to these manufacturers to acquaint them with our products. At the same time, we inquire at their business offices or agencies located in the Hiroshima District. We also collect VE information from specialty manufacturers during their marketing research and public relations efforts regarding their new product lines.

TRANSMITTAL OF INFORMATION TO DESIGN.

We select substitute items from the data collected that could replace formerly purchased parts, concentrating on those items with equivalent or better performance and lower cost, and pass such information to the cognizant designers. We also request the manufacturer's experts to make in-depth explanations to the designer.

FUNCTIONAL ANALYSIS.

By Hideo Wakashima
HIDEO WAKASHIMA is the subunit head of the Supply Section, Purchasing Department, Japan Steel Works (JSW), Hiroshima, Japan, and is a trained and practicing Value Engineer. He is a graduate of the Hiroshima Prefectural Kaitaiichi High School (Technical Secondary School). Mr. Wakashima began employment with the Japan Steel Works in the Labor Department in late 1955. In 1961 he transferred to the Supply Section, Purchasing Department of JSW, and became the subunit head in early 1973.

In 1959 Mr. Wakashima represented the Chugoku Region of Japan in a National Oratorical Contest sponsored by the Japanese Broadcasting Company (NHK). He participated in the Fifth National Conference of the Society of Japanese Value Engineers (SJVE) in Tokyo in 1972, where this paper was one of the highlights presented to the attendees.

function of the substitute products is compared to function of the items presently used.

COLLECTION OF SAMPLES. If the functional analysis indicates that the new products have merit, samples are obtained. The samples are either purchased or borrowed.

TESTING AND VERIFICATION. The samples are tested to verify their performance. The cost of samples and the expenses for testing and verification are provided either from the VE budget or from funds allocated from research and trial manufacture budgets.

ADOPTION. If all of the tests are satisfactory, we adopt the new products at the design level.

FORECASTING AND AUDIT OF COST REDUCTION. Value engineers of the Design Department forecast (estimate) the amount of cost reduction on specially prepared historical data forms at the time the VE Proposals are applied during the design stage. Upon completion of subsequent product manufacture, audit of the actual result is performed by the cost accounting section, and information concerning the results, including differences between forecast and actual costs, is transmitted to design for future use.

The verification of whether or not the functions and performance of the specialty maker’s products meet or exceed those of the previously used parts is determined by reviewing the VE history recorded on the drawings and specifications. Information is gathered by salesmen at the time of sale and at after-sale service visits, and is based on comments and complaints of customers.

CASE STUDY
Comparison of costs between old-type and new-type cylinders, pumps and coolers — which are installed in some of our industrial machinery in limited quantity — repeat manufacture is shown in Figure 1.

The total cost comparison for all three new items in various types of JSW products, the combined percentage cost reduction for the three items, and the percentage of cost reduction as a function of total product purchase price for the various products is shown in Figure 2.

SUMMARY
CYLINDER: The old-type cylinder had been ordered from the specialty manufacturer in accordance with our design drawings. The cost was high, delivery time was often delayed and the quality was low. By applying the VE Proposal, we were able to obtain a cylinder which was almost identical to the standard type of the manufacturer, after we had held many discussions with him. A trial and error process permitted us to implement the proposal.

PUMP: We reviewed pumps manufactured by several producers which had the merits of large capacity and low noise level. We adopted a combination pump which contained both merits. The general trend of today is to reduce machinery noise. By obtaining the new-type pump, other machinery noise became pronounced, but we were able to solve those noise problems.

COOLER: We discovered a mass-produced line of coolers with low price and better performance. As this cooler is manufactured using standard pipe, the diameter of the cooler pipe is limited, and its total length must be increased in order to provide the same heat exchange capacity. In using this new cooler on older installations, consideration must be given to space requirements.

