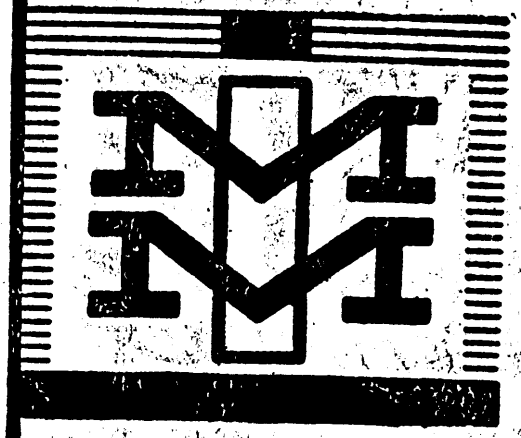
Reference Manual on

REDUCING PRODUCT COSTS THROUGH VALUE ENGINEERING AND ANALYSIS TECHNIQUES



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A N M M I A B S T R A C T

Reducing Product Costs

through

VALUE ENGINEERING AND ANALYSIS TECHNIQUES

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C O N T E N T S

I N T R O D U C T I O N

The successful business, whether it be to supply a product or a service, must, for money, perform some function or functions which the customer wants. The product or service must have...

appropriate performance in the customer's eyes; and

appropriate cost in the customer's eyes.

The growing technology of Value Analysis and Value Engineering is bringing the same proficiency into the matter of securing appropriate cost which has, for a few decades, characterized the technologies used in securing appropriate performance.

Is it worth the money?--a timely question, and an important one. Important because the answer to this question can mean the difference between profit and loss for any company. Unless a company's product is worth its cost, it does not represent good value and cannot maintain its position in a competitive market. Timely because a competitive market is here. Management faces a challenge. It is taking steps to make certain that products are worth the money. Specifically dedicated to this task is the Value Analysis Program.

Value Analysis represents an important concept in modern industrial management. Through Value Analysis, management makes Purchasing a full-time partner along with engineering and manufacturing and thus taps a reservoir of skill and knowledge that brings enrichment of value to all products. In Engineering, Value Analysis brings a new outlook to component parts design. It makes certain that new designs include the latest advances in low-cost production techniques. For Manufacturing, 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, Value Analysis offers a basic approach to greater value through principles and procedures universally applicable and readily understood.

What these principles are, how they are applied, and the results that have been obtained in representative case histories is the subject of this report.

WHAT IS VALUE ANALYSIS?

Value Analysis is by no means just a search for new materials and processes. Laboratories, and Engineering and Manufacturing organizations are constantly doing that.

Nor is it a substitute for cost reduction activities which daily are increasing Value.

Value Analysis is a well-informed creative study of every item of cost in every part or material or service--in view of other possible materials, newer processes, abilities of specialty suppliers and possibilities for engineering re-evaluation focusing Engineering, Manufacturing and Purchasing on one objective--equivalent performance at lower cost.

Value Analysis must bring new information into the project from new areas within a company and from specialist suppliers outside of a company--new possibilities and new Value opportunities each with its definite cost for proper evaluation--and refer this new information into its proper normal channel—the manufacturing man, the engineer or the buyer—for decision.

Value Analysis relates cost to the function or service or operation purchased by that cost. Specialists in a company, and to a large degree outside, are assigned specific functional areas. Their engineering is put to work. Their suggestions are provided with a dollar sign for our evaluation.

Value Analysis has two main areas in which it operates. One is the study of existing products, the other is the design of new products. In both areas, its major objective is equivalent quality at lower cost.

In the study of existing products, Value Analysis focuses attention on each part in the apparatus. It notes the function of the part, seeking to eliminate or simplify it, combine it with another part, or replace it with

a standard item. It considers the material used to determine whether some other material offers better value. For the same reason, processes and manufacturing methods are examined, purchasing arrangements are reviewed, and the wares of specialized vendors and the services of specialized suppliers are scrutinized. The entire procedure is an intensive effort to uncover every possibility for greater value in the product.

Directly affected by these activities are Engineering, Manufacturing, and in fact, any part of the company that influences product cost. But Value Analysis in no way interferes with their normal duties and responsibilities. Value Analysis operates through trained specialists who work in full cooperation with each unit and constantly receive valuable ideas from them. Analysts investigate and uncover possibilities for savings. These are offered as suggestions to those who are responsible for making a decision and taking action.

In this way, there is no overlapping of functions, no areas of friction. It is only through this smooth teamwork that it is possible to realize the tremendous savings the program can produce. Furthermore, this setup creates excellent relations with all other parts of a company, and permits Value Analysis to concentrate on its prime function--that of promoting and generating ideas for value improvement.

Vast benefits through better, lower-cost solutions are brought to the product or service provided if a sufficient number of technical and commercial employees learn and use the Value Analysis technology.

It is intense and thorough. It draws out facts. Value Analysis puts a dollar sign on the function. It applies creative techniques to the evaluation of cost versus function. It presents the facts and ideas it has developed along with the dollar value to purchasing, manufacturing or engineering

for their ultimate approval. It is helping to get today's and tomorrow's materials, ideas, methods and processes into use TODAY.

