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The impact of VALUE ANALYSIS

By Tom Johnson, associate editor

Twelve years ago, in 1947, the Value Analysis program at General Electric was established. Two years later (July 14, 1949) *American Machinist* published the first major article on Value Analysis to appear anywhere outside General Electric. During the past decade, Value Analysis has become one of the most widely imitated techniques in industry—and for good reason. Here is a program of product improvement and cost reduction that can save a large company millions of dollars a year. And more and more small companies are discovering that VA techniques can be put to work in their plants.

In 1947, the Value Analysis program was a one-man operation; today it is one of the most vital links in the vast General Electric chain of decentralized operations. Because the program has been such a huge success, and because it is of great interest to Metalworking, *American Machinist* feels that its readers ought to know what has been happening to the program during the past decade. Here's what you'll find in this Special Report:

- A re-statement of the philosophy of Value Analysis
- Where Value Analysis stands today
- A detailed description of the way in which the company trains its Value Specialists
- Example after example of "before" and "after" value-analyzed products and components

TESTS FOR VALUE

Our Challenge — Our Obligation

Every material, every part, every operation must pass these tests

★ ★ ★

1. Does its use contribute Value?
2. Is its cost proportionate to its usefulness?
3. Does it need all of its features?
4. Is there anything better for the intended use?
5. Can a usable part be made by a lower cost method?
6. Can a standard product be found which will be usable?
7. Is it made on proper tooling—considering quantities used?
8. Do material, reasonable labor, overhead and profit total its cost?
9. Will another dependable supplier provide it for less?
10. Is anyone buying it for less?

VALUE ANALYSIS SERVICES

GENERAL ELECTRIC

Tests listed on this certificate . . . are applied to every job that the Value Analysis staff at General Electric undertakes. To build optimum value into a product, **the Value Specialist must be free to probe deeply into a wide range of** operations. Every phase of product development—design, engineering, purchasing, manufacturing, marketing—must be investigated

The impact of VALUE ANALYSIS

Some time ago, the Value Analysis group at General Electric was asked to examine one of the company's transformers. What suggestions, the group was asked, did it have that might improve the transformer's design, its performance, its method of production, its components, its cost of manufacture? What management wanted was a broad but profound analysis of the whole manufacturing process—from design to packaging—that went into the making of the transformer.

On the face of it, suggesting that manufacture of a GE transformer might be improved is like telling the world's greatest chef that his prize sauce isn't properly seasoned. Yet the VA group, after extensive analysis of the transformer, made several recommendations that not only gave the company a better product but reduced its cost of manufacture.

Here's one of the group's suggestions, all the more striking because the idea, in retrospect, seems so simple: Substitute wooden washers for the fiber washers (about as big as a checker-piece) used as insulator-spacers in the transformer.

For years design had specified fiber washers, which at that time cost $9.83 a thousand. But the Value Analysis group discovered that a thousand maple washers would cost the company only $2.40. And the group also knew that the company bought hundreds of thousands of these washers every year.

The result: A substitute part—one that performed the same function as reliably as the original—saved the purchasing department $12,000 a year. If the group had not been in existence, the company would probably still be spending an extra $7.43 on every thousand washers it buys.

This cost reduction, although significant, is a small detail in a company with a budget as big as General Electric's. But multiply it by several hundred similar recommendations made each year, and you'll get an over-all picture that reveals savings of millions of dollars a year. And there are other benefits that are equally as important, though not so dramatic at first glance: product improvement, a more unified approach to the manufacturing process, and more competitive selling prices.

It has been ten years since AMERI-

ly, a part's real value is the lowest price at which it performs a given function reliably.

The key word here is *function.* The Value Analyst thinks in terms of function and acts in terms of function. His first thought in examining a product or component or material is of its function. When he first undergoes training, he is encouraged to forget traditionally sacrosanct terms like price, quantity, type of hardware, and appearance—there will later be time, he is assured, to ponder over what to do about all these things.

Basically, the VA expert examines a part in a series of logical steps that generally take this pattern:

1. What is the part?
2. What is its function?
3. What does it now cost?
4. What else would do the job?
5. What would that cost?

Simple? Not as much as you might think, for Value Analysis implies more than just value consciousness. The analyst must be prepared to act, to recommend. As Larry Miles succinctly puts it, "You don't learn how to play golf by reading about it." If awareness is half the job, the ability to act is fully as important.

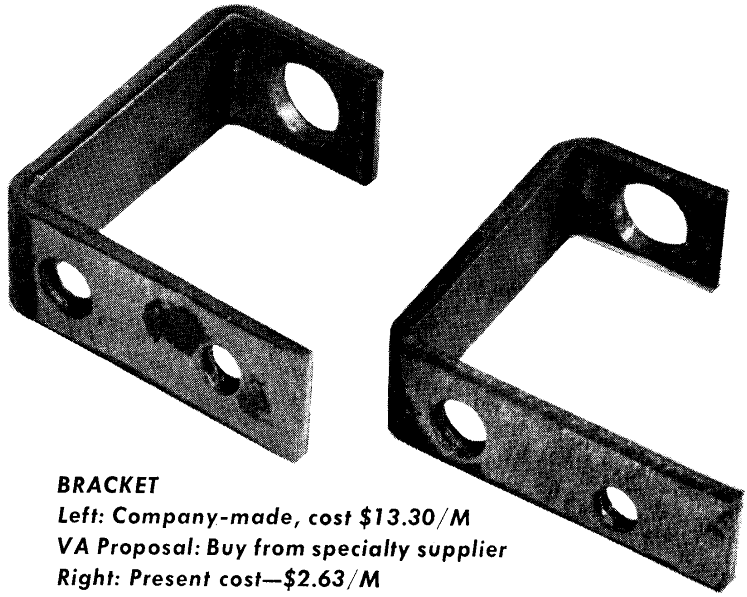
The success of the Value Analysis program, then, is the result of two factors:

1. The ability to think in terms of function—an approach never before tried on such an intensive, large scale in industry.

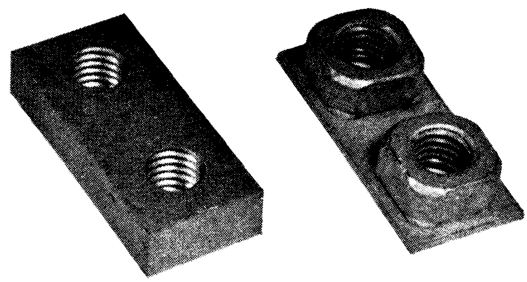
2. The ability to act upon conclusions reached in the analysis of a part or product.

People in the VA group like to emphasize that theirs is not just another cost-reduction program. Actually, they have sometimes recommended that a component be replaced by a more expensive one. Reason: The higher-priced part performed the function more reliably than the original, or performed more functions. In most cases, however, the cost reduction is one of the more striking results of the analysis of a product.