<table>
<thead>
<tr>
<th>Kind of machinery</th>
<th>Cylinder</th>
<th></th>
<th>Pump</th>
<th></th>
<th>Cooler</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
<td>Before</td>
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<tr>
<td>A</td>
<td>328</td>
<td>221</td>
<td>688</td>
<td>422</td>
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<td>B</td>
<td>633</td>
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<td>601</td>
<td>422</td>
<td>227</td>
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<tr>
<td>C</td>
<td>643</td>
<td>266</td>
<td>1721</td>
<td>552</td>
<td>269</td>
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<tr>
<td>D</td>
<td>906</td>
<td>318</td>
<td>1721</td>
<td>714</td>
<td>513</td>
</tr>
</tbody>
</table>

Figure 1
Unit: Dollars
Figure 2

<table>
<thead>
<tr>
<th>Kind of machinery</th>
<th>Total of the 3 items</th>
<th>Difference</th>
<th>Rate of cost reduction</th>
<th>Rate of cost reduction against total product purchase price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before VE</td>
<td>After VE</td>
<td>Before VE</td>
<td>After VE</td>
<td>Before VE</td>
</tr>
<tr>
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<tr>
<td>C</td>
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<tr>
<td>D</td>
<td>3140</td>
<td>1272</td>
<td>1868</td>
<td>59.4</td>
</tr>
</tbody>
</table>

PROBLEM AREAS

The following problems become apparent in a business environment such as the one in which Japan Steel Works operates:

LOST EFFORTS: Unlike automobiles that are mass-produced, our products are of various kinds and are manufactured in small quantities. When all of the VE effort is expended and the stage for implementation is reached, the VE efforts are wasted unless repeat orders are obtained for the product worked on.

SHORTAGE OF ENGINEERS: Due to the limited number of engineers, mechanical engineers must be borrowed from the Design Department when it becomes necessary to perform technical studies in the Supply Section.

LACK OF VE STAFF: Since VE is performed by line personnel, the daily work routine does not permit sufficient time for continuous VE studies in all areas. However, we maintain a positive attitude and find the time to apply the VE techniques to problem areas. At each opportunity, such as during group meetings for Zero Defects, free time or periods when other companies are on vacation and ours is still at work, intensive discussions are held on the problems that have accumulated. We take every opportunity for VE activities by attending VE meetings and conferences, making plant tours and attending training courses.

CONCLUSION

Although testing and verification are performed, there is a limit to the testing which is possible within the company. Even though tests are satisfactorily concluded, changes in operating conditions might make the product susceptible to claims arising after delivery. If fear of claims prevents risk-taking, effective VE cannot be expected. One way to cope with such fears in the early stages of implementation is to have both old and new parts available.

As sales competition becomes more and more intense among rival manufacturers, high sales profit cannot be expected. With an enthusiastic VE program directed toward reducing total cost of products, reducing life cycle costs, and with the full support of management, profit and competitive advantage will be enhanced.

The history of VE in Japan shows that VE activities were first applied in the materials purchasing departments, and were then thought to be more effective if applied during design. It is my belief that VE should be applied across-the-board; that consolidated, systematic VE activities in planning, design and supply activities — in addition to production improvement methods by Industrial and Value engineers — will be the most effective way of reducing costs and improving competitive advantage.

TEAMWORK

Continued from page 12

STYLE OF LEADERSHIP AND TEAMWORK

Teamwork can give good results only if there are the following conditions of leadership:

- concrete formulation of tasks
- common definition of goal
- full delegation of tasks to the team
- decision with respect to work result already when task is put
- release of the solutions elaborated by the team after having been objectively examined and proved by the team
- acceptance and realization of the teamwork results
- determined time scheduling
- determined perusing of aims
- preparation of all informations that are necessary for the team

active cooperation on the behalf of the person who put the task by giving the team stimuli
- stimulus as an aid, not as an instruction
- claims on the free development of the team members and its encouragement
- practicing and demonstrating teamwork as a function of leadership oneself
- to learn to listen to others
- let others express their opinions without interrupting them
- not intending to dominate oneself
- support new ideas and stimulations for the purpose of their realization
- provide training
- act as a motor and stimulator, not as a manipulator
- create a positive working atmosphere
- honor teamwork and its results