WHAT IS THE FUNCTION OF PRODUCT VALUE ANALYSIS?

To make certain that, viewing every usable idea, process, material and supplier, each part individually and each group of parts when considered as a unit, represents Value.

HOW IS VALUE ANALYZED?

The analyst working with the engineer, the manufacturing man, and the buyer makes an intensive study endeavoring to lower material and parts cost by substituting, eliminating, combining, simplifying or otherwise altering parts or materials through the application of a knowledge of materials and prices, the use of vendor's specialized skills, new ideas and purchasing negotiation.

The function, the construction, the manufacturing methods, the sources of supply and the purchasing arrangements for each part and each material are reviewed.

Each item of cost is severely questioned. While studying the part or service the answers to these questions are developed...

...What is it?
...What does it cost per year?
...What does it do?
...What else would do the job and what would that cost?

Then each item of cost is seriously questioned unless it clearly buys definite function.

Function is defined as...

...something that causes the product or service to do something needed-- "use" function

...or causes the buyer to buy it -- "esteem"

VALUE DEFINED

Before other Value Analysis techniques are discussed we ought to consider for just a moment what "Value" really is. We define value as the lowest price we must pay for the function or service to be reliably performed.

If anything is in a product which does not contribute to "use" or "esteem" function, it should be changed or removed.

The next important technique then is relating cost to function and determining when we actually have good value. When we obtain the cost of any particular device it is usually received in terms of material, labor, overhead and shop cost. This information may in itself tell us where our time should be spent. It may indicate, for example, that the material is the place to work, or the labor, or the overhead. The next step, however, is to divide these costs into functional areas. How much are we paying for appearance, for the cover, for support, for the mechanical part, for the electrical part, for the magnetic part, etc. In many cases the application of just good judgment to the cost of these functional areas will tell us where we should work.

TESTS FOR VALUE

Ten Tests for Value, which serve to point the way, have been evolved and have assisted in eliminating large amounts of unnecessary cost. They are multi-functional.

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?

What are some typical types of product value improvements produced by using this approach?

A. Eliminate the part.

1. Change another part to perform its function.
2. Check accessory items and features--possibly the need for them no longer exists.

B. Simplify it.

1. Put all the tapped holes into one part--eliminate them from others.
2. Use available fastening devices and eliminate tapping entirely.
3. Challenge secondary punch press operations or secondary screw machine operations or other secondary operations.
4. Make the parts straight instead of curved--straight fittings cost less than elbows.
5. Don't plate copper parts which are later painted.
6. When blind holes are needed, show minimum depth with notation, "Don't Drill Through", rather than specifying depth limits.
7. Use squared ends--ground ends double the cost of the spring.
8. Instead of two tapped holes for set screws at 90° put set screws one on top of the other in the same hole.
9. Avoid undercuts on molded plastics to eliminate mold cycles and slower machine cycle.
10. Question chrome plating or polishing on screw heads.
11. Question unusual machined surfaces. It may require secondary operations to obtain them.
12. Consider pal-nuts to eliminate nuts and lockwashers on light parts.
13. Stamp the nut impressions into the part--eliminate fastening devices.
14. Don't bend it.
15. Use a miniature casting in lieu of several small assembled stampings.
16. Use square instead of rounded corners on stampings.
17. Use roll pins to eliminate reaming.

C. Alter it so that a high speed method can be used.

1. With a slight change, perhaps it can go on a header or upsetter.
2. Make it of round or flattened wire on a wire forming machine rather than a complicated terminal.
3. Strike the slot in the screw instead of sawing it.
4. Design parts for die cast threads. A small flat in the parting line eliminates flash difficulty.
5. Drill and tap small parts in the strip before cutting apart.

6. When cross drilled screws or bolts are needed, design so that random drilling is permissible.
7. Make irregularly shaped parts of assembled laminations thin enough for stamping to avoid costly machining jobs.
8. Eliminate insulating sheets, strips, punchings and welding operations by making a composite molded part for electrical applications.
9. Instead of long screw-machine parts for filter housings, etc., use flared copper tubing and a small internal flare nut.
10. Mold gears from powdered iron to save cost of machining the teeth. If extra strength is needed, impregnate the iron with copper.
11. Use permanent mold iron castings for lower cost and better quality.
12. Use projections and resistance weld in one operation rather than spot-weld one spot at a time.
13. Consider magnesium—it machines twice as fast as aluminum and five times as fast as steel.
14. On thin gears—alter for punching instead of broaching.

D. Alter—so that standard parts or materials may be used.

1. Design around standard nails, rivets, eyelets, washers, spacers, etc.
2. Specialty vendors provide standard materials in many classes. For example, use standard terminal boards, standard switch contact blades, standard contact blade spacers, etc.
3. Design for standard bushings—don't make it necessary to cut them off.
4. Instead of fabricating terminals, buy them from a specialist in parts made from tubing.
5. Try "Johnson" weld nuts for resistance welding to sheet metal. They cost less than half the price of most others.
6. Use stamped "weld" nuts for even lower cost.
7. Use standard sizes for raw material to avoid "extras" in cost.