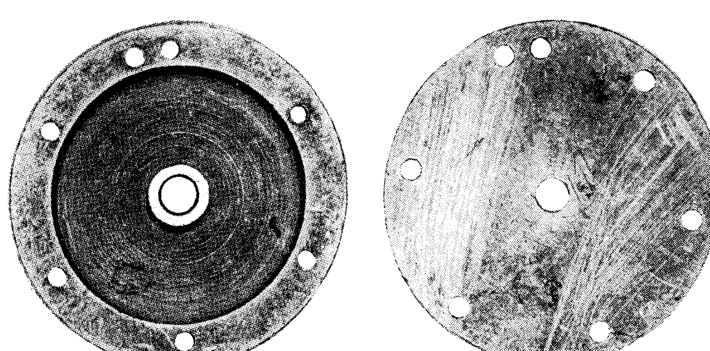
What areas of General Electric fall under Value Analysis's surveillance? The answer—literally every phase of product development and manufacture. Planning, design, purchasing, production, packaging, shipping—all divisions that are concerned with a product will sooner or later come into contact with the Value Analysis group. And because the group has not been afraid to cast a cold eye on all phases of product development and manufacture, it has



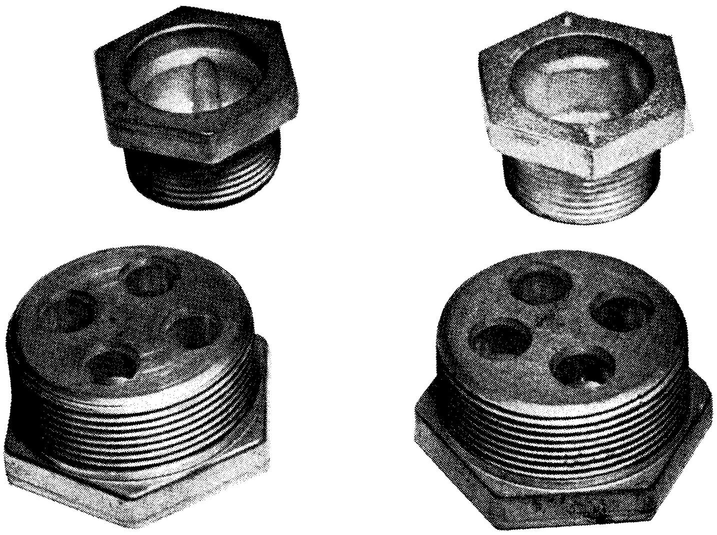
BRACKET
Left: Company-made, cost $13.30/M
VA Proposal: Buy from specialty supplier
Right: Present cost—$2.63/M
Yearly Savings: $10,670



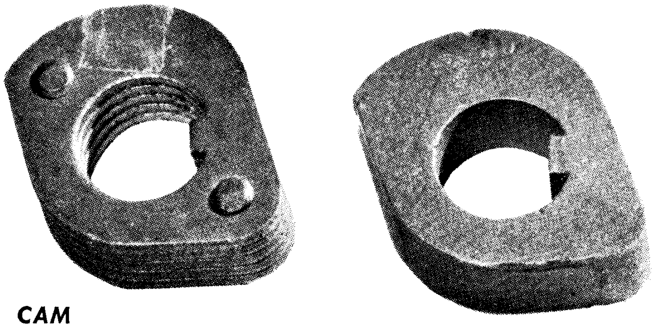
CLAMP BAR
Left: Machined from barstock, cost 32¢
VA Proposal: Use two nuts welded to 1/8-in. stamping
Right: Present cost—8¢



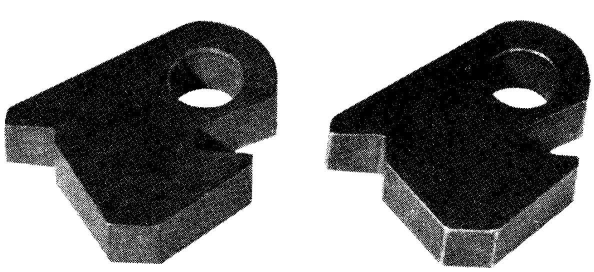
DIAL HUB
Left: Machined steel, cost $1.27
VA Proposal: Buy available aluminum disk from bulk supplier, flatten and drill
Right: Present cost—13¢



BRASS IMMERSION-HEATER PLUG
Left: Forged, cost $79.70/C
VA Proposal: Shell-mold it
Right: Present cost, $26/C



CAM
Left: Fabricated (5 stampings, 2 rivets), cost 12¢
VA Proposal: Buy 1-piece, sintered-iron units from specialty supplier
Right: Present cost, 3¢



IMPELLER CASTING
Left: Cast bar, machined and milled, cost 40c
VA Proposal: Buy powdered-iron casting (no machining required) from specialty supplier
Right: Present cost—10¢
Yearly Savings: $60,000

been able to initiate some radical changes in traditional methods of getting things done. Here are some examples:

CHANGE IN MACHINING:
A J-bolt used to be made on a screw machine for 11½¢. VA recommended that roll-threading do the job. Present cost: 1½¢.

CHANGES IN FORMING:
A simple hinge, once a stamped part that cost 37¢, now is a roll-formed strip that costs only 27¢. Saving for the company is $50,000 a year.

A cover latch that used to cost 44¢ now can be made for 11¢. A wire-forming technique recommended by VA brought the price down.

CHANGES IN MATERIALS:
An arcing horn, originally made of bronze by brazing, cost the company $6.80. A year ago, making the horn as a shell-molded casting brought the price down to $3.20. Now a new design is being tested (with the likelihood of complete approval) that will further reduce the cost.

USE OF NEW MATERIALS:
An impeller casting originally had to be milled after casting. Now it is formed of powdered iron. Price reduction: from 40¢ to 10¢.

A cap for a lightning arrester used to be made of porcelain; now it is molded of glass-reinforced polyester at a substantial saving.

CHANGE OF SUPPLIER:
A plug to protect a turbine opening during shipment was originally machined in the plant, at a cost of $15. Buying the part—a standard fitting—from a plumbing shop reduced the price to 40¢. Subsequently VA recommended that the part be made of Masonite, reducing the price still further.

These examples, together with the photographs that appear elsewhere, show the diversity of the Value Analysis effort. In retrospect these achievements are deceptively uncomplicated. Their *ex post facto* simplicity may even prompt the skeptic to criticism. "Anybody," he will exclaim, "should have been able to do these things."

The point is, however, that anybody rarely does, at least to such an extensive degree. It isn't unusual, of course, to hear that a company has saved money by using a newly developed material or by successfully solving a "make or buy" problem. But these generally are isolated efforts—attempts to solve specific problems rather than concerted studies of all phases of product development.

The Value Analysis program recognizes that in industry (especially in large companies with a multitude of products) there is often a tendency toward inertia. Once a product has been successfully launched, it will probably be made in much the same way—with the same materials and components–for years. The objective, outside look is missing, and suggestions for improvement never even occur to the people most intimately concerned with the making of a product.

