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FEATURES:

- It Pays To Pay — For Good And Valuable Ideas
  Robert N. Hart 8

- Design To Cost
  John E. Reichen 10

- Progress Through People, ASPI Annual Conference
  16

- Recording Systems For More Efficient Suggestion
  Plan Operations
  James A. Pingitore 17

- How To Succeed At Design To Cost
  By Really Trying (Conclusion)
  Wilbur L. Bryant 20

- Affirmative Action Programs For Handicapped Workers
  Chris W. Ford and Frederick C. Dyer 25

- Value In Value Engineering
  Gerald S. Swenson 28

DEPARTMENTS:

- Performance Update
  5

- Performance Trends
  7

SUBSCRIPTIONS — Single Issue $2. Yearly Rates: U.S. and possessions $12; Canada $12.60; Foreign countries $13.20. (Make all checks payable in U.S. dollars.) Write for organizational bulk rates.

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PERFORMANCE Magazine is published by Charger Productions, Incorporated, 34249 Camino Capistrano, Capistrano Beach, California 92624. Second class entry at San Clemente, California 92672.
SEVENTH AWARD TO CONVAIR

General Dynamics’ Convair Aerospace Division in February received its seventh Performance Improvement Sustained Craftsmanship Award from the Defense Supply Agency, attesting to the division’s continued efforts in improving its EXCEL Program. From left (back row) Colonel R. Bathke, chief, Defense Contract Administration Services (DCAS); Grant Hansen, Convair vice-president and general manager; Colonel R. C. Snavely, Atlas Special Projects Office, SAMSO; Brigadier General M. E. DeArmond, DCASR, Los Angeles; Rich Jumont, chief, NASA Resident Office; Colonel N. F. Zunic, commander, DCAS San Diego District; Jim Brown, General Dynamics Convair director of Quality Assurance. Front row, Faye Toler, Launch Vehicle Programs Logistics Support and Gil Reeves, Launch Vehicle Programs Production Control.

PAPERS SOUGHT FOR ASQC CONFERENCE

Not previously published nor presented at a national meeting papers are being sought by the American Society for Quality Control for presentation at its 31st Annual Technical Conference to be held May 16-18, 1977, in Philadelphia, Pennsylvania. Submittals should relate to new approaches for enhancing productivity attributed to product quality and service quality improvement, and for advancing the quality methodology concurrent with the conference theme: “Productivity with Quality — Today’s Challenge.”

Program areas in which papers will be considered for presentation are industrial quality, services quality, cost and regulation constraints, international quality challenge, and consumer/environment. To make a submission, note the program area(s) for consideration on four copies of your abstract (not more than five hundred words, letters and spaces in titles not to exceed fifty words) and send to Case

Continued on page 6
The eighty-six million pounds included $1 billion at the Federal Reserve Bank of Richmond, Virginia, indicating the record spending of the company's consumer aluminum recycling program.

David P. Reynolds, vice-chairman of the board, Reynolds Metals Company, stands with $13 million at the Federal Reserve Bank of Richmond, Virginia, indicating the record spending of the company's consumer aluminum recycling program. 

Authors whose papers are selected for the conference will be notified by October 1, 1976. Final camera-ready manuscripts for publication in the Conference Transactions will be due by February 1, 1977.

Papers are specifically encouraged from individuals in facilities employing 300-1000 persons in order to broaden the scope of the conference. The Technical Program Committee will select a Best Paper from those presented and award the recipient a suitable plaque reflecting on its excellence.

H.E. O'Kelly, Datapoint chief executive officer, stated that "Datapoint absolutely adheres to and supports the concept of equal employment opportunity for minorities and women and has committed a substantial amount of time and money to this end. We were shocked and offended that the EEOC instituted this action against Datapoint and feel we have been vindicated from the outrageous claims made by the EEOC against our company."

Datapoint general counsel S.E. Faye noted, "The substantial judgment against the EEOC is a very good indication of how the court regarded the absolutely groundless claims made against Datapoint. Needless to say, Datapoint is highly gratified by the outcome of the trial."

HENRY NAMED GM AT DOW

Hunter W. Henry has been named general manager of the newly created Organics Department of Dow Chemical U.S.A. as a result of reorganizing the Ag-Organics Department in Dow U.S.A. Henry had been vice-president and director of manufacturing of Dow Badische Company, Williamsburg, Virginia.

A twenty-five-year veteran of Dow, Henry joined the Texas Division in 1951 and after various production control positions was named assistant production superintendent of theylene Glycol Department there in 1957. He joined Dow International in 1962 as project manager for the engineering and construction of the Terneuzen complex in The Netherlands. In 1964 he returned to Midland as director of manufacturing for Dow International.

When the Latin American Area was formed in 1965, Henry was named director of operations and became director of business development in Dow Latin America in 1971. He is a graduate of Mississippi State College with a BS degree in chemical engineering.

REYNOLDS NAMES JOHNSON GM

Lloyd A. Johnson has been named general manager, sheet and plate, wire, rod and bar operations of the Mill Products Division of Reynolds Metals Company. Johnson, who was plant manager at the company's Listerhill, Alabama, aluminum sheet and plate plant since 1968, succeeded J. Lamson Kerins who moved to an executive position with British Aluminum Limited, London.

John P. Wilke, plant manager at the McCook, Illinois, plant, succeeds Johnson at Listerhill and Harold K. Ketelsen was named manager at McCook. John B. Kelzer replaces Ketelsen as plant superintendent at McCook.

A graduate of Northwestern University, Johnson joined Reynolds in 1965 at McCook and was plant superintendent at the time he was named plant manager in Alabama. He formerly held management posts with Kaiser Aluminum and Chemical Company.
TELEPHONE DIRECTORIES ON MICROFICHE — More than 360 current Bell Company telephone directories, covering 245 major metropolitan areas, as well as certain federal government telephone directories, are available on microfiche from Bell & Howell's Micro Photo Division. Recorded on 98-page format, 24X-reduction, diazo microfiche, Phonefich(TM) is available on a yearly subscription basis as a complete collection, by groups or individual metropolitan areas. For additional information write Phonefiche, Dept. P, Customer Service Department, Bell & Howell, Micro Photo Division, Old Mansfield Road, Wooster, Ohio 44691.

The 9866B plots graphs and bar charts with a resolution of .017 inches, at a speed of nine hundred rows of dots per minute. For additional information write Inquiries Manager, Hewlett-Packard Company, Dept. P, 1501 Page Mill Road, Palo Alto, California 94304.

DESKTOP PROGRAMMABLE CALCULATOR — A new thermal line printer with upper and lower case and plotting capabilities has been placed on the market by Hewlett-Packard. The new HP 9866B printer is designed to be used with all HP 9800 Series desktop programmable calculators. It is priced at $3350 and contains a ninety-five-character ASCII set, with upper and lower case alphabet and symbols reproduced by a 5x7 dot matrix. It can print up to eighty characters per line, at a speed of 240 lines per minute.

NEW CATALOG — A comprehensive Vacuum Components Catalog is available Continued on page 27
"You get what you pay for," or so the old saying goes. As there are a multitude of instances in which this simply is not so, even the partial truth of this statement is of dubious value. Today, particularly, we often have to question whether we are "getting what we pay for" in wages and salaries to our employees.

In many years of experience in suggestion system administration, the matter of who should and who should not receive monetary awards for suggestions submitted and adopted with resultant savings, has sometimes been trying and, occasionally, an exasperating task.

"First, there is the established, written policy stating the basis upon which eligibility is to be determined by the body responsible for its determination. Then there is the matter of interpretation of the written policy — unless it happens to be remarkably clear.

"In addition to the final decision-making group or individual, others indulge in interpretations and/or opinions. Some of those involved in the evaluation process are supervisors and management people. Others may be fellow employees sounding off in regard to awards that have been made or, perhaps, suggestions that have been rejected. In a few instances we may have a case of sour grapes.

Long experience in regard to policies and their effects, as well as extensive discussions and analyses, has led to some pretty clear conclusions on the subject of eligibility of suggestions. These might be well summarized in one statement: It Pays To Pay For Them If We Really Want Valuable Ideas.

A number of comments and assertions are frequently made in regard to the eligibility of certain employees for cash awards, and often in almost the same words. Some have their origin in personal philosophies and some are related to theories of management. Whatever their source, they have some validity and nothing is accomplished by angrily dismissing them. Instead, providing direct and specific answers may bring about a much better understanding and, even, agreement.

Some of the statements frequently made are:

"Making this suggestion is part of the suggester's job responsibilities."

"This suggestion is what we expect him or her to make as part of their job."

"He or she is paid to suggest such improvements and economies."

In many organizations, particularly large ones, there are a number of employees in the same classification, although there are often some variations in the specific duties of each. In regard to what follows, it is necessary to consider the personnel and compensation policies of the organization.

In civil service organizations, and in many others, pay schedules are fairly uniform and vary little with any appraisal of individual performance. In these cases, especially, the above quoted statements should be given these responses:

If the first statement were true, supervisors or management must say to the others in the same classification as the successful suggester: "You are not fulfilling your job responsibilities in that you have not made any proposals for improvement or economy." Disciplinary action may be called for.

If the second statement is valid, others in the same classification who have made no suggestions should be told that they are "expected" of them, and unless they are forthcoming some drastic action must be taken.

If an employee is actually paid to
come up with good ideas that result in saving appreciable amounts of money for the organization, it seems apparent that those in the same classification as themselves should certainly face a reduction in their pay. If this is not so, how has the one who has made a good suggestion been paid?