E. Determine where the design might reasonably be altered for automatic assembly.

1. Don't use a complicated terminal when simple flattened wire applied by an automatic stapler would do as well.
2. Don't have springs pressing against all of the assembly parts.
3. Don't assemble concealed parts between plates. Make up some sub-assemblies which are made openly and snapped together.

F. Use a lower cost material.

1. Use spring steel instead of music wire excepting when excessive loading demands additional properties and justifies additional cost of music wire.
2. There are many tempers of copper and many types of bronze. Remember that generally half the weight of copper will carry the same current as equivalent bronze.
3. Remember also that 1/2 to 1/4 the weight of spring brass carries equivalent current to phosphor bronze. 40¢ brass may replace 65¢ phosphor bronze. Suitable brass can be aged to provide comparable spring qualities.

4. Use Terratex or Quinterra instead of mica for high-temperature, low-voltage applications.
5. Buy an aluminum or other disc instead of sheet or strip stock.
6. Use more magnesium extrusions. Dies cost only a few hundred dollars for small extrusions.
7. Check tubing costs. In smaller sizes, copper is lower cost than steel—aluminum and magnesium still lower--magnesium is the lowest.
8. Don't use drill rod if steel rod will do the job.
9. Use Zn-Cu-Be instead of brass. Save 20%.
10. Use graphite-impregnated phenolic compound for a low-friction, low-cost bearing, thrust disc or seal nose.
11. For large die cast parts, check aluminum. It may cost less than zinc.

G. Use Lower Cost Processes.

1. Do the operation in a tumbling barrel. If the parts are too heavy and too precise—mount them on fixtures in the barrel and let the abrasive mixture flow through them.
2. Use automatic dial tapping machines.
3. Dip in paint rather than spray.
4. Design parts for barrel plating rather than hooking in still tank.
5. Use Multi-slide machines to eliminate secondary operations.
6. Stamp parts in punch press rather than hand stamp.
7. Use tubular rivets rather than solid rivets which have to be peened over slowly in a high speed hammer.
8. Lithograph or print rather than etch.
9. Permanent mold rather than sand cast.
10. When desired actually reduce the size of the shank on a screw by a special thread roller arrangement.

H. Use a higher cost material, which, by its nature and properties will afford a simplified design and facilitate lower cost assembly.

1. Consider fixture heat-treated beryllium copper—when phosphor bronze won't quite do the job. Eliminate adjusting labor.
2. Use Silicones--for innumerable benefits and savings.
3. Make the whole tip and support from silver rather than silver tip and brass support. Eliminating welding may offset the cost of additional silver.
4. Use Micaloi in flux paths. High permeability may save many laminations.
5. On very small parts with intricate forming use stainless to eliminate plating cost.
6. For high temperatures and high dielectric strength use Teflon to produce various savings.
7. Use brass instead of steel on very small screw machine parts. The saving in labor more than offsets the increased material cost.

I. Miscellaneous Lower Costs

1. Use a good sampling method instead of 100% inspection.
2. Make an entire subassembly smaller reducing material accordingly.
3. When buying adjacent parts from a vendor, have them pre-assembled if practicable.
4. Don't spend money for sizing if supplementary operations are necessary anyhow.
5. Make as many parts as practicable on a particular job of identical raw material.
6. Design part and tools to hold scrap in machining to a minimum.
7. Use Carboloy.
8. Hopper feed parts in assembly.
9. Provide proper tooling to eliminate need of expensive labor.
10. Conveyorize to facilitate material handling.
11. Avoid complicated equipment that requires continuous scrutiny and maintenance.

J. Check it against other methods of fabrication.

1. Fabricate it.
2. Die Cast it.
3. Extrude it.
4. Permanent mold cast it.
5. Roll and weld it.
6. Roll form it.

K. Check it against unique, less well-known methods of fabrication.

1. Lost wax casting.
2. Miniature casting.
3. Miniature casting on wire, cord, tape or rod.
4. Miniature casting automatically with inserts.
5. Electro-forming.
6. Low cost, low quantity stampings.
7. Fabrication from copper or brass tubing.
8. Powder metallurgy.

L. Check unusual but available forms of raw materials for use on the job.

For example Steel

1. Preplated steel
2. Prepainted steel
3. Steel clad with aluminum. Stainless, monel, etc.
4. Fibreclad Steel
5. Rubberclad steel
6. Embossed metal
7. Expanded metal

Or Miscellaneous

1. Silicones
2. Nylons
3. Micalex, etc.

WHAT IS VALUE ANALYSIS?

WHAT ARE SOME TYPICAL RESULTS?

SAVINGS MOUNT BY USING CLAD AND PREPLATED METALS

ALUMINIZED STEEL

ELIMINATES PLATING

ON 9 TOASTER PARTS

SAVES $100,000 PER Yr.