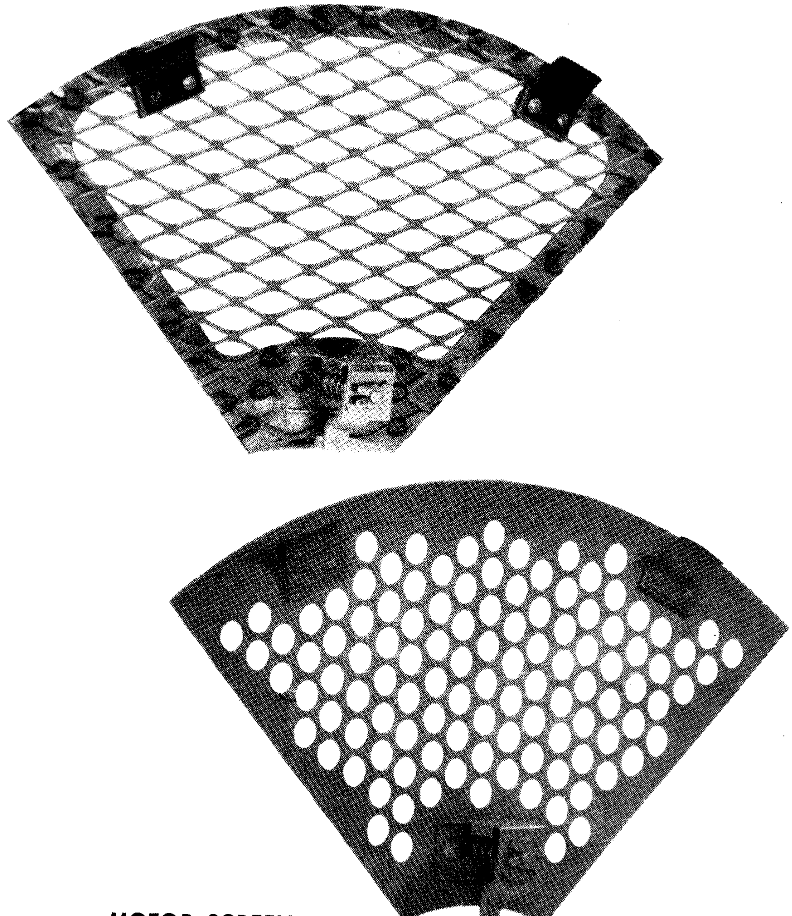
If the skeptic persists in his criticism, the VA expert's reply is likely to be something like this: "Why not analyze your own products? I've been looking at one of them. It's a good product, and it performs reliably. But you should be able to make it for far less money. Why don't you try to reduce the cost of manufacture 30%, without sacrificing any of the product's quality or reliability?"

Once the problem is stated this way, the skeptic realizes that Value Analysis is much more complicated than the results of its work apparently show. And it is precisely this sort of problem that the VA group at General Electric has been solving for the past twelve years. How each problem is stated, and how it is solved, can best be illustrated by describing the approach that General Electric takes in the training of its Value Analysts.

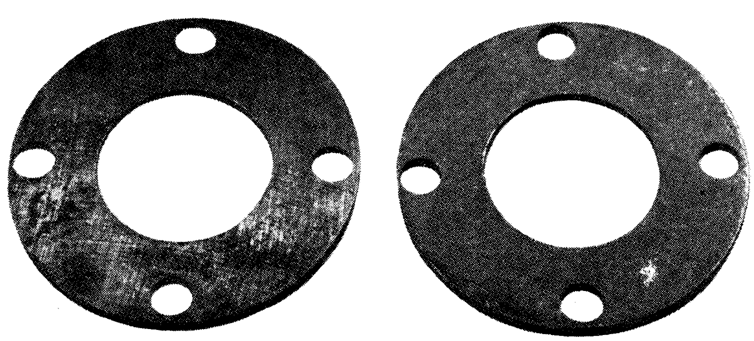
Training the Specialist

Periodically, the Value Analysis Service holds courses in Schenectady, designed to acquaint GE personnel with the various aspects of Value Analysis. Some courses are general approaches that introduce the subject in broad terms to management personnel. Others are restricted to special groups: Engineering personnel receive instruction that helps them to achieve optimum value in design work; marketing and sales people study ways to use Value Analysis in their work.

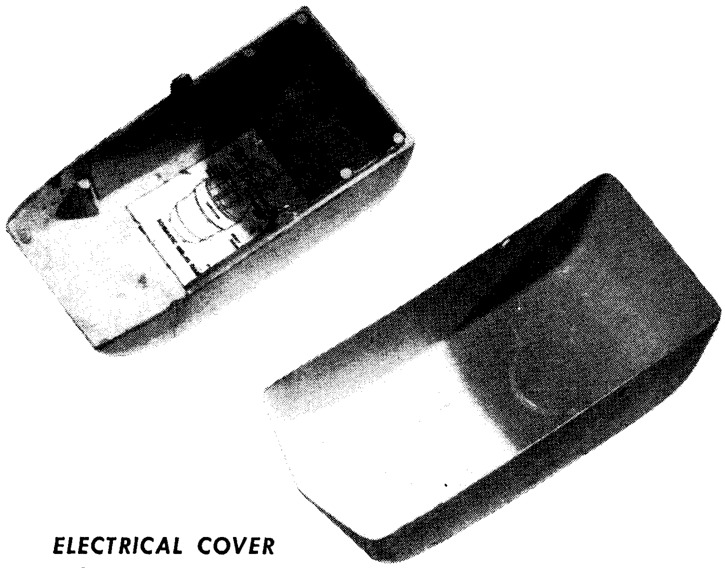
The most intensive course taught at Schenectady is a two-week seminar designed for GE personnel who will become Value Specialists in their plants. Here the implications of value are studied in depth; management men and engineers from GE plants work together as a team, learning VA techniques and applying them.



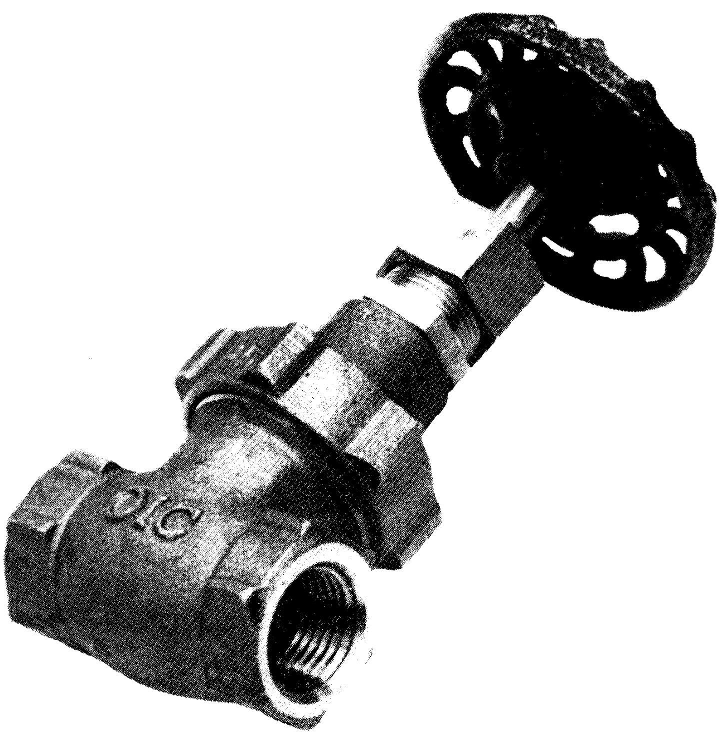
MOTOR SCREEN
Left: Expanded metal, with 40 spot welds, cost $6
VA Proposal: Use perforated metal stamping
Right: Present cost, $1.20
Yearly Savings: $22,776