A fairly clear conclusion emerges from the foregoing. No employee is paid to make suggestions except those few who are regularly required to make them in their work. Others are paid to do only what they were doing prior to making a suggestion.

It is all very well to expect all employees to conceive ways to improve operations and find ways to save some of their cost—and they should! But it is not reasonable to expect them to do so without recognition (including monetary), particularly when others are so honored.

Occasionally, another somewhat distressing (and snobbish) comment by some is that professionals, presumably filled with esprit de corps and receiving high salaries and other special advantages of their status, should freely contribute any ideas they may have with no expectation of a monetary award for so doing. Of course some, perhaps many, actually do. But many, who might be able to if motivated, do not.

The status of professionals at one time may have warranted greater expectations from them than from others, as they did enjoy advantages in compensation and special privileges. Conditions today are quite different. Both advantages have narrowed greatly, and many have become nonexistent. In any event, there seems little justification for this type of discrimination.

In recent years, there seems to be an increasing tendency in wage and salary administration to pay all persons in the same classification the same or, at least, on the same schedule. This simply puts any variations on a time basis. Some organizations may have an individual performance evaluation program in which such items as significant proposals made (suggestions) are duly noted. But, even in these programs, it is doubtful that many make any attempt to correlate pay with the results of the appraisals.

In some organizations, management may have the prerogative of increasing pay or promoting employees who show special ability, including making good suggestions. In some cases this is an excellent policy when the overall performance of an individual deserves immediate recognition, advancement and/or a higher salary. But, obviously, even several good suggestions may not justify either promotion or more pay. Suggestion awards are a direct and reasonably accurate way to evaluate and immediately reward the development of valuable ideas.

Amount of Awards

The Annual Statistical Report of the National Association of Suggestion Systems shows a wide range of Percent of Savings Paid. There has been a tendency in recent years to increase this percentage. It is my inclination to favor ten percent of first-year savings. It is questionable whether a higher percentage results in enough more net savings to more than cover the higher awards. With a ten percent policy, I would advocate a high maximum, or perhaps no maximum. It seems that substantial savings should receive a proportionally higher award.

With a policy of paying awards of ten percent of only the first-year net savings, the fact that ideas continue to be in use for an average of perhaps five years means that the actual award is only about two percent of the total actual savings enjoyed by the organization. This fact makes it evident that it doesn’t pay to quibble about the eligibility of most employees if a fifty to one return is jeopardized. It is unlikely that any other portion of a business has a $50 return on every $1 invested.

Other Policy Considerations

While engaged in urging liberalization of eligibility policies in suggestion systems throughout the country (and the world), it might be in order to go all out and propose that almost all employees be included as eligible for cash awards. This would include even those engaged in research and development and in other positions in which production of significant ideas is actually expected.

Policies for evaluation of such suggestions might vary somewhat from those more commonly in effect. The degree of ingenuity involved could be given special attention as it is in some systems now. The probable life of an idea and its possible application might be given greater weight.

If people in these categories were to be made eligible for monetary awards, it might be advisable to establish different base salaries which are adequate for run-of-the-mill performance in these jobs. Accomplishments that are above routine would then be recognized and compensated according to their magnitude. It seems possible that such a policy, if properly established and administered, could bear fruit at the fifty to one ratio. This plan would be justified if only half of that ratio were realized.

Sometimes there is thought of accepting a suggester as eligible only if the suggestion involves an operation or activity outside the suggester’s area of responsibility. There are at least two objections to such a policy. One is that some employees may spend an inordinate amount of time searching for ideas in other fields while their regular work suffers. And, it also seems that those thoroughly familiar with a certain kind of work should be the source of more viable ways to improve it.

Certainly, no one should be prohibited from submitting suggestions which are outside of his or her own field. The functions of some areas of work are, unfortunately, almost sterile as to opportunities for savings.

We hear, occasionally, of a suggestion system in which other than monetary awards are used to inspire employees to come up with ways to save substantial amounts of money. These generally involve a variety of inexpensive awards—mostly recognition by high management personnel at dinners and other occasions. While such programs are reportedly successful, it does not seem that they can get the results that a full monetary award program would when it is effectively administered.

In the course of long experience and concern with the problem of eligibility, the following proposed written policy has emerged as the most sound, fair and clearly understood basis.

A Suggester Is Eligible For A Monetary Award For A Suggestion If He Or She Was Not Assigned To Do What Led To What Was Suggested, And If The Suggester’s Position Is Not One Regularly Requiring The Development Of Such Suggestions.

I believe that the primary purpose of a suggestion system is to provide an incentive and encouragement to employees to find ways to improve operations, particularly in respect to their cost. While employee morale is important and should be carefully maintained, to me it is secondary. Recognition is an essential part of the program, but a reward of money closely proportional to the value of an idea is, in my opinion, indispensable. It Pays To Pay For Good And Valuable Ideas.

(The content of this article is entirely original and does not necessarily constitute the endorsement or opinion of the city of San Diego, California.)
JOHN E. REICHEN, CVS, is presently employed by Engineering, Tektronix, Incorporated, Beaverton, Oregon. He formerly worked as a machinist, draftsman and designer for the same firm, and in Europe as a VE consultant from 1967-69. A native of Switzerland, Reichen is a graduate of Technicum Neuchatelois at La Chaux-de-Fonds and earned his ASEE from Multnomah College, Portland, Oregon, and ATM from Toastmasters International.

He is a charter member and past-president of the Portland SAVE Chapter. Currently he is using VE techniques in engineering design, with emphasis on upgrading reliability and product safety at lowest cost penalty, and is doing part-time technical translating. He has edited a bilingual VE handbook for a European firm, has been published twice in the Journal of Value Engineering, and presented a paper at the North Central VE Conference in 1972.
This article endeavors to highlight various aspects of the Design-to-Cost (DTC) technique now coming into use in Value Engineering (VE), where it's used to properly set goals or parameters and to suggest ways of combining it with Cost-Targets (CT), another technique for setting and controlling cost goals.

The VE Job Plan, in fact, is easily adjusted and has some operating mechanisms added to put DTC to work for the VE team. And, look at VE manuals – all show best cost-improvement possibilities early in the game, at design or even the conceptual stage. But, the earlier, the more difficult it is to justify VE effort.

Effective DTC needs cost goals for design parameters, which require utmost expertise, for top design capabilities must come into clear focus. As questions on feasibility, development costs, lead time, etc., will likely run the gamut of VE tactics, its approach and process must likewise be logical, sound, penetrating and easily communicated. CT is very close kin to DTC – viewing them closely together reveals the essential VE thread running through both.

The following basically covers some basic norms for operational VE, DTC and CT for an easy conclusion that they interrelate favorably, and covers various aspects of their implementation. DTC on a specialized application for electrical facilities is used as an example. One obvious point about VE and DTC is that they can be worked together from a fairly common technology to jointly produce the results, synergistically, that each aims for.

Definitions of VE, DTC and CT

Value Engineering (VE)

DISCIPLINE – Systematic application of recognized techniques to: identify the function(s) of an item; establish a monetary value for the function; and develop means to provide the function at optimum cost.

OPERATIONAL/PROGRAM – Task team(s) of trained and capable people with a properly selected project, systematically using the VE Job Plan and techniques, making deliberate and penetrating function/cost comparisons, then building major results from these approaches and a creative atmosphere.

---

**Value Engineering**

**Job Plan Phases & Key Questions**

1. **Acquisition of Information**
   - What is it?
   - What does it cost?
   - What does it do?
   - What must it do?

2. **Brainstorm, Speculation**
   - What else will do the job?

3. **Creative Evaluation**
   - What does that cost?

4. **Development**
5. **Execution**
6. **Follow-up & Report**

---

**Design to Cost**

1. **Set Parameters**
2. **Meet Cost Parameters**
3. **Measure Results**

---

**Cost-Targets**

1. **Set Goals**
2. **Accomplish Goals**
3. **Monitor Results**

---

**Figure 1: Phase Comparison of Value Engineering, Design to Cost, and Cost-Targets.**
DESIGN TO COST (DTC)

DISCIPLINE — Systematic management and control of future (acquisition, build or production, operating, support, and removal) costs through the design process under set and approved cost goals (1).

OPERATIONAL/PROGRAM — Contractually established program between contractor and customer to incentivize the amount of progress made in accomplishing designated cost parameters.

COST-TARGETS (CT)

DISCIPLINE — Systematically developed set of dollar levels compiled from best judgment of responsible people on what the item should cost and, in order to get that level, what the various sublevel components must cost (2).

OPERATIONAL/PROGRAM — Involves developing, establishing and monitoring progress on cost parameters to bring about corrective action, where needed, toward meeting established levels.

(1) That is — specific cost number (in constant dollars for a specified number of systems at a defined production rate) set as early as possible in the life cycle, definitely no later than start of full-scale development phase.

(2) Quite different from cost estimated figures typically predicting what the costs will be under normal processing.

RELATIONSHIPS BETWEEN VE, DTC and CT

Design to Cost, like any other new tool entering VE, has its advocates as well as detractors — with the very same reasons fielded against VE itself: sloganeering, buzzword, hottest thing, return to basics; clearing cobwebs, already doing it by another name, etc.