Clad with	Preplate with
nickel	zinc, tin
aluminum	brass lead
copper, monel	copper
stainless steel	nickel
zinc, inconel	chrome

Our $1,000,000/YR

ADDITIONAL FREIGHT COST
FOR OUTGOING CRATING LUMBER WEIGHT

CAN BE REDUCED **$220,000**

by using **SPRUCE** instead of YELLOW PINE

- SPRUCE IS 22% LIGHTER THAN YELLOW PINE
- INITIAL COSTS NOW COMPARABLE

Controller Ring - preformed slug instead of machining - $1.26 to .13

Stamped Gasket - let the specialist sell you his specialty - $4.15 to .15

Door Hinge - Roll Form Products Co. - 37¢ to 27¢

Valve Handle - investment cast instead of sand cast and machined - $1.10 to .60

Terminal Block - "specials" are "standard" to many suppliers - $2.52 to .12

Palnut	.08 to .015
Drawn Stamping	.035 to .015
Nut	4.75 to .21
Pin to Roll Pin	24/M to 5/M

WHAT IS THE PAY-OFF IN TERMS OF DOLLAR RETURN FOR DOLLARS SPENT?

As a rule--$15 return for each $1 spent in learning, developing and using Value Analysis technology. Some yields are higher. A conservative bottom figure would be $10 return for each $1 invested in the technology.

WHAT RESULTS ARE TO BE EXPECTED FOR VARIOUS TYPES AND SIZES OF BUSINESS?

ORGANIZATION NEEDED

First it will be well to review the organization which has been found to give the various results which will be listed. This will be covered by a quotation of part of Chapter 8 of "Techniques of Value Analysis and Engineering". [1]

"Industry is learning that there is a vast difference between the everyone-does-it result and the result which is achieved by specially trained men using an appropriate set of techniques and a specialized universe of knowledge. And so managements of competitive businesses--businesses in which value is important--are learning that it is efficient to provide value consultation to aid their decision makers at the right times and to the right extent.

"It is not the intention in this chapter to suggest that the use of value techniques is exclusively a matter for full-time specialists. That would be like taking the stand that all sections on tax accounting should be removed from textbooks on general accounting. It is rather the intent to point out clearly that while much can be gained in achieving good value by everyday use of certain of the value analysis techniques large amounts of unnecessary cost will still be unidentified. Further, if value really is important to the business, the benefits from value activities must be enhanced by the use of specialized skill and knowledge.

"Obviously, the prevailing philosophy of management and the size and scope of the particular business will determine the appropriate provision for value analysis effort. Hence the discussion which follows merely outlines basic patterns that should help to orient the reader.

"8-1. Smallest and Smaller Businesses

"It is useful to understand clearly that while in the smaller businesses organization is not a problem, the lack of large expenditures of the hardware and

[1] Miles, Lawrence D., "Techniques of Value Analysis and Engineering". McGraw-Hill Book Company, New York, 1961.

process type obscures opportunity. To accomplish important results, a clear focus on the fundamentals of all business—even the smallest business—is necessary.

1. What is money spent for?

2. What precisely is the performance or service or benefit which is to come to the business as a result of the expenditure?

3. What is the value of that performance or service or benefit?

4. What are the alternative ways of securing the same performance or service or benefit and what are the associated costs?

5. The value then becomes the lowest-cost alternative which will reliably accomplish it.

6. Regardless of the size of business, the number and status of individuals involved, the type of business, and the type of alternative, whenever change is involved there will be resistance at every step.

7. Typical of the nonproduct type of expense, i.e., items for which money is spent, are the following:

Paper Work: Precisely what necessary function or service does each item of expenditure serve? What are the alternatives and their costs?

People's time: Precisely what necessary function or service does each item of expenditure serve? What are the alternatives and their costs?

Maintenance: Precisely what necessary function or service does each item of expenditure buy? What are the alternatives and their costs?

"In businesses of below $200,000 sales per year, the owner or manager will benefit his business very profitably by securing training in value techniques.

"In businesses of $200,000 to $2 million, one competent and dependable man from among the top three is usually given training in value techniques. This

man will himself evaluate functions, services, and benefits secured in important expenditure areas. He will promote suitable group work and action in appropriate areas. He will constantly teach the functional approach and lead activities which bring benefits from it.

"Depending upon the size and nature of the business and the emphasis at the time, he will devote more or less of his attention to this responsibility and activity.

"8-2. <u>One-man Setup</u>

"Businesses with $2 million or more of annual sales will start with one or more carefully selected and trained value consultants.

"The selection of personnel for the one-man setup is most important. This man must rank high in competence, must have a proven record of high accomplishment, must be respected by his peers and management alike. His background must be exceedingly broad. The qualifications set forth in Chapter 9 are a must for him.

"Even so, it must be recognized by management that, since he will be constantly calling for change, his will be a most frustrating job. Experience shows that when one good man works in an atmosphere of frustration long enough, he often decides that it is not worth it and asks for reassignment to more traditional work which will make him more acceptable to his associates.

"Real attention must be given by management to this new work until it becomes understood by, integrated into, and accepted by, every phase of the business.