The above described conditions for leadership can be portrayed as a dynamic and liberal style of leadership under the concept of "Participative Leadership." An authoritative style of leadership, on the other hand, does not permit any cooperation in a team and, consequently, no results.
Continued from page 5

Stranger when one considers the exorbitant profits being given to the five cents per gallon variety. It is even stranger when one considers the exorbitant profits being given to the American oil companies — given, not earned. There is no excuse for the lack of immediate, positive action on the part of our elected members of Congress and our Administration to stop this “ripoff” of the American consumer. In the next election, our voting consumers must remove from office every Senator and Representative who has not co-sponsored bills to return the price of gasoline and oil to a level which provides a maximum of ten percent profit plus reserves on gross sales, and a restriction on the expenditure of any funds, in any foreign land, which have been earned in America. Energy research begins at home, and should be so legislated.

Profits (Plus Reserves) Soaring

Public utilities companies have joined the quest for bilking the U.S. public. Using the rising cost of fuels as an excuse, electric, gas, and water and phone companies are seeking sympathetic judges and public utilities commissions for large price increases, little of which is justified. For instance, in Fairfax County, Virginia, it has recently been estimated by the county staff that the county could earn $28 million per year, after reducing the unit rate to the consumer, if the county would purchase the Virginia Electric and Power Company plants and property. And how was that answered by VEPCO? They have asked for a rate increase! If the new generating plants are to be financed by the consumer public, they should be owned by the same public, and not by stockholders. The reason for having stockholders is that they are supposed to share in expansion costs and earnings. If their purchase of shares does not pay for expansion and modernization, they should not share in earnings from such expansion and modernization.

Unjustified Price Increase

The recent requests for rate increases by the “Public” utilities cannot be justified on increased operating costs alone. One might worry that unwarranted price increases could lead to nationalization of electric power, gas, telephone and oil companies. At this point in our inflationary cycle, that worry is not without justification. Funding for expansion should be raised by bond issue, or sale of additional stock if the utilities are to remain in private hands. At some point in time, the consumer revolution will start and those consumers who are paying for expansion will insist on sharing in the revenues so generated — justifiably so.

The Consumer’s Voice

As a consumer, has your voice been heard? When was the last time you corresponded with your elected officials about the unhappy situation caused by oil and public utility price increases? How many of you have accepted the inconvenience of shoddy automobiles and other merchandise without contacting the responsible manufacturers and the Better Business Bureaus — in writing? Have any of you been paid for your mileage expenses and your time while waiting for your car to be repaired under warranty? Have you contacted your local automobile association to demand that they publicly list the cost of dialed local calls in the motels/hotels they direct you to, and to list all of the new, low-cost motels being built throughout the land? Are you planning to vote for fiscally responsible public officials in the next election? Can I count on your vote against any Senator or Representative who has not co-sponsored a bill to restrict profits and reserves of oil and gas companies based on gross sales, and a restriction against their spending of funds earned in America in any other country?

The consumer is a power in America because he is every man, woman and child. Rich or poor, we all have a lot to gain from a united consumer front. If consumerism is to be real, each of us must do his or her part. Reread the list of questions in the preceding paragraph. If all of us do our share, we can prevent consumerism from dying and make it a power in national politics. Speak out for America and her masses, and we shall stem the inflationary tide.

UPDATE

Continued from page 6

NASA REDUCES PROPERTY REPORTS

The National Aeronautics and Space Administration (NASA) has eliminated the requirement for future mid-fiscal year Government-Owned/Contractor-Held Property and Space Hardware Reports (NASA Forms 1017 and 1018). The proposed revision of the NASA Procurement Regulation and the Financial Management Manual will provide for annual reports only which would be submitted as of May 31 on a new, combined NASA reporting form. NASA Headquarters has advised that, due to the time required for the preparation of the revisions to Appendices B and C of the NASA Procurement Regulation and the revision of the Financial Management Manual, the submittal date for the next report is July 26, 1974, and will be submitted in accordance with the existing procedures, including the use of NASA Forms 1017 and 1018.