---

Figure 2: Flow Chart of Cost-Target Technique

Ref: SAVE 79 - 69
DTC and Cost-Targets (CT) can be welded with VE to produce outstanding value improvements in relatively unlimited applications, usable by practically anyone in industry, government or military, and successfully adaptable to small or large projects. There's little or no excuse to exclude this from one's activity; if it's already in. This presentation may yet give added insights to improve effectiveness in their everyday working relationships.

Cost-Target Procedure

COST VISIBILITY - Combines program definition with pertinent data (can be pictorial of major subunits with costs and critical points noted). Close study of this with situation appraisals permits program manager to decide on areas to attack, assignments, timing of further actions.

SET GOALS — Program manager instructs team (size depending on project complexity) on top-level goal, amounts involved, implementation cost levels, time-frame, etc., at kick-off meeting. Each team reviews Cost Visibility, gets facts, originates and gathers improvement concepts, evaluates most promising, writes Accomplishment Plan and sets goals to match. This phase is done when at least two number sublevels are set and backed by definitions on how to reach the goals.

ACCOMPLISH GOALS — Goals are firmly set after comprehensive review (team, manager, assigned functional group). Variations from plan are project manager's option; the end requirement is meeting the cost parameter.

MONITOR RESULTS — Status reporting follows schedule. Responsible engineer can call for measurement against cost goal at subunit completion events, none considered done until all its cost parameters are met (any overrun requires immediate notification of responsible manager). VE-substudies may be initiated for specifics.

Job Plan

<table>
<thead>
<tr>
<th>Phases</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Acquisition of Information</td>
<td>Area study, Project Selection, Lead-off investig., Task team assignm., Orientation, Kick-off discuss., Significant facts, General assessment</td>
</tr>
<tr>
<td>B. Brainstorming (Speculation)</td>
<td>Preliminary identification, Categorization, Goal scope, Sub-task assignments, Current conditions study, qty. usage, cost visib., methods, toler., etc., Functional analysis</td>
</tr>
<tr>
<td>C. Creative Evaluation (Analysis)</td>
<td>Problem definition, Sequence priorities, Group ideation - a,b,c, Individual ideation</td>
</tr>
</tbody>
</table>

Figure 3: JOB PLAN (First Three Phases)
Final reviews precede corresponding Production Releases of project item.

**Goal Setting Techniques**

The VE Job Plan provides a ready-made means for setting goals and guiding the VE Study at the time. The steps called upon specifically to this end are listed for the first three Job Plan Phases in Figure 3.

Referring also to Figure 1, comparing VE, DTC and CT, we see those phases of the Job Plan relating to Goal Setting of the CT technique. The first, Phase A, aims for us to acquire facts and data needed and to organize them into workable form. Next, Phase B, is when a fund of ideas on potential alternates is generated. This is followed by Phase C, Evaluation, involving decisions and verification on ideas to be proposed. Phase D, Development, is accomplished when we have a subset of cost goals worked out, and documented instructions or recommendations to reach the necessary cost levels.

Reading a double meaning into the above paragraph lets us either set cost goals or start off on a VE study by the same procedure. Only the end point is significantly different — for goal setting we also must document the number subset. All skills and experiences gained in doing one are readily transferable to the other. Of course, there's no need to reinvent the wheel; what proves out best for one repeatedly proved as well for the other. With this common and basic framework, attention can focus on tailoring the various steps with each successive application into a more productive combination to further improve the integrated approach.

**Feedback, Pareto, Correction**

As a study proceeds, timely update feedback on expected production and support costs is needed to guide progress and trigger corrections as needed. Such feedback is basic to DTC; its lack virtually prohibits timely program moves. A program manager's duty is to monitor cost parameters with the same emphasis and priority as applies to performance and schedule; measurements should be based on most recent data. The manager must secure approval for raising a cost level from the approving authority.

Pareto's Law can be applied to minimize cost estimating; it involves ranking the expected unit cost of all elements from highest to lowest. Fewer than twenty percent of the highest cost parts should represent more than eighty percent of the item's total cost. Tracking parameters on the fewer high-cost parts provides timely feedback to designers, manager and customer at least cost.

Cost should be charted to inform on progress toward discrete goals; including control limit curves that represent program management's best judgment on maximum cost levels reflectible in the design cycle where the cost goal is to be met. Decisions early in design affect production cost elements. A chart can give production cost visibility early, say at the six percent expenditure point for a Design Validation Phase. All concerned must be informed on an exception basis of their progress toward meeting assigned cost goals as work proceeds. Whenever overruns show up, immediate executive review should decide whether to reorient or cancel.

**Allocating DTC Goals**

To manage DTC goals, the full system cost must be reduced to meaningful goals for the respective functional groups or elements. DTC goals generally given to designers include recurring cost elements at either factory cost level or production hours level. Designers responsible for developing a system can only perform to this goal if they know what share of total price is represented by the particular elements.

The levels to which these goals should be broken down vary and, since each added level multiplies expense, the level should be carefully chosen. An engineer's choice of design approach affects two cost elements in production: direct labor and material costs. If the design creates needs for special processes, tooling or facilities, it may also affect the contractor's burden; e.g., complex designs or special facilities are likely to incur not only higher labor and material costs, but also higher than normal burden.

Engineering decisions also determine many support costs, i.e., the level of skill needed to repair or service, reliability (mean-time-to-repair), maintenance and operating costs. These costs, difficult to estimate during development, may be controlled in other ways — test and evaluation of operating reliability, or reevaluating system requirements.

Administrative costs are usually allocated on some prorata basis and may not be visible in a designer's unit production cost goal. Development, operational evaluation and technical evaluation costs are rarely seen in unit production cost goals; they don't normally recur.

**DTC applied to Electrical Systems**

Proceeding through the DTC study of several electrical systems of buildings runs basically the following course:

a. Tabulating information on the following factors: Ec - electrical contract cost in $; Ek - electrical system capacity in kVA; EL - electrical load connected in kW; G - gross—(area in) square feet (SF); L - linear feet of equipment in feet (LFE); (for different types of business, this factor might be in other units).

b. Calculating ratios to focus on utility (Use Value), then adding the results to the tabulation — use the following formulas: Cost per square foot, Ec/G, $/SF; System capacity per square foot, (Ek/G) x1000, VA/SF; Cost of
system capacity, Ec/Ek, $/kVA; Cost per LFE, Ec/L, $/LFE; System capacity per LFE, (Ek/L) x1000, VA/LFE; Load connected per LFE, (E1/L) x1000, W/LFE.

c. Plotting charts of ratios in combination.

d. Comparing adjusted values and (determining) goals.

Caution:

Each of the above ratios has its pros and cons, and no one ratio can tell the whole story unless all designs are identical. For example, the cost per square foot ratio penalizes special efficiency versus loads served. Where same system designs serve two identical facilities, the cost per SF will be higher for the more efficient unit and vice-versa.

A weakness of using cost per capacity by itself is that it doesn't account for over or underdesigned cases, both with respect to equipment type or size. For example, when comparing two like facilities, one having a 1 MVA capacity at $50,000 cost and the other with 1.6 MVA at $80,000, both would be rated at 50 $/kVA, again no true comparison. The same reasoning applies to other ratios.

However, cost differences become clearly visible, and candidates for restudy or challenge are pinpointed when job costs vary from the model or standard.

Conclusion

Design-to-cost means making cost a design parameter of importance equal to performance and schedule; but this presentation barely scratched the surface of the discipline, which is, after all, not only an adjunct to VE but can be used as well on its own. There are many more charting techniques, calculation methods, numerous considerations plus extensive subtechniques for applications to other areas: mechanical, architectural, structural, site work, production, etc.

DTC is spreading and it's working; integrate it now into your VE tool kit. Experience has shown that together with VE, practical values for the system performance we need are achievable.
How are managers responding to workers' growing demand for more involvement with decisions and satisfaction from their work? What caused workers to turn from alienation to the constructive pursuit of their demands? Will their participation in the management of work contribute to improve America's economic productivity? What company programs are needed to improve performance in the management of human resources? What new skills are needed for making programs effective?

These issues will be aired at the 8th Annual National Conference of the American Society for Performance Improvement, to be held under the theme Progress Through People in cooperation with the U.S. Department of Commerce and the National Center for Productivity and Quality of Working Life, May 19-21, 1976, at the Sheraton Hotel in Anaheim, California.

Speaking on the topic "The Counter-Productive Forces of Inflation," Robert D. Nelson, executive vice-president and general manager of the Los Angeles Times, will sound the conference keynote. He will be followed by speakers from industry, government and education who will relate knowledge and insights gained from cases of real experience with efforts of achieving progress through people.

They include E. Gary Anderson, director of industrial relations, Boeing Aerospace Company; Joji Arai, manager, U.S. Center, Japan Productivity Center; William E. Bright, manager, manpower planning and development, Union Oil Company; Donald Dewar, manufacturing and quality coordinator, Lockheed Aircraft Corporation; Dr. Rosemary Fraser, Department of Educational Psychology, Miami University; F. Cecil Hill, manager, improvement programs, Hughes Aircraft Company; Ernest L. Loen, president, Ernest L. Loen & Associates; Dr. Norman Paris, management consultant; Laurel Parker, public inquiries coordinator, Southern California Edison Company; Herbert H. Rosen, director of operations improvement, Ralston Purina Company; Robert D. Thorne, manager, San Francisco Operations Office, Energy Research and Development Administration; and Robert Wood, director of training, American Telephone and Telegraph Company.