"8-3. <u>Two-man Setup</u>

"Two men can provide a much more satisfactory penetration of the necessary knowledge and experience. Combined in the two should be skill in engineering ideas,

in manufacturing methods and processes, and in the very extensive field of using vendor and specialty-vendor competence. While the two men work together, they do not work as an interlaced team. Rather, they work as consultants to each other on any particular job. In every instance, each project or activity is the responsibility of one of the two. That individual, in turn, to the right extent and at the right time, consults with the other man on the job. One of the two may be the senior man and carry certain responsibility for assigning work to the other. Care must be taken, however, that neither of the two works as an assistant to the other but rather that each accepts responsibility for a particular activity in the plant and consults with the other as needed.

"8-4. Three-man Setup

"Normally and practically, three men constitute the smallest efficient operating unit for wide-range value work. It is then usually possible to have the necessary penetration in the three required areas of skill named above. The three men again act as individual value consultants, each taking responsibility for particular value work and calling on the others as consultants to improve the degree of accomplishment. Again, one man may be a senior member who organizes and assigns work to the others, or else the three may report to one and the same manager who, in that case, must have a real grasp of value work, its problems, and its opportunities, and must be capable of performing the management function skillfully. Three men often aid one another during the creative phases of their work studies, and having enough in common, they do not readily become frustrated and discouraged.

"8-5. Four or More Consultants

"As the business begins to see the benefit of the activity, additional value consultants will be added. This will provide more penetration in the three identified

areas, and besides, additional abilities will be secured. For example, with groups of four persons or more, an individual who has special abilities in teaching and communicating will be very valuable in that education is an important part of the work of value consultants and specialists...

"With four or more individuals assigned to the value work, it will be of definite advantage to have the managerial functions delegated to one of them. He, then, will be the one to:

Set objectives

Establish plans and programs

Provide for proper staffing of the group, augmented by provisions for continued development and growth in the individuals' competence

Motivate appropriate actions

Support each specialist in his work with other segments of the business

Administer work assignments, schedules, compensation, facilities, etc."

In manufacturing businesses--large or small--results of the magnitude of 25% of cost with no reduction in performance or customer features are practicable. Of course, organization and personnel appropriate to the size of business, as previously shown, are required.

In high quantity repetitive product businesses, the large multipliers bring handsome return for the better answers which are brought forth by the Value techniques. 25% reduction in cost is normally readily realizable.

In low quantity job shop work, contrary to first belief, the yield runs high. From 25% to 40% is a normal budget. There are several factors which cause this apparent paradox. Some of them are:

It has not been practical--due to low volume--to do intense creative cost prevention work on the elements and components of the product before now.

Changes can be made quicker.

It is easier to obtain approval.

Details have not been as carefully examined.

Greater variety provides great opportunity.

Problem areas are real opportunity areas.

In all other types of business, the common approach of starting with annual expenditure in dollars, whether it be for a communication, an engineering service, a maintenance service, personnel, or whatever--then identifying and studying the function which that expenditure brought to the user or customer, then the creation of alternatives, brings the same order of magnitude of improved costs as in the product type of business.

WHY IS IT POSSIBLE TO ACCOMPLISH THESE RESULTS?

Any product is the result of from dozens to thousands of decisions. Many of the decisions were made at different times by people of different backgrounds, competence and limitations, and made under a variety of different limiting conditions.

At least six common reasons for unnecessary cost are worthy of mention.

1. Lack of essential information at the time the decisions are made, usually lack of knowledge that the information exists.

   As an example, engineering and manufacturing did not know that for a modest sum in molds a brass arc chute could be so well made. Thus, it cost $6.80 each instead of $2.80.

2. Lack of specific idea that would make possible production of the item for much lower cost. The idea of forging a switch arm all in one piece instead of the traditional machined casting with brazed blade was not before the decision-making people, thus it continued to cost $3 each instead of 40¢.

3. Decisions based upon honest wrong beliefs which each responsible decision-making person progressively accumulates. Manufacturing and design people in the area so accustomed to fabricating from plate honestly believed that the functions supplied by a support flange would be most economically provided by using their standard equipment for flame cutting, welding, and machining plate, although in reality an entirely different process would provide the total functions for one-eighth of the cost.

4. Decisions originally forced by temporary circumstances continue "non-functioning" unnecessary costs—long periods after the temporary circumstances have ended.

   For example, a welded assembly securely and effectively fastens a cover. It cost $2.12. That was the correct way to do it with only the short time

involved. However, a three-piece assembly comprising two U-bolts and a spacing strap accomplish the total function for 42¢...about one-fifth of the cost. Too often, because we have done it once under pressure of time limitations and have perhaps built tooling and trained people, we do not objectively re-evaluate and end the extra costs which were made necessary by the temporary circumstances.

5. Decisions based upon habits of people involved in the area involved built into the drafting and methods system, built into the machines and tooling, built into supplier relationships, purchasing habits and others.