NATIONAL STOCK NUMBER

All government equipment supplies and material will be identified by a national stock number after September 30, 1974, it was announced by Defense Procurement Circular Number 120 dated March 11, 1974.

Effective September 30, 1974, Federal Stock Numbers (FSN) will change to National Stock Numbers (NSN). NSNs differ from FSNs in that they have a two-digit National Codifications Bureau (NCB) code which follows the four-digit Federal Supply Class. For comparison purposes, a typical FSN and NSN is shown below:

FSN 5960-123-4567
NSN 5960-00-123-4567

The term Federal Supply Class will be retained after September 30, 1974. However, Federal Item Identification Number will change to National Item Identification Number.

PERFORMANCE
VALUE ENGINEERING IN THE DESIGN STAGE

By William P. Shine

How far to go with Value Engineering in the design stage is an age-old problem of cost and worth, with delivery time complications. The design engineer has to analyze the aforementioned facts, build a structure around his project, set goals to be met, and have management approval before proceeding with his work.

For an all-out effort with ample lead time, the Figure I flow chart is a guide to the step-by-step procedures from concept to production release. Functional analysis must be started in the early stages in order to apply the techniques over a wide-open field, rather than being restricted with compromises which usually are more costly and less efficient to implement later on in the project. The individual steps under each of the five main procedures are not necessarily in the proper chronological order and, as can be realized, many of these are in process at the same time — as a parallel effort which saves overall project time — if an early completion data is targeted.

RESOLVE DELAYS

One caution! Any delay in the accomplishment of each procedure should be resolved promptly so as not to impact on the next item or group of items, which could result in a multiple of lost overall time.

After layouts are approved and details are started, concentration should be placed on long, lead-time items for early release for final pricing and tooling lead time. These include castings, moldings and intricate sheet metal stampings, which require elaborate tooling.

The production prototype is a fully detailed model produced from checked details, with concentration on "fits" of mating parts and performance of function as set forth under the quality standards.

This flow chart should be a guide, but not become a bottleneck for the fluent succession of work. Paperwork, if excessive to needs, may block the open-mindedness required in efficient problem solving. Brainstorming is an excellent method for enhancing problem solution.

MODIFIED PROCEDURE

What does a product designer do when he is asked to work on a crash program and not to worry about cost reduction until the item is on the market and proves itself? In such a case, function and time are the...
primary factors, with appearance and
cost of secondary concern. Items of
this type usually are entirely new in
concept or, using a new idea, outdate
or undersell a competitive item already
in use.

In order to design an item such as
this, a modified procedure chart —
Figure II — is used. As indicated, the
design layout is the key item on which
the designer bases his fabrication and
tooling methods, and time is the most
important factor. Use of standard
commercial parts and hardware is
mandatory. After breadboarding, the
designer needs time to review possible
problem areas and, using a value
framework, follows through to com-
plete the prototype. In the meantime,
the designer will review alternates to
the direction he has established, and a
prompt confirmation or denial is
required as to whether each alternative
is acceptable for the product at that
time.

He also will be hounded for details
and shorter delivery schedules for
marketing prototypes before he feels
assured that all the changes and
improvements made from the bread-
board to the prototype will actually
work out without intense debugging
and major last minute changes. A gear
train running the wrong way, bearings
that do not hold up, unanticipated
deflection in critical areas, and impos-
sible assemblies are some of the pitfalls
of crash programs.