THRUST PLATE
Left: Machined plate, cost $1.35
VA Proposal: Produce by stamping
Right: Present cost, 16¢



ELECTRICAL COVER
Left: Die casting, cost 60¢
VA Proposal: Substitute steel stamping
Right: Present cost, 21¢
Yearly savings: $39,000



VALVE
Before: Worn valves replaced with new ones
VA Proposal: Reclaim to new-valve quality
Now: Reclamation costs average less than 60% of original costs

And the learning process is not purely academic: Students work on a GE product during the course, and are expected to make recommendations that will lead to substantial savings without sacrificing any product quality.

Candidates for the course are carefully picked, and are expected to bring certain qualifications to Schenectady with them. These extracts from the announcement for a recent seminar precisely define the scope of the course:

"**Broad Description:** A ten-day depth course in *Value* designed to provide a sound working knowledge of Value Analysis which will enable participants to produce equal or better quality products and service at a substantially reduced cost. The program includes an extensive study of Value Analysis techniques, the relationship of Value Analysis to other functional activities, and presentations and displays by over 50 specialty vendors, company specialists, and consultants. In addition, each participant applies Value Analysis on a company product to obtain the lowest cost for reliably performing the function.

"**Participants:** Designed for men who will be assigned as Value Specialists and key personnel from engineering, manufacturing, finance, and materials functions who will be assigned responsibility for leading Value Study teams.

"**Qualifications and Experience:** Engineering or methods and planning background. Understanding of materials. Creative imagination. Initiative. Self organization and drive. Ability to work with minimum supervision. Desire to obtain good value. Ability to work with others. Three to thirty years' experience.

"**Other Information:** This program is designed to substantially increase the effectiveness of all personnel regardless of the phase of business in which they operate. Value Analysis training creates a frame of mind or mental approach that insists on continuous inquiry, that is intolerant of complacency. In addition, it organizes the thought processes and provides the techniques for obtaining optimum value—'The Lowest Cost for Reliably Performing a Function.' "

Establishing the Project

On his very first day at the seminar, the participant is given the project that he, working as a member of a team, has to solve. Essentially, he is told something like this:

"Here is a General Electric motor.

It's a recent development that hasn't appeared on the market yet. Right now it performs reliably and its quality is well up to company standards. Our marketing people tell us that there is a real need in industry for a motor with this rating. Unfortunately, material and manufacturing costs are high and we can't meet the selling prices we must expect from our strongest competition. Your problem, gentlemen, is a simple one: At the end of the course, submit recommendations that will reduce cost of manufacture 30%, without reducing the motor's quality or reliability." (This problem, a hypothetical one here, is typical of the type that Value Analysis teams are called upon to solve in every-day practice.)

At this point the leader of the seminar may add a few remarks: "Here it is, gentlemen. We think we can give you the tools to cut costs 30%. But meeting this goal is your job, and you have exactly ten days to do it."

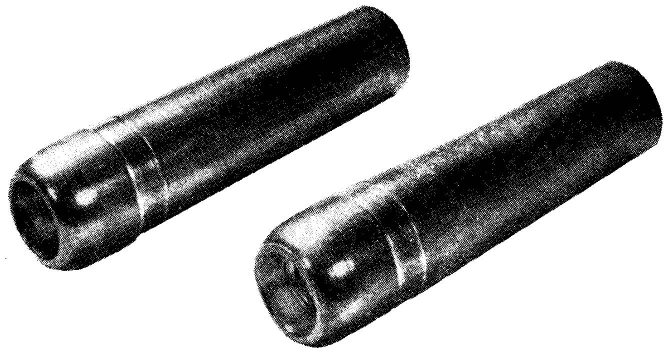
Once the problem has been explained, the whole class gets a detailed briefing on the motor. Here are some of the data furnished by the instructor:

- Present costs of each component in the motor
- Names of present vendors
- Drawings and specifications
- Estimated quantities of components used each year
- Materials specified
- Design and performance data
- Planning and manufacturing paperwork and control procedures
- Present methods of fabrication and assembly
- Manufacturing cost and time data

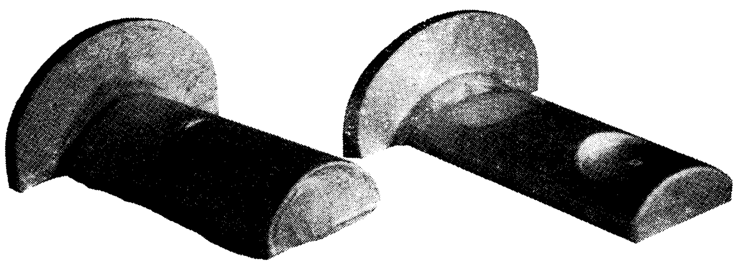
To answer any further questions, project consultants are on hand. These consultants are men who know in great depth particular technologies that apply not only to the current project but to many others. Some may come from GE laboratories, others from vendor companies. Their advice may be freely solicited on such items as machining processes, insulating techniques, electric-current interruption, coil winding, magnetic steels. And in addition to the consultants, GE engineers and manufacturing men in the area are, of course, readily available for other information.

Philosophy of the Project

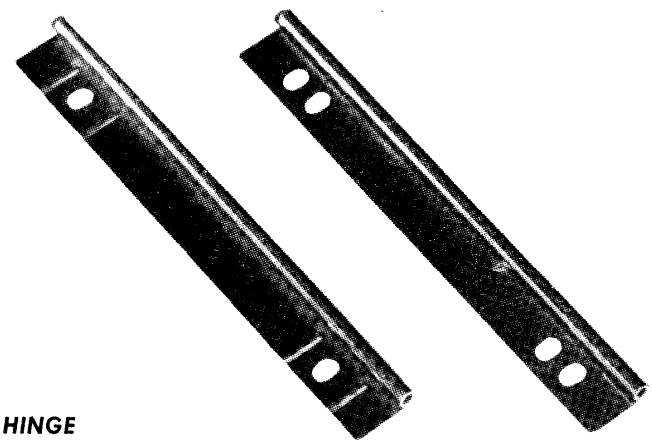
While the participants are becoming acquainted with the project, they also receive an introduction to the