Presenting an innovation from previous conferences, a multinational management seminar will examine why, as business becomes increasingly international, it is important for managers to know how worker participation developments progress in other countries. The panelists of this seminar include Professor Louis E. Davis, Center for the Quality of Working Life, Institute of Industry Relations, UCLA; Erwin H. Klaus, president, Global Operations Incorporated; A. Peter Ried, president, Krehl & Ried, Karlsruhe, Germany; and Richard Siegel, human resource planning and development, Weyerhaeuser Company.

Still another innovation is the executive session in which some twenty company chief executives will share ideas and experiences in the management of human resources. Ernest J. Stecker, president, Holex Incorporated, is going to moderate this session.

A third conference innovation is the spouses' program conducted by Louise Russ, Hughes Aircraft Company. Its attractions include visits to Los Angeles' famous Farmers Market and Universal Studios, a champagne brunch at the historic Cannery Restaurant, a cruise of Newport Bay, and a stop at Roger's Gardens.

Wes Magnuson, chief of special projects, quality control, Convair Division, General Dynamics, is the conference moderator. The welcome address will be given by W. Michael Richardson, ASPI president and associate manager of improvement programs, Boeing Aerospace Company.

The conference organization committee is composed of Marvin Wasserman, Pendleton Industries, Incorporated, chairman; R.S. Bailey, Hitco Defense Products Division; Adela F. Harris, ASPI vice-president/finance; D.W. Harris and F. Cecil Hill, Hughes Aircraft Company; Erwin H. Klaus, Global Operations Incorporated; Joseph E. Martelli, Hyatt Medical Enterprises, Incorporated; Scotty Roberts, Louise Russ and Larry Shifflett, Hughes Aircraft Company; Anthony R. Tocco, TRW Mission Manufacturing Company; and Jack Wilburn, U.S. Department of Commerce.
Recording Systems For More Efficient
Suggestion Plan Operations

By James A. Pingitore

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Suggestion Program for the Kenosha, Wisconsin, plants of the American
Motors Corporation. He has been employed by that corporation since
1959. In 1967 he became an analyst in the Suggestion Department and was
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Pingitore received a bachelor of
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Association of Suggestion Systems and
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toward accreditation as a Certified
Suggestion System Administrator.

(The views and comments of the
author do not necessarily reflect or
constitute the endorsement or opinion
of the American Motors Corporation.)

Have you ever lost a suggestion?
For instance, you receive a call from a
suggester requesting the status on his
or her idea which had been submitted
through your company's suggestion
program. What if you can't find it?
What if you don't even know where to
start to look. Meanwhile, your suggest-
er is thinking, "What a way to run a
railroad. Here they ask me to submit
an idea and it was so good that they
lost it." It may be the last time that
employee submits a suggestion.

If you had only one suggestion sub-
mitted at a time and then did not re-
cieve another until the one you receiv-
ed was resolved, and if you had only
one individual evaluating that sugges-
tion, it would be an easy matter for
you to keep track of that suggestion.

Fortunately, this is not the case. A
suggestion plan receives many sugges-
tions from different employees about
any number of subjects, which require
evaluation from any one of the depart-
ments in the organization. Any one
suggestion can be in any of many
stages in the investigation that it will receive until it is finalized.

How do we go about keeping track of the whereabouts of these suggestions? Obviously, a system must be developed which enables the suggestion plan administrator, or a member of the suggestion department, to be able to find, in the least time possible, a suggestion which is somewhere in the system.

The very function of a suggestion system, that of a clearing house for employee ideas, requires a smooth and orderly flow of information. Our purpose is to channel employee ideas to the department in our organization best qualified to evaluate the idea and to communicate the results of this evaluation to the employee.

Employee ideas are received from throughout the organization, brought to a central processing area, sent out to any number of different evaluating departments, returned to the central processing area, and returned to the employee with the results of the evaluation in the form of a nonadoption letter or an award.

This system can be compared to a wheel with the suggester and the evaluating departments as the spokes and the suggestion department as the hub holding all the spokes together. By holding the wheel together, the suggestion department makes it roll smoothly.

All of this activity takes place in various lengths of time, and in different time frames. To avoid mass confusion and to keep our wheel rolling smoothly, we need a system to keep track of ideas and their status.

First, let's look at where an idea can be at the various stages of the processing cycle of our suggestion system. An idea received by Suggestion Department.

1 - Idea received by Suggestion Department.
2 - Idea processed through recording system.
3 - Initial investigation with suggester.
4 - Sent out for evaluation.
5 - Evaluation review by Suggestion Department.
6 - (Optional) Filed for follow-up.
7 - Waiting for final disposition.
8 - Filmed after final disposition.
9 - Ideas may be reviewed by the plant suggestion committee.
10 - Ideas may be reviewed by the company suggestion committee.

There are eight basic stages through which an employee's suggestion passes from the time the employee submits it until it is finalized.

At stage 1, the idea has been received in the suggestion department, either by delivery by the suggester or in-plant mailing system, or it has been removed from suggestion box and brought to the department. This stage is the shortest one of the eight and it lasts only momentarily.

At stage 2, the idea passes through the internal recording system of the Suggestion Department. It is here that the basic information about the suggestion and suggester are recorded in some method which, in turn, forms the foundation for the system we are going to use in keeping track of the idea as it passes through the other stages.

Once the idea has been recorded, it passes on to stage 3 where an initial investigation is made with the suggester by the Suggestion Department to ensure that all pertinent information is available on the suggestion to enable the evaluator to understand what the suggester had in mind and to respond properly to the idea.

At stage 4, the idea is ready to be sent to the evaluating department for review. Depending upon the response of the evaluating department, an idea may stay in this stage for the longest period of time, as more than one department may be required to evaluate the idea before a final accept or nonadopt decision is reached.

Stage 5 is really a part of stage 4. The idea has been returned to the Suggestion Department from the evaluating department. Now, the analyst or administrator must review the evaluating department's comments relative to stage 4 because it must be sent to another evaluating department; or it may pass on to stages 6 or 7.

Stage 6 is an optional stage in our system. For instance, an idea may appear to have merit, as determined by the evaluating department, but an extensive study must be made to verify the initial evaluation. Rather than keep this case open on their books, the evaluating department sends the idea to the Suggestion Department with a request that it be returned to them at some later date. This enables the Suggestion Department to communicate with the suggester and advise that there will be a delay in reaching a final decision about the idea.

At stage 7, the evaluation of the idea has been completed. The idea is now channeled into one of three sub-stages:

(a) Ideas which require review by the Plant Suggestion Committee. Usually, these cases are placed on an agenda for the committee meeting on some sort of priority basis. Depending on how many cases the committee can review at one meeting, and the frequency with which the committee meets, an idea should not remain in this stage for too long a time.

(b) Ideas which will not be adopted. This stage requires only the time it takes from the final decision until the employee is notified.

(c) Ideas which have been adopted and approved and require processing of the award. Again, this stage only lasts from when the decision is made until the employee receives the award.

Stage 8 — after the employee has been advised of the results of the evaluation of his idea, either by notification of nonadoption or by an award being made, the idea is in the last stage in our processing system.

As an employee's suggestion moves through the eight stages of our system it can be in any one at any given time. Multiply this by the number of ideas that you receive, add the fact that they all travel through the system at different speeds, and you can see that you must have a system to keep track of all this activity.

In addition, you can develop a number of forms and recording devices to help simplify the system so that it runs smoothly and, therefore, the wheel runs smoothly.

The forms and methods described here will follow a suggestion as it passes through the various stages to show how an idea is easily kept from getting lost.

Identification Of Suggestion
At stage 1 an idea has been received by the suggestion department from the suggester. What now? We must have a way of identifying that idea from now on as it passes through the other stages. We need a method that will enable us to identify that specific idea. It must be identified with a unique method. The easiest method is a numbering system. In some organizations, all suggestion forms are numbered, so that when the idea is received it already has the identification which will be unique. Our system uses a numbering method, except that we number an idea as it is received. Once we have date stamped an idea to establish the official receipt date, we sequentially number the idea, the employee's receipt, and a legal-size folder using a sequential numbering stamp. The receipt is returned to the suggester advising that we have received the requesting information about his idea from the Suggestion Department. The legal-size folder becomes the repository for the original suggestion, plus all information gathered during the investigation of the idea.

Next, the idea is logged in our
We need to record the pertinent facts in sequence with the suggester’s name and the date received.

We are now ready for stage 2, processing the idea through our internal recording system. The first step is to record the idea on an Employee History Card. There is a card for every employee who has ever submitted an idea through the Suggestion Program. It lists his or her personal data (name, department), as well as a history of every idea ever submitted. We enter the suggestion number, the date of submittal, the date of final disposition, the final disposition, and amount of award and savings, if applicable.

One problem encountered in the administration of a suggestion system which receives a large number and variety of employee ideas is the search for ideas which ideas. Relying on the memory of the staff of the suggestion department is not a safe method. To assist in this search, a system of coding had to be developed which would enable the department to screen quickly all incoming ideas and compare them with previously submitted ideas, thus eliminating the processing of duplicate ideas and, possibly, eliminate paying duplicate awards.

Employee ideas have been divided into two major subject categories, facility and product. Each of these major categories is further subdivided in the following manner:

**FACILITIES** - Machine, Machining, Material Handling, Plant, Tooling, General Miscellaneous

**PRODUCT** - Body, Chassis, Equipment, Engine, General Miscellaneous

The code card utilizes 5x7-inch pre-printed cards which offer sufficient space to write all the information we need to record the pertinent facts about an idea. Each of the sub-categories is typed on a card file divider. A further subdivision of these sub-categories is made and the title of this subdivision is entered on the actual code card.