**VALUE UPDATE**

After marketing has been success-
fully completed, the product is investi-
gated for market durability. How
many years will it last? This time
estimate will determine whether
product improvement through Value
Engineering and long-term tooling is
warranted. After receiving a go-ahead,
a joint meeting between industrial
design, marketing and production is
conducted by the design engineer,
value consultant. This meeting deter-
mines, on the basis of value, where
improvement is required according to
the units now being manufactured,
and also feeds in the original value
engineering projections as suggested in
the sum-up procedure from Figure II.
At this time, it also is decided how
many of the procedures from Figure I
will be reinstated, and how far to
proceed with the entire cost reduction
effort.

In some of the products which have

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**Figure I Product Value Design**

<table>
<thead>
<tr>
<th>Product Or Concept</th>
<th>Breadboard</th>
<th>Engineering Follow Thru</th>
<th>Production Prototype</th>
<th>Release For Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Survey-Saleability</td>
<td>Establish Functions</td>
<td>Design Layout</td>
<td>Final Cost Estimates</td>
<td>Sum Up Project</td>
</tr>
<tr>
<td>Industrial Design</td>
<td>Combine Functions</td>
<td>Quality Standards</td>
<td>Release Drawings To Purchasing</td>
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<tr>
<td>Fabrication Analysis</td>
<td>Structural And Stress Analysis</td>
<td>Coordinate Vendors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Unit</td>
<td>Cost Reduction</td>
<td>Release MarketingModels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Reduction Alternates</td>
<td>Production Details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate Cost Of Unit</td>
<td>Drawing Check And Approval</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate Tooling And Amortization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PERFORMANCE 33**
achieved reductions in cost through value analysis, I have found high cost attributed to tooling of individual functions which could be combined, materials that have a higher rate for forming, and the finishing and assembly operations which had been based on original low quantities.

Consider a "family die" for die casting parts as an example. A large part — 1.2 pounds — was being cast at the same time as two smaller parts. Through analysis and machine time, it was determined that it was taking twice as long to cast the small parts because of filling and cooling the larger part while the smaller pieces just sat there in the same die. A two-cavity die for the large part, and a six-cavity die for the smaller parts — three pieces of each, per shot — reduced the cost by thirty percent.

**NEW APPROACHES**

A special stop washer was eliminated entirely in one review and its "stop" feature was built into a cast collar. This made the collar a bit more intricate — a common reason for using die castings — and the new piece-price did not change at all.

A deep drawn can with a .040-inch aluminum wall was changed to an A.B.S. plastic extrusion, saving all the draw and trim operations. The plastic material is available in all colors, eliminating the etch and paint operations on the aluminum. The new cost is less than one-third of the original.

A good fastener for low quantity — less than 10,000 per year — is a slip-on nut and its mating screw. The assembly time for this operation is costly, so by using a trapping principle rather than a holding-down one, the nut was eliminated and the screw changed to a self-tapping type. There was a considerable saving of parts and assembly time.

An extruded aluminum channel — about a foot long — required anodization, but was not held to a rigid outdoor environment test. It was treated chemically in thirty-foot lengths and then cut off to size, with a finish saving of about forty percent.

Including bent tabs and offset bends on sheet metal stamped parts, and stamping inscriptions simultaneously with other operations saves a tremendous amount of secondary operations. Some of the secondary operations, such as silk screening and finishing, require an extra shipping and handling charge which, on high volume, is a considerable amount of money. With parts that have finishing and painting after fabrication, a full investigation into automated shops should be made. In some cases this could provide a fifty percent savings, if you find someone set up to do it with little change to his everyday schedule.

If you can find specialists in an item being produced that is similar to your part, "See Them First." A vendor, having specialized knowledge in a field, knows what to expect from his tools and machinery and is usually your best bet. However, with any item sent out of your own shop, use competitive bidding from several vendors before choosing. A final review, even in this case, usually can reduce price prior to placing the order.

It always is a pleasure to have an opportunity to practice cost reduction and value analysis on a previously produced item, especially if it was produced as a result of a crash program.

A value designer is a rational designer who keeps an open mind and approaches problem solving with a positive attitude. The feeling of accomplishment is its own reward, which enhances confidence and results in a secure and more experienced outlook to new challenges.
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