Perhaps I might relate an example of a quantity of one which, getting away from habits, reduced its cost to one-tenth. A few years ago we built a laboratory with an enormous x-ray equipment to detect hidden defects in large castings and forgings. Because the radiation would injure at several thousand feet, the drawing showed a horseshoe shaped mound of concrete outside of the building to protect adjacent areas. It was 7 ft. thick and 14 ft. high. Bids showed it would cost $50,000.

Then something happened that broke the habit pattern. The works manager in that area acts as a landlord, leasing out the area to the different businesses. He heard about this concrete and said, "I have leased you this land for a certain period of time but I want to make sure that if you put that concrete in and decide to move, you will take the concrete with you."

Concrete was the usual way to stop radiation but this upset the habit pattern; so they called in a man who happened to have had Value Analysis experience to work it out. He asked questions.

"What is the concrete for?"

They said, "To stop x-rays."

"What else will stop x-rays?"

"Lead," he was told but lead cost too much.

"What else?"

The value man suggested dirt.

"That would do the job if you had enough."

"How much would that take?"

They found a factor of two to one, so they used a pile of dirt 14 ft. thick instead of concrete 7 ft. thick...got out the drawings, erased the concrete, put on the dirt, and got the bids. Cost was $5000 instead of the originally planned $50,000 which habits put into the specification.

6. Normal attitudes which support the continuation of existing habits and the acceptance of roadblocks continue a pre-disposition to always react to a set of circumstances in a pre-determined manner.

For example, one of my engineer friends was designing a product such as a fuse that was only used once and thrown away. He was putting it together with rivets. The value specialist suggested that he use "glue" meaning of course the proper grade of adhesive such as that which is being used to assemble our highest speed jet planes in lieu of rivets. The engineer said, "I'll never put any of my products together with glue!" This sounded like an attitude. The value specialist knew the make of car he drove and said, "I've got news for you. Your brake bands are glued to the shoe." Whereupon my friend's rejoinder was, "You're crazy." A joint luncheon was arranged after which they went by the automobile company and got a replacement brake

band and sure enough it was "glued" to the shoe. The impact on my friend was quite shocking. I am facetiously told that he is still driving at the rate of fifteen miles per hour.

Certain beliefs become attitudes which control the actions and decisions of all of us.

Updating of decisions under different circumstances with better techniques and better information makes the difference of 25 to 40% in cost.

HOW ARE THE VALUE ANALYSIS TECHNIQUES USED?

Now we must get down to the serious business of learning to select and use a few of the special Value Analysis and Engineering techniques.

This process starts and proceeds as follows:

1. Identify the function or functions clearly. Precisely, exactly what is the desired or required function?

   Divide Into Functional Areas of Cost--

   How much does the main function cost?
   Electrical function?
   Mechanical function?
   Base?
   Support?
   Cover?
   Finish?
   Appearance (Is it designed "in" - not "tacked on")?
   What are Key Tolerances?
   Are we paying extra for something in design that's not desirable (such as shock)?
   Avoid duplication of function.

2. Evaluate the Function or Functions in Dollars.

   How is value determined? Unfortunately, there is nothing inherent about value. It is determined by comparison. The only way to determine whether a given part, a functional assembly, or complete design has true value is to compare it wisely to something else. To analyze value is to compare.

3. Cause alternatives to be developed by use of the Value Analysis Job Plan as a framework and the individual Value Analysis techniques as needed throughout the process.

4. The Job Plan

   <u>Information Phase</u>

   Secure all pertinent facts--actual samples of parts and assembly where practicable. Costs, quantities, vendors, drawings, specifications, planning cards and manufacturing methods information.

   Learn the basic engineering, with the engineer, ask questions, listen, develop with him a thorough understanding of the product.

Learn the basic manufacturing--observe manufacturing, ask questions, listen, study.

Decide the amount of effort that should reasonably be expended on each item of cost.

Speculative Phase

Generate every possible solution to the problem.

Consult others who may help you.

Systematically explore various materials, machine processes, rearrangement of parts, etc.

Encourage free use of the imagination.

Record every suggestion that seems remotely possible.

Establish two man teams for creation of additional ideas.

Analytical Phase

Estimate the dollar value of each idea.

Develop all ideas with emphasis placed in proportion to their value and probability of accomplishment.

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.

Set up a program to vigorously pursue ideas with most promise.

Program Planning Phase

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.

Select the top specialist in the company to consult on each.

Select from one to three of the best suppliers for each functional area of the product.

Program Execution Phase

Pointing out the top function desired--discuss the problems and solicit specific suggestions with both in-company and out-of-company specialists.

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.

Periodically support the work of the specialists by speculative or idea study and evaluation pertaining to the individual functional areas.

Stick to each promising suggestion. Thrash it out and reach definite tangible usable conclusion.

Status Summary and Conclusion

Issue a concise suggestion sheet covering each part which shows possibilities.

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.

Send copies to the man designated by the manager to receive and follow up, also to others who should receive them.

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.

Finish the job promptly and go on to the next.