For example: An employee submits an idea that deals with a change in our shock absorber. This idea would be listed under the major category Product, sub-category Chassis, and subdivision Shock Absorber, which is the title on the code card. Once it has been determined where in our coding system, and on which card the idea is to be entered, the code card is pulled from the file and reviewed for a possible duplicate idea. If none is found, the idea is recorded on the code card by entering a brief description of the idea, along with the case number, suggester and suggester identification number.

If and when the idea is finalized, it is entered on the code card by either signing an adopted case with the letter A, or a declined idea by entering the expiration date (which, for our program, is one year from the date of declination). Once a code card has been filled, and all the cases on the card have reached their expiration dates, the card is removed and refiled in an expired code file. This eliminates the necessity of reviewing expired cases for duplication, yet still maintains a file of cases by subject for review should the need arise.

Once this process has been completed, we are ready to proceed to Stage 3, the initial investigation with the suggester. As a case is referred to an investigator, the name of the investigator and the date referred are entered on the inside cover of our legal-size folder and on the investigator’s log sheet in our Suggestion Referral Log. When the case is returned to the suggestion department, the date of return is also entered. This same procedure is followed when sending cases out to the evaluating departments. The inside cover of our folder contains the recording section for the case in question.

Every time a case is referred, the name of the evaluator and date of referral are recorded. Upon return to the suggestion department, the date of return is recorded. This provides a readily available reference to departments which had the opportunity to review the idea. At the same time, the date of referral and case number are entered in the Suggestion Referral Log.

Each evaluating department has one or more pages in our log, which is housed in a three-ring binder. (Presently, there are sixty-two different evaluating departments to which an idea can be sent.) This log assists us in compiling a Monthly Evaluator Status Report to evaluators advising them of their activity for the reporting period, and identifying those evaluators falling behind in returning our evaluations to the suggestion department.

After the initial investigation has been completed, the idea is sent to the evaluating department. This is recorded in the folder and in the referral log in the manner used when sending out the initial investigation. This is Stage 4.

Once the evaluation is returned, the response is reviewed by the analyst. Depending on what the analyst decides, the case may be sent to another evaluating department (back to Stage 4), may be filed in the follow-up for a later referral (Stage 6), or may be ready for final disposition (Stage 7). It is in Stage 5, Evaluation Review by Suggestion Department, that this action occurs.

Sooner or later, a final decision is made as to the adoptability or lack of same for an employee’s idea. If the analyst agrees that an evaluating department has given sufficient and reasonable grounds for not adopting the idea, a declination letter is composed and forwarded to the suggester and the case then moves on to Stage 8. If the case is found to be adoptable, an analysis is made of the benefits and the case is presented to the committee. Upon review by the committee, the necessary award approvals are sent to management and then to payroll for the award. Upon award presentation, the case is sent to Stage 9.

Once the final disposition has been reached (Stage 7), the case is ready for Stage 8. At this point, the final decision is entered on the employee history card, the idea code card, and the case can be filed.

Our system and its documents have been described. Just what does it do for us?

Suppose a suggester calls about the status of one of his suggestions. Chances are, he does not have the number handy. Our first step is to inquire as to the subject matter of the suggestion. Then we pull his history card, which tells us the number and if the case has been finalized. If it has not been finalized, we know that there are seven stages where the case might be. Since we know the approximate time of submittal, we can usually eliminate Stages 1 through 3. We then go to our referral file and make our search. If the case is not there, we next search each of the remaining files (which are all filed numerically) until the case is found. We can then tell the suggester at what stage his idea is, and which department is currently reviewing it.

At the end of the month, or any other reporting period, the Referral Log becomes our source for compiling our reports to management as to the efficiency of our evaluators.

There have been cases where the only information known about an idea was its subject matter. The code file, both active and inactive, has been an invaluable tool for conducting our search.

These are just some of the ways in which our system helps to keep our wheel rolling smoothly. If you already have a system, you are aware of its benefits. If you haven’t, don’t you think it’s about time you did?
WILBUR L. BRYANT has been a contributor of papers, patents and novel approaches to cost management in numerous industries where new technologies were being implemented. Work experience in design engineering, quality control, manufacturing engineering and value engineering for such diverse products as airborne radar, nuclear reactors, automotive piston rings, aircraft flight simulators, missile guidance systems and high-speed hovercraft has provided extensive exposure to the multi-faceted cost problems of development type projects. His presentation of cost and value oriented materials extends from cost effectiveness papers at the 1959 American Nuclear Congress to several recent talks to local groups on blue collar creativity and homemaker value analysis.

A 1963 engineering graduate from Indiana Institute of Technology, he presently is associated with the shipbuilding industry of New Orleans.

(Concluding the case study of the first-time Design-To-Cost contractor who attempted to control the performance/cost configuration by concentrating on red-flag items.)

The sizable cost growth, an accumulation of small-cost variances on nonflagged items, was not fully visible until the first Program Review. Although the review configuration was contractually compliant, it was inadequate for fee award. The division president, Altem Topbraz, has just instructed the program manager, Alwez Rational, to develop a recovery plan to "get the cost down and establish our cost-effectiveness image."

Rational was not a manager who allowed organizational pressure (even from Topbraz) to panic him into irrational action. Being an experienced manager, he knew the embarrassment caused by overlooking potentially viable solutions; being a trained manager (he had attended several program management seminars), he was knowledgeable in decision theory and the diagramming of problem theses; being naturally a rational manager, he was aware of his limitations and was not hesitant to consider outside assistance when appropriate.

After three sleepless nights and several discussions with DeZionrite, Thibux and Awnime, he identified three feasible actions to initiate the design/cost review and the subsequent redesign to reduce cost variances. He defined these actions as:

A Act A — He could call the design group together and say, "Hey fellows, Topbraz wants us to take a second look,
and . . . “ DeZionrite would then lead the review and redesign.

A Act B — He could issue a memo designating Saphen Shoor, who had been used effectively on many previous brushfires, as the chairman of the review and DeZionrite as the redesign task leader.

A Act C — He could designate it as a value review and request a value engineer to organize and lead it. DeZionrite would lead the redesign.

Rational, remembering Topbraz's interest in the recovery plan, wanted to be confident of his decision electing the course of action. He needed to assess the probable yield in cost variance reduction for each action and then select that action which would maximize his yield. He proceeded to structure and quantify the outcomes of each action and diagrammed the Decision Tree shown in Figure 2.

NOTE: Decision Tree symbology and notation used were:

A A decision point leading to one or several elective actions, designated by upper case letters (A, B, C, . . .).

G A gamble or chance leading to two or more events designated by numbers. Each event is assigned a probability (e.g., .3) of occurrence as noted on the event forks following each gamble. The events following a gamble must constitute a collectively exhaustive set (must include all possible outcomes; sum of event probabilities must equal unity).

40 The quantified outcome of an event. In this problem, the quantity is the percent of cost variance reduction.

32 The calculated Certainty Equivalent (CE) of a gamble or action. It quantifies the expected results of all branches of the tree to the right of the respective gamble or action.

Rational’s rationales for the quantities and structure of his Decision Tree were:

A Act A — This action exposes Rational to a gamble on DeZionrite's abilities and three possible events.

G Event Al — reflects his belief that the same design team will have a vested interest in defending the present design and will find only token changes (some already identified by Biznus) which will reduce the variance by twenty percent. He is sixty percent sure of this outcome for Event Al.

G Event A2 — recognizes the possible impact on the design group's motivation by Topbraz's strong interest in reducing this variance. Such impact is a documented phenomenon in some previous cost reduction efforts. This forty percent reduction or variance is given a thirty percent chance of occurring.

G Event A3 — holds on to the slim (ten percent) hope that the full technical and cost expertise of the program staff can somehow be synchronized for an eighty percent variance reduction outcome.

FIGURE 2 INITIAL DECISION TREE

21
G. Events A1, A2, A3 constitute a collectively exhaustive set, since Rational admits no probability of one hundred percent or zero percent reduction of variance if Act A is elected.

A. Act B - Rational knew that DeZionrite would resent the introduction of Shoor as leader of the review and that he would be gambling on how Shoor accommodated the situation. Shoor has always managed to get the job done, albeit not always with outstanding results. Rational envisioned two possible results.

G. Event B1 - If Shoor does not establish a rapport with DeZionrite, the outcome will be the already obvious changes (twenty percent reduction of variance) plus some that Shoor will unearth to his own credit for a total of thirty percent reduction of variance.

G. Event B2 - If Shoor and DeZionrite can team up, their natural competitive spirit will drive each of them to search for the most changes (and personal credit). They will avail themselves of Thabux's cost data and suggestions to maximize the effort. However, their inherent caution on strange (cost) ground, will lead them to lock-in the gains too early for full realization of the potential variance reduction, and this early lock-in will limit the variance reduction outcome to sixty percent.

G. Events B1, B2 - Rational thought it an even toss-up between these two possibilities of Act B and assigned a fifty percent chance to each.