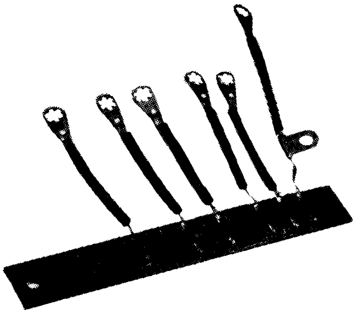
SOLDERING-IRON TIP HOLDER
Left: Made on screw machine, cost $52/C
VA Proposal: Produce by forging and machining
Right: Present cost, $31.46/C
Yearly Savings: $21,500

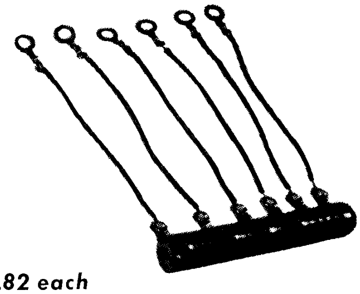


ROTOR END PLATE
Left: Casting, cost $8.76
VA Proposal: Substitute forging
Right: Present cost, $1.67

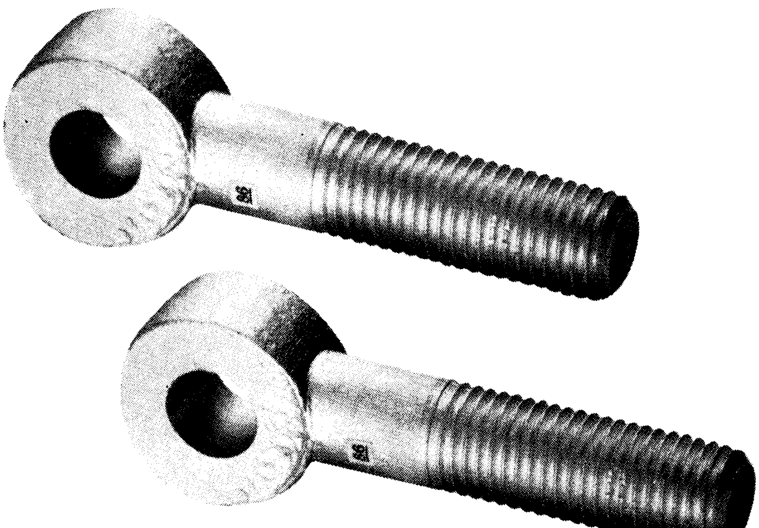


HINGE
Left: Stamped part, cost 37¢
VA Proposal: Buy roll-formed strip from specialty supplier
Right: Present cost, 27¢
Yearly Savings: $50,000

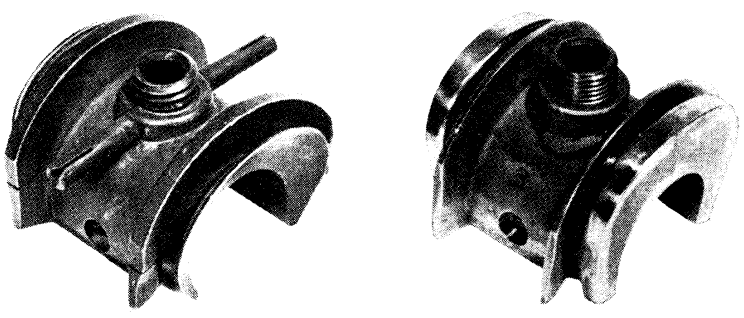




RESISTOR ASSEMBLY
Left: Original design cost $7.82 each
VA Proposal: Redesign assembly to permit use of a tapped vitreous-enamel resistor
Right: Present cost, 94¢



EYE BOLT
Left: Forged by company, cost $27.60
VA Proposal: Purchase from standard supplier
Right: Present cost, $1.86



INSERT FOR INFLECTION YOKE COIL
Left: Machined, cost $87.50
VA Proposal: Produce by investment casting and machining
Right: Present cost: $29
Yearly Savings: $29,250

philosophy of Value Analysis. A series of lectures, given at frequent intervals during the course by experts from the Value Analysis Staff, outlines the plan of attack.

A key initial step is to make the trainees think in terms of function rather than hardware. What happens when hardware—and its cost—are prime considerations in product development? To illustrate the danger here, the VA instructor shows twenty objects, bought in a local hardware store, to the class, asking each person to estimate the value of each. Objects may include an 8-penny nail, a threaded hook, a clothesline pulley, a drillpress chuck, a window stop, a paint scraper—small, inexpensive articles that everyone is familiar with.

When the actual prices of these objects are revealed, and the participants see how widely their estimates have missed the mark in most instances, the point has been firmly made: Don't try to establish the value of an object by thinking of it as a piece of hardware.

Think of the object's function, the class is told. What is the part? What is its function? What does it now cost? What else would do the job? What would that cost?

At once these questions are directly related to the group project. What is the function of the motor? What is the function of each part in the motor? What does each part now cost? How can each part be redesigned, remade, repurchased yet still perform the same function as reliably as or better than the original? How much would it cost to make each part?

All these questions are answered in depth during the remainder of the course. Each day the seminar meets, the implications of the questions are revealed in a series of talks given by specialists on the Value Analysis staff and from other GE departments. The following talks, only a portion of the total made at a recent seminar, give a good idea of the broad yet deep approach:

"What is Creativity?"

"Costs—Get Them, Know Them, Use Them"

"The Need for Good Human Relations"

"Determine the Basic Function of Your Project"

"How to Analyze Your Project"

"Work on Specifics, Not Generalities"

"Search Out the Best Suppliers and Specialists"

"Use All the Company Services"

"Relationship of Value Analysis to Other Functional Activities"

"What's New in Manufacturing Processes?"

"Ten Tests for Value"

"Let's Get More Value in the Original Design"

"What Management Expects From a Man Who Has Had Value Analysis Training"

"Value Analysis and Cost Improvement"

"The Work of a Professional Value Specialist"

"Where Do We Go From Here?"

The Right Attitude

The trainee's introduction to Value Analysis consists, then, of an orientation in two major fields: He finds out what project he is to work on, and at the same time is thoroughly indoctrinated in the concept that will enable him to meet his goal. To these might be added a third orientation: Creation of an attitude that will lead to success.

Quite naturally, the participants bring to Schenectady many prejudices that make innovation difficult: "It's the best design." "We always make it this way." "Why change it? It works."

Much emphasis in the course is placed on accentuating the positive, on breaking down the negative attitudes that restrain the creative mind. No idea, the trainee discovers, is too small for consideration. Imagination should stray far afield of conventional boundaries. No product is perfect in itself, cannot be improved in some way.