5. One of the Value Analysis techniques which is used as needed is...

Get Away From Generalities - Get Down To Specifics

[1w]Forty thousand 1/4 x 3 inch screws were required. It was necessary that they be threaded all the way to the head. Standard screws contained only a 1 inch length of thread, but they were purchased and then put in a screw machine for extension of the threads to the head. The costs became 12¢. The arrangement satisfied all involved because (1) purchasing could buy available standard screws with no problems; (2) manufacturing had the equipment and welcomed the work which could be put on its machines; and (3) the

engineers obtained the screw they needed. As is so often the case, all considerations except those of value were properly cared for. The use of value analysis techniques showed that the function was not worth 12¢. Accepting no generalities as bases for decision, suppliers were asked for bids on supplying screws with the proper full-length thread initially. This resulted in a change to buying the screws ready to use for 2½¢ each. The purchase and modification of standard products may be a good-sounding generality that does not guarantee best value."

6. Another of the techniques is...[1]

"Blast, Create, Then Refine

"Blast. In this stage (keeping in mind the basic functions to be accomplished but not expecting necessarily to entirely accomplish them) alternative products, materials, processes, or ideas are generated. These alternatives should, first of all, qualify for accomplishing some important part of the function in a very economical manner or, at least, serve as an economical base for modifications that are likely to accomplish an important part of the function. At the same time, the precise amount of the function which would be accomplished and the specific cost which would result are brought into clear focus.

"Create. Using intense creativity, this step should serve to generate alternative means by which the concepts revealed by the blasting can be modified to accomplish a large part of the function with pertinent increases in cost. In this creative part of the technique, definite integers of increased function are associated with definite integers of increased cost.

"Refine. In this final step, the necessary created alternatives are added to the functions which would be accomplished by the blasted product. These

are further sifted and refined, adding additional integers of function with additional integers of cost, until the refined product fully accomplishes the total function. It is not uncommon for the resultant newly constructed product concept to accomplish the total functions with the same reliability and over-all benefits for a cost of one-half to one-tenth of the original."

For example,[1]

"The clamp bar shown in Figure 3.3 is made of steel, 1 x 1/2", with two 1/2" threaded holes. It is 2" long. Required quantity is 4000 per year. What is the function? Half concealed inside heavy equipment, this clamp bar performs a basic function which could be provided by two 1/2" nuts. It does, however, also provide the secondary convenience function of compensating for the fact that there is no space in which to insert a wrench to hold individual nuts during the tightening operation. Further, the clamp bar is desirable to keep individual nuts from becoming loosened during the use of the equipment. The over-all function, then, consists of a holding function, approximately equivalent to that which would be performed by two nuts, plus some type of secondary fastening function, such as could be provided by welding the two nuts together, welding them to a common piece of metal, or pressing them into some sort of holder which would keep them together.

"Blast. The basic function for which this part was designed, we find, could be accomplished by two nuts which cost 1½¢ each. Hence, the value of the basic function is 3¢. This represents a typical blast finding. We have an alternative which will provide an important segment of the function, though it will not accomplish the over-all function. To do that the two nuts must somehow be fastened together.

"Create. How to fasten the nuts together is the subject of the second step, and we arrive at these solutions.

1. Weld the two nuts side by side.
2. Weld the two nuts to a piece of wire.
3. Weld the two nuts to a piece of sheet metal.
4. Press the two nuts into two holes in a piece of sheet metal.

Approximate costs for the above alternatives are brought into view.

"Refine. Particular complications or problems to be solved in each case are now generally considered. While so investigating, we find that a vendor makes and sells weld nuts of the proper size. Further, we find that the factory has proper facilities for making a small stamping and for welding the two nuts into the stamping. The result of the blasting, creating, and refining is the double nut assembly shown in Figure 3-4. Its cost is 8¢, while the cost of the clamp bar had been 32¢. In other words, by applying the technique, an alternative is provided which reliably accomplishes the over-all function for one-fourth of the cost."

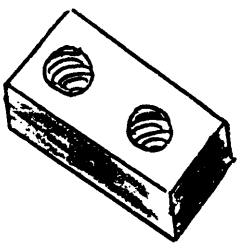


Figure 3-3.

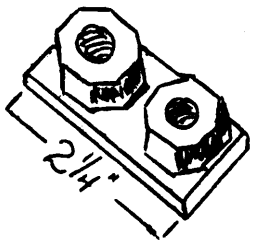


Figure 3-4.

7. A well-known but too-little used technique which must be effectively used to produce results of a high order of magnitude is...

   Use Real Creativity

   Since books are available in every land on it--only a description is here included.

The first requirement is an active and inquisitive mind. The second trait is a constructive discontent with the present state of the art. The inner drive to do something about one's ideas is the third trait. A broad background of information is necessary as a fourth trait if one is to have material with which to generate ideas. With the above traits--combined with an approach to a problem--any problem can be successfully attacked.

First, define the problem -- A problem well-defined, functions well-understood, is half-solved. Once the problem is defined, an open-minded search for a method must be made. At this stage, the concept of a two-sided mind is valuable. The creative mind is that portion that creates. The judicial mind evaluates ideas based on past experience and habit. A thorough search can only be made when the judicial mind is turned off. At least eight solutions for the problem must be collected by a review of power inputs available, laws and effects, new materials, etc.