A. Act C - Rational had led himself to strange ground here. He was aware that a Value Engineering group existed in the division but had never used them and was unfamiliar with their track record. He actually picked this alternative action from his program manager’s manual, which documented some impressive results for past VE efforts. In his research for this action, he had learned from a fellow program manager that one of the value engineers, Gotchur Buxbak, had proved especially adept at leading reluctant designers to discover unnecessary costs in their design and in assisting them to implement appropriate cost-effective modifications, without alienating them to a rigid defensive position. And, surprisingly, Buxbak apparently had made some converts in the design group who had adopted some of the basic VE techniques. Rational realized that the designation of this review as a Value Review would turn-of DeZionrite and some of the designers, but reasoned that a skilled value engineer such as Buxbak must have obtained most of his successes in a hostile environment and could overcome (with the boost of a few chosen remarks by Topbraz) the design group’s resistance. By electing Act C, he would be gambling on the value engineer assigned to the task:

G. Event C1 - By now, more appreciative of the VE methodology, Rational was confident that a fully capable value engineer could match the best yield (sixty percent reduction of variance) of Shoors leadership. He knew that, with Topbraz's support, he could pick from the available value engineers and was sixty percent sure of selecting a fully capable one.

G. Event C2 - This estimated outcome of thirty percent would occur on the remaining forty percent chance that Rational's selected value engineer did not prove fully capable for the task.

Then, by starting at the event outcome possibilities and working toward the left (backward induction), Rational was able to quantify the Certainty Equivalent (let's think of it as worth) for each gamble or action. The CE for a gamble is the summation of the outcome times probability products of the possible events. For example, Rational calculated the CE of the gamble following Act A as:

\[ (.6) (20) + (.3) (40) + (.1) (80) = 32 \]

and the three elective actions compared as follows:

- Act A, CE = 32
- Act B, CE = 45
- Act C, CE = 48

from which he obviously selected Act C.

Therefore, Rational's variance reduction plan predicted, under uncertainty, a forty-eight percent reduction of variance. He realized that Act C was only a marginally preferred choice. But he also recognized, by analyzing the Decision Tree parameters, that if he could elect Act C with beforehand knowledge that Event C1 would occur with certainty, he could predict a sixty percent reduction of variance (CE = 1.0 x 60 = 60). Then, such pre-event certainty would be worth 60 minus 48 = 12 percentage points of variance reduction to him.

He believed that the forty-eight percent variance reduction plan would be challenged by Biznus and rejected by Topbraz, and resolved to upgrade the prediction to sixty percent. He called for an immediate meeting with the VE group manager, Don Rokbotes, to discuss the qualifications and availability of the VE staff.

In the meeting with Rokbotes, a company veteran coasting to retirement, Rational learned that Buxbak was no longer employed by the company. The division, in anticipation of future Design-To-Cost contracts (for which the customer does not allow value engineering as a direct charge), had decided to reduce the VE staff.

Buxbak, who had achieved all of the design-oriented value improvements scored by the VE group during his three-year employment, was the last value engineer hired and was, routinely, the first one designated for the department cutback. Rational also learned that Buxbak, in addition to being highly skilled in the selective application of the VE methodology, was an experienced technical generalist and had, the previous year, led a system redesign effort which had produced several accepted Value Engineering Change Proposals for another program. As a participant in advanced planning for that program, he had authored a paper titled “The Advantages of Systems Engineering Management in a Design-To-Cost Effort.”

Buxbak had been surprised when that program reached the final test and delivery phase and had obtained higher salaried employment in a non-VE assignment with another company. The remaining value engineers were retained under the umbrella of low salaries and indirect charge accounts but were oriented, by training and experience, to process improvements and production cost trade-off efforts.

Disillusioned by the unexpected results of his search for certainty, Rational was forced to recalculate Act C, under certainty, at a thirty percent reduction of variance (C2 was a certain event). This recalculation indicated Act B as the preferred action and reduced the recovery plan prediction to forty-five percent reduction of variance. He approached Shoor with hope of reducing the uncertainty of Act B, but Shoor's negative contribution was, "I've been fairly successful in assignments to get the job done because I made the
guys feel proud of the extra effort, but you're asking me to browbeat those designers to a 120 percent effort rate just to cut the guts out of their apparently acceptable design. I'll give it a try, if that's what Topbraz wants, but I can't guarantee the results that you and Biznus are looking for.”

At next morning's Topbraz staff meeting, Rational sent out the feelers for acceptance of his forty-five percent variance reduction plan. Topbraz gave an adamant reaction, “If we reduce this variance only forty-five percent, then we're telling the world that we can't come close to hitting a cost target even given the opportunity to check ammunition and re-zero our sights between shots. I would be very reluctant to fund two successive design efforts and still show a barely acceptable performance and a large cost growth for this weapon system. Biznus still thinks we can reduce program costs to approximately the original estimate. You two get together and decide who is right.”

Rational volunteered that he had an alternate plan with higher yield, but lacked the Value Engineering personnel to implement it. All the staff voiced doubts that the transition to cost-oriented design from performance-oriented design could be accomplished by the engineering groups without feeling their way through a few programs to debug the approaches. Topbraz did not respond to these pessimistic opinions, but called for a meeting with Rational and Biznus for that afternoon.

Rational's alternate plan, as diagrammed in Figure 3, required the modification of Act C to add a decision point and gamble subsequent to Event C1.

A  Act C — (revised) leads to a gamble with two possible events:
G Event C1 — (revised) was given a seventy percent chance on the strength of Topbraz's support of a higher yield plan, which Rational interpreted as approval to hire a fully capable value engineer. If such a person is obtained (Event C1 occurs), then Rational assigns himself a decision with two elective actions.
G Event C2 — (revised) retained the same estimated thirty percent outcome, but the probability was reduced to thirty percent due to the increased expectation of Event C1.
A  Act CIA — retained the outcome of the original Event C1 and the sixty percent variance reduction estimate for a fully capable value engineer working with DeZionrite.
A  Act CIB — rational, upon confirming that the new value engineer was named Buxbak (or was equally quali-
fied), would give him more authority over the review phase and designate him to lead the redesign effort. This action leads to a gamble on two possible outcomes:

**G** Event C1B2 — recognizes the remaining (sixty percent) probability that even a fully authorized Buxbak will yield only a sixty percent reduction of variance.

**Rational** recalculated the CE for the revised possible outcomes of Act C as:

- Act C1A = sixty percent reduction of variance
- Act C1B = (.4) (100) + (.6) (60) = seventy-six percent

Therefore, Act C1B would be elected if Event C1 occurs; then, seventy-six percent becomes the expected outcome for Event C1, and

- Act C = (.7) (76) + (.3) (30) = sixty-two percent

which indicated Act C (revised) as the elective choice for a predicted sixty-two percent yield from the revised variance recovery plan.

He reviewed the plan, in detail, with Biznus and further pointed out that the certainty of getting a Buxbak equivalent would raise the yield prediction of the plane to seventy-six percent. He suggested that they press Topbraz for a Buxbak commitment, since it reflected a worth of fourteen percentage points.

Topbraz was very attentive to Rational's presentation of the plan and then listened to Biznus' confirmation of Rational's decision parameters. Topbraz concluded, "Well, we really have no choice. We have assured the customer we will reduce the cost significantly; we need to establish our image as a contractor who can Design-To-Cost; and, quite frankly, I am determined to carry a successful contract fee recovery plan.

Topbraz asserted that he was not familiar with this certification program. Gettaman did remember something about a certification program, and after checking Buxbak's employment file, confirmed that Buxbak became a Certified Value Engineer two years ago when a program requisitioned a value engineer. Rokbotes had told him that if a person called himself a value engineer and could get an employer to designate him as a value engineer, then he was a value engineer. Rokbotes' present entire staff of value engineers got the title by that route from inside the company. Gettaman anticipated Topbraz's question and asserted that he was not familiar with this certification program.

Topbraz concluded the meeting with these action items assigned:

**GETTAMAN** - Contact state agencies and local universities to get information about certification program. Get employment agencies and other contacts to look for value engineers. Arrange a constant flow of certified value people to Rational for interviews. Contact other companies for appropriate salary information.

**RATIONAL** - Work with Gettaman to develop a value engineer employment criteria profile.

**BIZNUS** - Contact other defense contractors. Collect knowledge of value engineering.

**TUBIHOLDE** - Call special staff meeting at 9 a.m. tomorrow; subject: What Do You Know About Value Engineering? Contact Rokbotes; cancel vacation. 

As the meeting disbanded, Topbraz was heard giving this instruction to Tubiholde, "Joy, call my wife. Tell her that I will be working late."

That evening, Gotchur Buxbak received a phone call at home: "Gotchur, this is Altiem Topbraz, president of JUSEE Military Contracts Division. Guess we never had a chance to meet while you were with us, but I know of your accomplishments here. I was wondering if you are satisfied with your present employment and if you are free this evening we could . . . ."
AFFIRMATIVE ACTION PROGRAMS FOR HANDICAPPED WORKERS: The Whys And Hows

By Chris W. Ford and Frederick C. Dyer

CHRIS W. FORD is Associate Editor of Achievement, The Voice of the Handicapped, and author of numerous magazine articles.

FREDERICK C. DYER has published twenty books, and serves as a management consultant to business and government.

Executives and training directors who still may be holding back on hiring the handicapped will have to give the matter a second look as the new affirmative action policy (Section 503, Rehabilitation Act of 1973) became fully effective on January 1, 1976, if they expect to receive or continue to hold federal contracts.