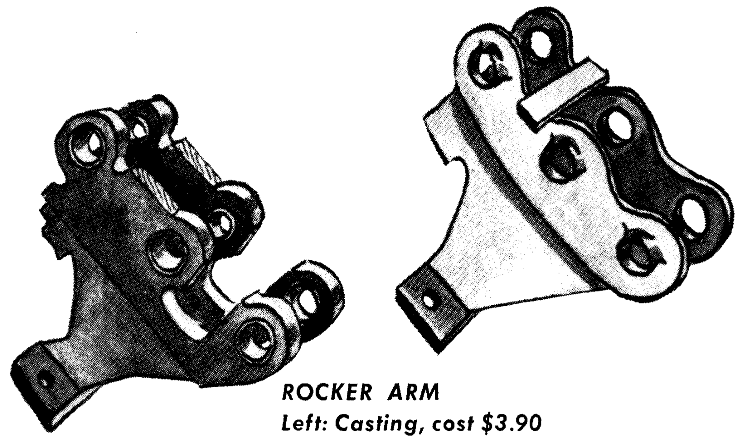
Here are some of the positive attitudes that every Value Specialist must have:

- We must want something new to work.
- There must be a better way.
- We all make mistakes.
- We are all on the same team.
- We have no supermen.
- A major contribution to the art makes further progress possible.

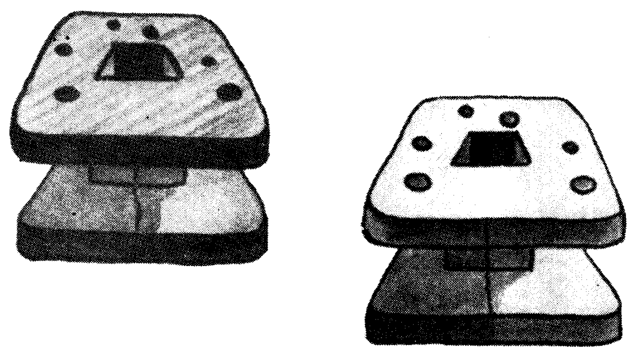
The VA Job Plan

The seminar approach to the project is to divide the class into several teams (usually three men to a team). In the example selected here, each team is given responsibility for some component of the motor. One team might work on the conduit box, another on the rotor, another on the bearings. Still other teams would concentrate on the winding, the insulation, the housing, the fan, the method of packaging.

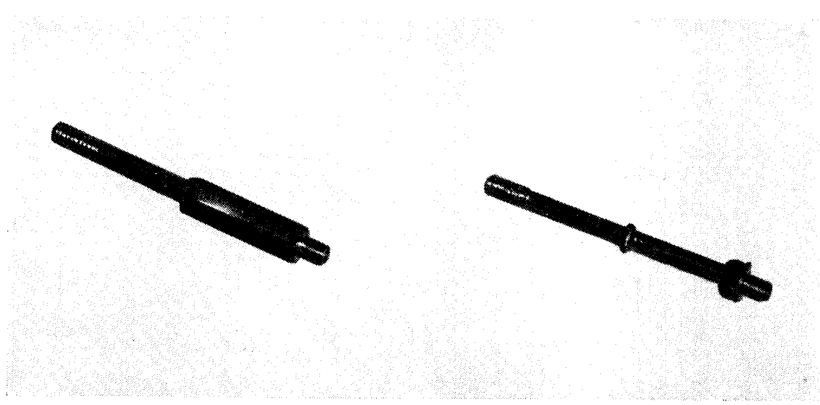
Each team is expected to establish



ROCKER ARM
Left: Casting, cost $3.90
VA Proposal: Fabricate the part
Right: Present cost, 90¢



COIL FORM
Left: Molded plastic, machined, cost 40¢
VA Proposal: Try injection-molded nylon
Right: Present cost, 3¢



SPACER STUD
Left: Made on screw machine, cost 7¢
VA Proposal: Buy cold-headed part from specialty supplier
Right: Present cost, 2¢
Yearly Savings: $12,000

Future Value Specialists receive their training in seminars held periodically at Schenectady. Training of these carefully selected men is by no means purely academic. Participants apply VA techniques to a company product, are expected to submit concrete proposals that will increase the product's value

GENERAL ELECTRIC COMPANY
VALUE ANALYSIS SERVICES

SH. NO. ____
SEMINAR

VALUE ANALYSIS SUGGESTION SHEET

NAME OF PART	PART USED IN
DWG NO	QUANTITY/UNIT
	QUANTITY/YR
PRESENT	PROPOSED

	MATERIAL—C	LABOR—C	SHOP COST—C	TOOLS OR PATTERNS
PRESENT COSTS	$	$	$	
PROPOSED COSTS				$

ESTIMATED ANNUAL SAVINGS $ ____

COMMENTS—

SUGGESTIONS—

PROJECT GROUP ____ / ____ / ____
TABLE NO. ____
DATE ____

Suggestion sheet submitted by the Value Specialist contains his final proposals on each part that shows possibilities for improvement

the optimum value of the component it works on. It must investigate every source that goes into the making of the component: design, manufacture, materials, suppliers, control methods. But because the end product consists of components that must function smoothly together, there are frequent exchanges of notes between teams. Of necessity, each team is dependent on all the other teams.

Training that accompanies the project work follows standard procedures set up for Value Analysis of any product. At the beginning of the course, all teams are introduced to the formula that has solved so many value problems in the past. (See the opposite page for a detailed description of this plan.)

Known as the Value Analysis Job Plan, this six-step formula details the approach covered not only in the course but also in actual practice:

I. BECOME INFORMED: Learn all the details of the project—costs, vendors, drawings and specifications, quantities used, materials specified, etc. Talk with experts who are familiar with the project, so that you understand it thoroughly.

II. SPECULATE: Think creatively. Search for all solutions to the problems you have. Explore every avenue that might lead to a possible solution. Get all these suggestions down on paper.

III. ANALYZE: Study all the suggestions carefully and pick out the most promising ones, from the standpoint of reliability and cost. Write off to vendors for quotations. Check on methods of manufacture. Consider design changes.

IV. PLAN: Consult with engineers and vendors, who will be able to offer valuable advice on materials, design, and manufacturing techniques. Keep working until you are able to arrive at tangible conclusions.

V. EXECUTE: Get your conclusions into orderly form. Consult with other project teams, to make certain that your conclusions don't jeopardize theirs. Put your conclusions in writing, spelling out all the essential details.

VI. ACT: Present your conclusions to the developer and manufacturer of the product, so that he can take prompt action to build optimum value into the product.

Once the job plan has been established, work on the project begins in earnest. Teams, working separately and together, follow the formula until the project is concluded. Work

How does the value analyst proceed with a project?

VALUE ANALYSIS JOB PLAN

1. Information Phase

a. Secure all pertinent facts—actual samples of parts and assembly where practicable. Costs, quantities, vendors, drawings, specifications, planning cards and manufacturing methods information.
b. Learn the basic engineering, with the engineer, ask questions, listen, develop with him a thorough understanding of the product.
c. Learn the basic manufacturing—observe manufacturing, ask questions, listen, study.
d. Decide the amount of effort that should reasonably be expended on each item of cost.

2. Speculative Phase

a. Generate every possible solution to the problem.
b. Consult others who may help you.
c. Systematically explore various materials, machine processes, rearrangement of parts, etc.
d. Encourage free use of the imagination.
e. Record every suggestion that seems remotely possible.
f. Establish two-man teams for creation of additional ideas.