The idea is not new. The government has been fostering employment of the handicapped since passage of the first Vocational Rehabilitation legislation in 1920. Efforts to stem discrimination against various disadvantaged segments originated with Franklin D. Roosevelt's wartime order establishing a Fair Employment Practices Committee. The President's Committee on Employment of the Handicapped (PCEH) has been combating discrimination and opening new doors since 1947.

However, the scope of these efforts, as well as their financing, has been profoundly affected by political and economic developments. For instance, the 1973 Act was twice vetoed by President Nixon, and became law only after extensive compromises.

This situation frequently leads the handicapped, who are often disillusioned job seekers, to violent outbursts.

"During the war, they called it 'hiring the handicapped' then 'selective placement,' and now it's 'affirmative action,'" writes one handicapped person. "But many of us still don't have jobs. Why all the antics with semantics?"

This is a crisis situation. One out of every eleven Americans is disabled, and fifty-two percent of this number have incomes of less than $2000 a year. Only one-third of the blind are employed. Among the severe neurological conditions, it is reported that only twenty-five percent of epileptics and only one out of seven persons with cerebral palsy have a job.

Who is to blame? A radio and TV commercial suggested that the handicapped were fearful and apathetic and asked, "What is holding you back?"

Thousands answered, only to find that there were few jobs they were capable of doing, or programs to train them.

There is real discrimination, which we will point out, but there are also barriers which must be overcome. Your organization must take positive steps to effectively fulfill your affirmative action obligations.

Discrimination

Some examples of discrimination are unconscionable. The American Cancer Society is up in arms against large companies who deny employment to post-operative cases for five or even ten years, even when there is no visible or vocational disability. On the other hand, there are many severely disabled persons whose employment requires special considerations.

One gentleman, who has cerebral palsy, was recently turned down for a position as a counsellor at Sumter Correctional Institute in Florida. He has a master's degree in Counselling, which satisfies the educational requirement. In a preliminary interview, he was assured that his speech was understandable and other difficulties, such as slow locomotion, would not seriously interfere with his job. He feels his experiences with his handicaps would inspire the prisoners to try harder.

This case is a test of Florida's new Constitutional amendment, as well as federal affirmative action provisions. Florida is one of twenty-three states with provisions of this nature. However, The New York Times reported in May 1975 that only half-a-dozen cases on the average have been entered in each of these states. The new federal provision will presumably clarify the employer's obligation, although final guidelines have yet to be issued.

In cases involving turndowns or dismissals, the applicant has three years in which to file a complaint with the Office of Contract Compliance, U.S. Department of Labor. The Association of Rehabilitation Facilities suggested that this function would be more effective if given an agency more directly concerned with programs for the handicapped.

What You Should Know and Do

All federal contracts and subcontracts of $2500 or more must include an affirmative action clause, applying
to recruitment, training, promotion and other functions. Contracts ranging up to $500,000 must outline an affirmative action program in some detail. On contracts above this figure, a complete affirmative action program must be submitted to the Employment Practices Division, Department of Labor.

Affirmative action requires that qualified handicapped persons be actively recruited. The original regulations suggested that employers contact various agencies within the community.

These fall roughly into three categories: committees on employment; U.S. and state employment services; voluntary agencies, such as the Easter Seals, serving most disabilities, and others serving a single category, such as the Muscular Dystrophy Association, and hospital-based rehabilitation centers.

However, we question as to whether busy executives can or should involve themselves in such outside ventures. Large employment offices are expected to have a specialist in rehabilitation needs, and this key person should provide liaison. If there is a Committee to Employ the Handicapped, you can attend their seminars and get a closer look at the problem locally... it is important that these counsellors know your job requirements, so they will refer qualified applicants. You must respect these applicants who have undergone rigorous training to cope with their disabilities, and prepare themselves to serve your organization.

What Others Have Done

Dr. Henry Viscardi, who is dwarfed and a double amputee, established the Human Resources Center, Albertson, New York, in 1952. A total of 214 trainees have been placed with cooperating firms, including Insurance Company of North America, Bankers Trust, General Electric, and Metropolitan Life Insurance Company. It is reported that those currently employed have annual earnings of $1,406,000, and are returning $150,628 in federal and state taxes.

Human Resources Center cooperates with neighboring colleges and universities, as well as the above firms. Many of these students have potential for leadership in business, industry or the professions. However, they frequently have lost years or valuable experience because of their disabilities. The center offers them expert guidance and continued physical restoration. The students also are offered up to four hundred hours of apprenticeship during the Summer or after hours, with one of the participating firms. These experiences, along with their studies, prepare them for permanent gainful employment.

PCEH makes Employer of the Year awards to large businesses (over two hundred employees) and small businesses. The 1975 winners were: Weyerhauser Box Company of Hot Springs, Arkansas, and City Blue Printing Company, Cleveland, Ohio. Of the 1,100 people employed by Weyerhauser, 150 are mentally or physically disabled, while forty-seven of City Blue's 109 employees are disabled. Both companies offer equal opportunities for promotion, salaries and fringe benefits.

International Business Machines has been employing handicapped individuals for three decades, and they are integrated throughout the work force domestically and throughout the world, according to John Seely, Handicapped Programs administrator. IBM regards a handicap as secondary, and gives special attention when needed to assure efficient performance.

Personal, safety and medical departments regularly monitor job requirements. Architectural barriers have been removed in cases where they have blocked or endangered a handicapped employee. Ramps have been put in to accommodate a wheelchair, doors have been altered, and safety rules amended to include adequate coverage of those with special needs. An electrically oriented door controlled by a foot plate was installed for an employee who has no use of his hands. Catches were removed from doors which interfered with the movement of another employee who uses mechanical arms. Push-button and speaker phones assist where needed. A magnifying device used to enlarge TV screens is used by one employee who types with his feet, where the reading distance is too great. What ever the job requirement, tools or environment usually can be reasonably modified to reduce the effect of a handicap when this is done.

IBM is, of course, a major producer of electronic and cybernetic equipment, such as braille typewriters and embossers, which often are the key factors enabling those with handicaps of many types to become productive. Individual adaptations can be made when necessary.

Selective Placement

Our modern economy has the potential of absorbing its handicapped citizens and enabling most of them to become productive. A study made of nearly 600,000 disabled World War II and Korean Conflict veterans provided rehabilitation training showed 122,000, or approximately twenty percent, entered such professions as teaching, engineering, accounting and law. Approximately 150,000, or twenty-five percent, were trained in technical, business, management and sales, and clerical areas. Current data indicate that the percentage for Vietnam veterans in these fields will be higher, as opportunities continue to increase.

You can employ more handicapped workers, and fulfill your affirmative action obligation, by applying selective placement; that is, place them in positions where the disability ceases to inhibit, or even becomes an asset. For example, a highly trained computer engineer at a California aircraft factory is almost totally paralyzed from polio; a large Chicago insurance company has found deaf-mutes make better than average file clerks and checkers, since noise doesn't distract them; blind workers have made superior assemblers, inspectors, sorters and counters of small parts in electronics, aircraft and missile production; cerebral palsy victims have been trained to use hand precision tools; and paraplegics can work productively on assembly lines.

Formulating Your Plan

A positive attitude is the prime requirement. Familiarize yourself with handicapped job applicants and let them know your requirements.

Architectural and other environment barriers mitigating against those with various disabilities are everywhere. Your ability to prevent or overcome them may be limited by: size of your operation or government contracts; building plans or lack of them (adjustments are more feasible when incorporated in new construction); and factors outside your control (few cities can boast accessible public transportation).

Your Committee on Employment, Easter Seal Society or architect can advise on specific adjustments. These can have a positive PR effect. Ramps at strategic locations, lowered telephones, or extra-wide and automatic doors can aid oldsters, young children, pregnant women and those who carry heavy bundles.

Look over your plant for positions that handicapped persons can do and, where practical, obtain or adapt working tools for them. However, you may explore all these options and still have applicants unable to meet plant conditions. Three other options are: modified time schedules; letting
employees work at home; and subcontracting to sheltered workshops and other enterprises.

Modified time schedules are being used successfully by an increasing number of companies and government agencies, and New Time is operating as a private employment agency in New York City. In the instance of disabled workers, it is helpful when they function within their best energy span, or perhaps entering and leaving the plant when there is little or no congestion.

Don Frieffield, best-selling author, considers modern office procedure a throwback to feudal times when the king wanted his knights around him for protection. A pool operation, with typewriters clacking, phones ringing and constant interruption, is unnerving not only to disabled workers but to others as well. Decentralization can frequently enhance efficiency. Jobs often can be transferred to a worker's home, taking advantage of their special environment.

A four-year research and development program at George Washington University enabled thirty-four home-bound persons, twenty-one in wheelchairs, to obtain training and ultimately employment in cybernetics fields; five in computer programming; five in data entry; eighteen in microfilm operations; two in bookkeeping; and four in other projects, at hourly rates well above the minimum wage.

Cooperating employers included COMSAT and Chesapeake & Potomac Telephone Company. Two of the graduates formed their own companies to continue operating after the grant period ran out. Each worker had a home office with telecommunications.

Another practice which can facilitate employment is the subcontracting of certain operations to sheltered workshops, such as Goodwill Industries. Status under affirmative action regulations may be ambiguous.

"Subcontracting of work does not relieve an employer of the obligation to recruit, employ, and promote handicapped workers on his own work force. This is not to say that an employer's program which seeks to identify tasks which can be performed in a sheltered workshop, where at least minimum rates are paid, will fail to enhance a 'good faith' effort evaluation," so reads a leaflet (not official regulation) from PCEH.

There seems to be several ways of getting around the impasse. When the subcontract is under $2500, or you just farm out odd jobs, the responsi-

bility is all yours. Many workshops operate under federal grants, or federally assisted contracts, which come under Section 504.

Implementing the Program

In a panel discussion at PCEH's 1975 annual meeting, Dr. Harold B. Yunker of Hofstra University viewed affirmative action as a vehicle for changing people's attitudes, to focus on abilities, rather than on their handicaps. Albert F. Yuker, American Coalition of Citizens with Disabilities, charged that the federal effort to date has been less than adequate, either with financing or enforcement machinery.

"Affirmative action does not create jobs, and therefore will not insure employment for any protected class, especially in a shrinking labor market," says H. Paul Stuber of Reynolds Metals Company, Richmond, Virginia. Stuber points out that industry is beset by affirmative action demands from minorities, women, persons aged 40-65, Vietnam veterans and the handicapped, and predicts that consumers will ultimately bear the cost. However, he pledged that industry would comply and this assurance was echoed by Robert McIntyre, treasurer of Pennsylvania AFL-CIO.

This promise of management/labor support, even in a time of economic uncertainty, is most encouraging. In March 1975, PCEH published a report on the impact of unemployment, based on hearings and samplings in New York, Detroit and Los Angeles, showing clearly that employment and training for the handicapped, as well as subcontracts to sheltered workshops, are dwindling at a time when we are supposed to be gearing up for affirmative action. Without downgrading the importance of employed among the able-bodied, most of them have insurance protection and skills which will enable them to recoup. However, each year we postpone implementing affirmative action for the handicapped, we sentence vast numbers to permanent dependency.

Conclusion

The Word (March 1975) defines affirmative action as "finding contentment in the heart, and fulfillment in the mind." Such profound meditation should not be out of place among executives and training directors. Certainly, helping deserving persons surmount their impairments through training and employment will not only fulfill their lives, but will also improve your self-esteem as well. [P]
VALUE IN VALUE ENGINEERING

By Gerald S. Swenson

Value engineering may be a misnomer. Neither element of the title provides an adequate description of the discipline. Taking last things first, the term engineering creates an obvious deception. Unless one thinks of engineering as a general, systematic approach to quantitative problem solving (as few do) then the term is confined within the realm of a field in which relatively few professionals feel competent. As a result, this field of engineering is avoided by nonengineers. Semantic countermeasures designed to alleviate this particular problem have been attempted; value analysis is one alternative to value engineering, and value management is another.

But this is old news. There is a better word out there somewhere — my purpose is not really to concentrate on the latter word in the title of the discipline. The first word, the meaning of value — or more correctly, the concept of value — presents the more imperative problem.

Value vs. Money

The word value deceives engineers, nonengineers, businessmen, systems analysts and every professional alike. I imagine that even a semanticist has more than a few problems with the term value. Here lies the real dilemma. Value has come to be singularly identified with one of its traditional definitions: the exchange of cash for products or services. Ask for a definition of value and you will probably hear the word money somewhere in the response.

Many students of value engineering, and of other fields alike, will consider this concept of value as much too narrowly defined. They will ordinarily introduce a number of other variables that impart a more complete meaning to value. The value within the term evaluation more nearly reflects the definition that the value engineer recognizes.

But regardless of one’s opinion of the cost-only concept of value, it cannot be realistically opposed. It is a well-established attitude. When confronted with the term value engineering, those professionals who have adopted the limited definition of value will either be intrigued or offended. Those who are faced with solving a problem in which the dominant goal is actual dollar savings will embrace value engineering as a means to that end. The VE track record clearly demon-
strates the effectiveness of the method in saving money.

Cost Not Dominant

However, for projects in which low capital outlay is not the dominant goal, value engineering encounters a much lower acceptance level. Those who have not come to accept value in its broadest context will reject value engineering out of hand. Since cost is not the dominant concern, they will assume that the rigorous of intensive value analysis are an unnecessary stage of project planning. As a result, the beneficial effects of a value engineering study and the talents of these unenlightened professionals are lost to the project.

This attitude is clearly wrong! Cost is only one element of the value in value engineering. It may be a more-or-less important element, but it remains only one of the parameters by which the merits of a system are judged under the value engineering method. However, there is a legitimate basis for confusion on this important axiom.

One major impediment is that the value engineering methodology itself does little toward maintaining the relative importance of cost savings in the entire analytical framework. In fact, the method produces an unintentional magnification of the importance of cost savings.

Several Values

This proposition may be illustrated by dichotomizing the value-engineering procedure. In fact, the systematic-type approach of the discipline does that for us. Stage one of a value engineering workshop includes a functional evaluation of the project followed by a brainstorming episode in which three integral factors are derived.

First, the basic function we are trying to achieve is defined. Secondly, all alternative methods of accomplishing this function are proposed, listed, and evaluated. Finally, the primary values of the system under investigation are circumscribed — that is, we analyze which properties of a system may have value in the implementation and operation of that system. One of these values is generally cost (though not always), but I emphasize again that this is only one of the listed values.

Additional values may include system flexibility for change, reliability, appearance, maintainability, ease of implementation, employee attitudes and a wide variety of others. These values are then given a numerical rank with respect to each other; and the determination is made as to which values are most and least important in accomplishing the basic function. Further on, the alternative systems and the values required of these systems are placed upon a matrix and cross-ranked.

Consequently, though the methodology is begun with subjective determinations of value, the final analysis yields quantitative results. It is somewhat of a mystery, even to the totalization of the last column, as to which system will prevail. The analysis evolves from educated subjectivity to an objective determination of comprehensive value. This is the best possible combination. The parameters are set by knowledgeable opinion from a cross section of related professionals; ranks within these parameters then are simply cross multiplied. The answer evolves by this method, and it is the best answer that value engineering can offer.

Effective Alternative

Any given set of alternatives normally can be ranked with respect to a chosen set of variables. Even if all alternatives were acceptable in accomplishing the established function, some would be more effective than others. Further, it is probable that out of the set of alternatives, one method will stand out as the most effective method of all. Ideally, stage one of the VE technique will single out this optimum alternative.

Then comes stage two of the value engineering methodology. In this stage, all of the above analysis is subjected to a re-analysis using one variable: cost. The optimum alternative selected by the above time-consuming, detailed analysis is compared, through life-cycle cost analysis, to the second or sometimes the third or fourth-ranked choice. If the secondary alternative is judged to be the most economical over the life cycle of the system, then it is underlined as the best choice. The previous determination is superceded.

To understate the situation, there is fault in this two-stage method. Although the selected system will accomplish the basic function we seek at the lowest possible cost, it cannot be construed as the best system. In stage one the most effective acceptable alternative is determined; in stage two the least expensive acceptable alternative is chosen. Unless both of these indicators point to the same system, it cannot be claimed by the analyst that he has determined the best possible system at the lowest possible cost. He

PERFORMANCE

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Figure 1. Sample Value Engineering Ranking Matrix

<Ranking of the Alternative with respect to the Value (4 = Excellent; 0 = Poor)
(Value Rank) X (Alternative Rank) = Value Score>
has only determined the least expensive alternative using life-cycle costing among the highest-ranked alternatives under value engineering.

**Life Cycle Cost**

Is it necessary to include life-cycle costing as an integral component of the VE methodology? Cost is taken into account during stage one of the VE analysis, and it can be given any weight the analyst cares to allow. Subsequent attachment of life-cycle costing, with its focus on the single value of cost, dilutes substantially the time and effort involved in the initial determination and comparison of all values of the various systems.

It may be argued that life-cycle costing does account for other cost-related variables in the VE methodology by requantifying them into the life-cycle format. This certainly holds true for such variables as maintenance costs of system longevity. But what of variables such as aesthetics, system reliability or flexibility for future change? These elements are not reflected in the conclusions that life-cycle costing produces.

Simply because one system surpasses another during the life-cycle costing phase of the VE analysis, it is not necessarily the desired system, especially if cost was not originally a primary variable. Yet the VE specialist is taught to allow the conclusions of life-cycle cost analysis to rule with only a secondary regard for the results of the original value analysis.

**Questionable Attribute**

Consequently, the relative merit of life-cycle costing in the value engineering methodology comes under question. It certainly should not be afforded the predominant status described above. Costing analysis is not the sole major contributor to the overall goal of value engineering.

Neither should life-cycle costing be thrown out of the window as a part of the discipline. Rather, it should be allotted the position it deserves as an adjunct for further study. Life-cycle costing can be (and frequently is) used as a cost-effective analytical tool without regard to the nonquantifiable values that are considerations under true value engineering. The reverse can hold and should hold. Value engineering is an analysis of all principal values of a system and stands alone as a method toward determining the most effective system.

The results that are obtained from value analysis should not automatically be subjected to life-cycle costing. The results of original value analysis will only be weakened by subsequent analysis in which one value — cost — is the only variable.

**Results Gratifying**

The concept of value engineering is simple. After all, any professional properly performing his duties subconsciously executes at least some of the stages of value engineering. However, the systematic methodology is more difficult, for it involves placing our observations, our experiences and our educated opinions into a quantitative format.

But the results, once obtained, are gratifying. Through VE, we are provided a method in which we can systematically create near ideal solutions without being intimidated by the vast amount of variables involved. To modify these solutions with a forced concern for cost is to dilute much of the satisfaction.
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