3. Analytical Phase

a. Estimate the dollar value of each idea.
b. Develop all ideas with emphasis placed in proportion to their value and probability of accomplishment.
c. Investigate those ideas with an "obvious" reason why "it won't work." List the good points and the bad points. Eliminate or overcome the objections.
d. Set up a program to vigorously pursue ideas with most promise.

4. Program Planning Phase

a. Break the job down into a progression of functional areas; i.e., a fastening job, an electrical contact job, a support job, a dust protection job, etc.
b. Select the top specialist in the General Electric Company to consult on each.
c. Select from one to three of the best suppliers in the country for each functional area of the product.

5. Program Execution Phase

a. Point out the top function desired—discuss the problems and solicit specific suggestions with both in-company and out-of-company specialists.
b. Constantly pursue thoroughly and intensely until suggestions of all specialists are in. Work with vendor companies until they can provide alternate practical suggestions and quotations.
c. Periodically support the work of the specialists by speculative or idea study and evaluation pertaining to the individual functional areas.
d. Stick to each promising suggestion. Thrash it out and reach definite tangible, usable conclusion.

6. Status Summary and Conclusion

a. Issue a concise suggestion sheet covering each part which shows possibilities.
b. Make certain the sheet shows pertinent information, such as . . .
   . . . before and after sketch of the part.
   . . . quantities used per year.
   . . . material, labor, and shop cost.
   . . . suggested cost, and tool cost, if any.
   . . . statement describing function of part.
   . . . suggestions in condensed form.
c. Send copies to the man designated by the manager to receive and follow up, also to others who should receive them.
d. Send all quotations to the Purchasing group concerned. Attach all specific engineering data, engineering studies, etc. to one copy and all studies pertinent to manufacturing methods, techniques, etc. to another of the copies given to the designated follow-up man.
e. Finish the job promptly and go on to the next.

is intense, relieved only by a one-week break at the halfway mark. Dividing the ten-day-long seminar at midpoint accomplishes two things: The participant does not have to stay away from his own plant for more than a week, and the extra time allows vendors time for adaptation of their products to the special functions required and insures that their quotations will arrive in adequate time. And there is one important by-product: During the off week, the trainee can use his leisure time to think about the project, to plan in greater detail for what he must do when the seminar reconvenes on the following Monday.

Speculating

How does a team member "speculate" about a component? The seminar instructors, drawing from past experience, are able to suggest a variety of ways in which the participant can approach this phase of the VA Job Plan:

(1) What does the part now cost? What percentage of the motor's total cost is this? What are material costs of the part? Labor costs? Overhead costs? Machining costs? How does each of these costs affect all the other costs?

(2) Is the part really necessary? Does it have a vital function in the motor? In a surprising number of projects, great savings have resulted simply from elimination of certain components.

(Here the teams are urged to proceed with caution. If a part is eliminated, the redesigned product still must have the same quality as or better quality than the original. There are many parts that can be removed entirely, but their elimination must *never* remove quality, no matter how much costs drop. Actually, the functions of many parts may be transferred to other parts and assemblies. Too, in many cases the needs of customers and requirements of the job have changed since the products were designed, so that some parts no longer make *any* contribution to the use or features wanted by the customers. One point the VA staff likes to emphasize: Taking off features that the customer might like, but which he can probably "get by without," violates the basic principles of Value Analysis.)

(3) Is the part too complex? Often the design can be simplified, reducing the cost of manufacture and improving reliability.

(4) Can the part be made by another process? Here a simple forming operation on a press may be able to replace an expensive screw-machine or milling operation. Or a forging may replace a casting. Or a stamping process may eliminate expensive fabrication.

(5) Can the part be made by a specialty vendor? Value Analysis lays great stress on the services of these suppliers, who with their specialized facilities are often able to supply components at far less cost than company-made parts. Too, their experience with specialty components makes their advice extremely useful.

(6) Can the plant make the part more cheaply than an outside supplier? Often changes in design or manufacturing will enable the plant to use its own facilities more profitably than it was able to do in the past; as a result, expensive services of an outside specialist are no longer needed.

(7) Can a less expensive material be used? Often a new material will be as reliable as, yet cheaper than, the material specified in the design. Chances are that the responsible design and engineering people specify materials that have been successful in the past, and that they aren't aware of the newly developed material.

(8) Can a custom-built part be replaced by a standard part? The VA group has found that in many cases components available as standard fittings will do just as good a job as

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new materials NEWS

ISSUED BY VALUE ANALYSIS SERVICE
MATERIALS SERVICE
Schenectady, New York

FOR GENERAL ELECTRIC EMPLOYEES ONLY

August 1958

METALS AND METAL PRODUCTS

Thermolay Strip

Electroplating plus heat treatment changes chemical bond into a metallurgical bond. Thus terminals and other parts blanked from Thermolay strip (all tempers available) are vastly superior to barrel plated brass parts and at a fraction of cost of conventional silver-clad brass. Many other combinations are available. Electroplated layers include choice of silver, copper, tin, nickel on one or both sides. Base metals include copper, brass, nickel, low carbon steel, nickel silver, Kovar, monel and others.
(American Silver Company, Inc., 36-07 Prince Street, Flushing 54, New York)

Extruded Tubular Rivets

These rivets are headed and the hole extruded complete in one operation on high speed headers. The most important advantages are... uniformity in hole location and wall thickness. The sidewalls are stronger than drilled rivets due to finer grain structure. Because of an independent price policy, General Electric has the potential of very substantial savings.
(New Jersey Rivet Co., 10 S. 3rd Street, Camden 3, New Jersey)

PLASTICS

Resinous Products for Reinforced Plastic Applications

A series of new resinous products for reinforced plastic applications, designed to withstand operating temperatures up to 500°F is announced. The resins provide the combination of the ease of handling of polyesters, high temperature resistance approaching phenolics, and desired electrical characteristics. They are suggested for applications undergoing continuous exposure at 425°F or intermittent exposure at 500°F. The inherent temperature resistance and chemical resistance of the new products, coupled with their ability to provide

GENERAL ELECTRIC

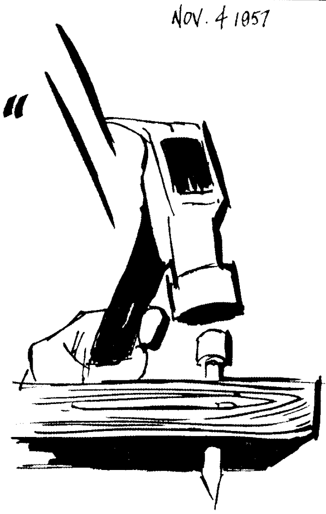
News about new materials . . . is of great importance to the Value Analysis program. At frequent intervals, Value Analysis Services sends out multi-page notices of new developments in materials to all interested GE personnel

VALUE news

ISSUED BY VALUE ANALYSIS SERVICE OF MATERIALS SERVICE, SCHENECTADY, N.Y.

Nov. 4 1957

"Tough as Nails"



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(SEE REVERSE SIDE FOR TECHNICAL DATA)

GENERAL ELECTRIC

Special bulletins . . .
on important new developments go to every GE plant. The reverse side of this sheet gives extensive technical data on the development, so that designers, buyers, and manufacturing men can compare it with similar developments

expensive special components. Usually, only minor changes in the specifications of these mass-produced parts are needed.

(9) Can the part be made by a new process? The VA staff at GE endeavors to constantly keep abreast of new manufacturing processes: automatic assembly, powder metallurgy, new casting methods, ultrasonic cleaning and finishing techniques, machinability developments, and all other new developments that might reliably produce the component less expensively. Naturally, the Value Specialist cannot master *all* new developments; but he can and must be aware of all new technologies, and must be prepared to call in experts in these fields at the proper time in product development or re-planning cycles.

(10) Can some steps in the manufacturing process be simplified or eliminated? Some parts are "overmade." A finishing operation, for example, may not add "appearance value" if a part is permanently concealed. Or the tolerances held on a part may be much too fine for the job that the part actually performs. Or a new machining technique may simplify the process eliminating some production operations.

These questions, which each team in the seminar must investigate, by no means exhaust the repertory of Value Analysis techniques. But they are representative of the approach that the seminar takes. And this extensive search— this digging for results—almost always pays off handsomely.

Analyzing the Project

Phase III of the VA Job Plan consists of analyzing all the suggestions developed in Phase II, then selecting the most promising for more concentrated planning. Here selectivity is important: All impractical ideas are carefully weeded out, and the trainee makes every effort to secure all possible data on the remaining suggestions—the ideas that he will develop into practical recommendations at the end of the seminar. Emphasis here is on selecting the alternatives that offer greatest benefits, then concentrating on ways to overcome any shortcomings they may have.

At this point, the trainee is urged to write off for quotations from suppliers of materials and components. Normally, he sends these requests by mail, but he can telephone the vendor if it looks as if he'll have trouble meeting his deadline. He can send off as many requests as he likes; there are no restrictions in this respect.

Meanwhile, each team carefully checks the design and manufacturing techniques that go into the making of the component assigned to it. The team consults experts in these fields; investigates new processes for machining, fabrication, and assembly; checks with purchasing agents; and gathers all the necessary data for setting the machinery of the program into motion. And because teamwork is essential, there are frequent comparisons of notes with other teams that are working on the project.

Planning the Proposals

When Phase IV of the Job Plan is reached, early in the second week, the project has shifted into high gear. By now, quotations from vendors are beginning to come in. Each team is thoroughly familiar with the way its component is made, as well as a host of alternative methods of manufacturing. And all participants in the seminar are thoroughly indoctrinated in every aspect of material and fabrication costs.

Innovations in training don't stop here. Specialty vendors, selected by the VA staff because their products apply to the project, come into the classroom to demonstrate what they have to offer. (At one recent seminar, more than 50 vendors responded to GE's invitation.) The range of products shown is extensive: A maker of industrial fasteners shows how his products can be used in the project; a supplier of epoxy resins will give an actual demonstration; another vendor will exhibit newly developed insulating material; still another vendor shows off a new welding or cutting technique.

There are further talks by experts who are familiar with the project: manufacturing men, designers, purchasing agents, and research and development engineers. And basic talks on every conceivable aspect of Value Analysis continue to be given in generous doses.

Meanwhile, concentrated work on the project draws to a close. Teams are urged to get their proposals down on paper. The process of selectivity continues, and concrete, workable ideas begin to emerge from the apparently chaotic data that has been studied so exhaustively during the past few days.

The Final Phases

Just before the end of the seminar, teams are asked to summarize their findings and to make specific recommendations that, adopted by the company, will result in a product that has greater "value" than the original. By now all suggestions have been thoroughly analyzed, sifted through, and put into presentable form. The proposals of all teams have been coordinated, and at last the recommendations are ready for presentation.

At the end of the seminar, representatives from the plant which makes the product that has been analyzed are invited to visit the class. Here the proposals of the class are formally presented to them for action. The VA group at General Electric emphasizes this point: The proposals are presented as recommendations, not commands. The plant has the right to act upon the proposals or to ignore them.

There is one further point which the VA staff likes to make: Its proposals do not necessarily represent the ultimate in value improvement. The plant receiving the recommendations should be able to extract even more value out of them. If the men who make the product (and who therefore are most familiar with it) can't make still further improvements, there is something wrong somewhere!

What sort of recommendations come out of the seminar? The example selected to illustrate the story here is a hypothetical one, and for this reason it is impossible to cite specific proposals. But an examination of hundreds of proposals made on other projects leads one to believe that the following recommendations would be typical:

- For the present insulating material, substitute the ABC Company's product. A newly developed material, it has better insulating properties than the original and costs 30% less.
- Redesign the end shield, which is unnecessarily bulky and requires expensive spot welding of the screen to the frame. Substitute a perforated metal stamping. Cost reduction here will be 70%.
- Simplify the wiring in the conduit box, as shown on the proposal sheet. Savings: 20% over the original.
- Total yearly savings: $55,000.

Value Analysis and Teamwork

As this article shows, Value Analysis has come a long way since it was established at General Electric twelve years ago. By acting as a monitor of all GE product activity, it has helped greatly to integrate the company's widely diversified interests. And it is this contribution to company-wide teamwork that is perhaps the greatest achievement of Value Analysis.

To be completely successful any management program must be contagious. And the Value Analysis staff does not operate in a vacuum. The ideas of Value Analysis men, and the recommendations they make, are effective stimuli for engineers, manufacturing men, and buyers in their own work. The techniques of Value Analysis, used by these people, bring into focus additional viewpoints, additional information, additional possibilites. At the same time that they accomplish their normal objectives, VA techniques enable them to build a higher degree of value into their products.

The importance of teamwork was apparent to the Value Analysis staff from the beginning. No further proof of this is needed than to reprint a portion of L D Miles' introduction to his American Machinist article of July 1949:

"Value Analysis represents an important concept in modern industrial management. Through Value Analysis, management makes Purchasing a full-time partner in cost reduction, and thus taps a reservoir of skill and knowledge that brings enrichment of value to all General Electric products. In Engineering, Value Analysis brings a new outlook to component parts design. It stimulates the cost-consciousness of every engineer to make certain that new designs include the latest advances in low-cost production techniques. For Manufacturing, to supplement the constant efforts of methods men and planners, Value Analysis represents a valuable new tool, extending the range of those responsible for dollar production and bringing their problems directly into the shops of suppliers. To any group in the company, Value Analysis offers a basic approach to greater value through principles and procedures universally applicable and readily understood.

"Its success in General Electric is due not only to its basic soundness but to a large degree to the enthusiastic support of management at all levels in Purchasing. Engineering, and Manufacturing."