8. Another technique is...

Don't Be A Hermit

All too frequently, we find that too many people try to do too many things themselves. As the old saying goes, "Two heads are better than one", and better value can always be obtained by calling in the specialist whether he be inside or outside the company. We must not try to do everything ourselves; we must not be hermits.

In order to avoid falling into the error of trying to generate complete solutions from within ourselves, we must stimulate our ideas and our growth by contact with others. It is well to remember these four rules.

1. Search out all industrial know-how.
2. Put vendor's engineers on your team.
3. Use specialty vendors' skills.
4. Use all sources of printed information.

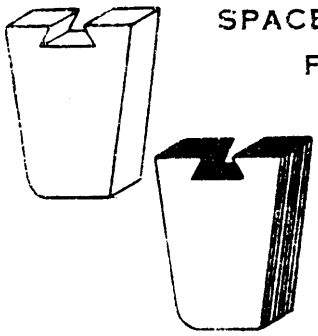
KEY VALUE ANALYSIS TECHNIQUES

SOME CLASSES OF EXAMPLES ON TYPICAL PARTS ARE:

OLD MATERIALS-NEW IDEAS

Same shape,

but new make-up!



SPACER FORMERLY MACHINED FROM ½" THICK ALUMINUM

NOW MADE OF STEEL PUNCHINGS.

Another yearly saving

of 24,600 lbs of aluminum

and $8,570.

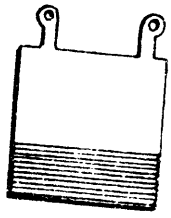
A TAPPED BUSHING ...

WITHOUT DRILLING! WITHOUT TAPPING!

ONE OF OUR SPECIALIST STAMPING SUPPLIERS...

FIRST

- BLANKS
- PUNCHES
- COINS



THEN

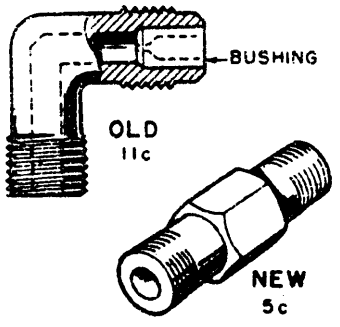
- ROLLS

CUT AWAY SHOWING COINED THREADS

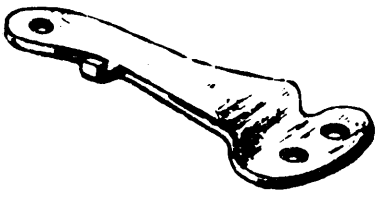
THE RESULT IS A FUNCTIONAL PART AT A FRACTION OF FORMER COST

SUPPLIERS HELP IN SOLVING PROBLEMS

SHORT RUN STAMPING



Conferences with suppliers often turn up helpful suggestions for greater value. For example, fitting originally was an elbow, made of 2 pieces at a cost of 11¢. First attempt was to make the part in one piece, but cost then went to 12¢. Next, value analyst and supplier set 5¢ as their bogey and found that only way to meet bogey was to make part straight. Investigation showed that bend readily could be made in part, to which fitting is connected.



TOOLS ONLY $35.00

1/2 SIZE

PARTS-FIRST 100 $5.00

If You

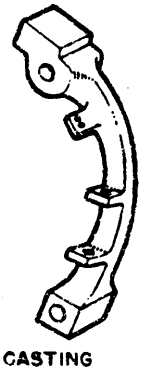
BUILD DEVELOPEMENT SAMPLES
MANUFACTURE IN SMALL QUANTITIES
USE SAMPLES FOR FIELD TRIALS
NEED STAMPINGS ON SHORT NOTICE

Investigate

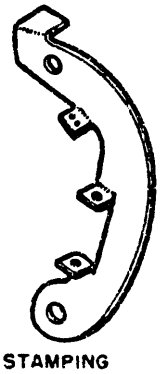
SPECIALIST SUPPLIERS
OF SHORT RUN STAMPINGS

SPECIAL SUPPLIERS ENABLE LOW COSTS ON SMALL LOTS

High tool charges often prevent the application of low-cost manufacturing methods to small-lot, low-quantity production. Yet, there are suppliers with special equipment that enables them to do this class of work with low charges for tooling. Parts below illustrate what can be done through specialty stamping shops.



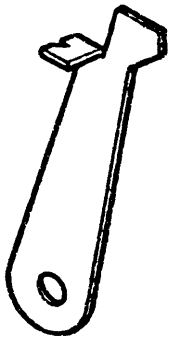
CASTING



STAMPING

As casting, part required considerable machining and cost $1.76. Part, as stamping, costs 25¢. Tool charge was $100

2-PIECE ASSEMBLY



STAMPING

Made as 2-piece assembly, pawl cost $1. Changed to stamping, cost is now 8¢. Tool charge at specialty shop was $50

NEWER MATERIALS

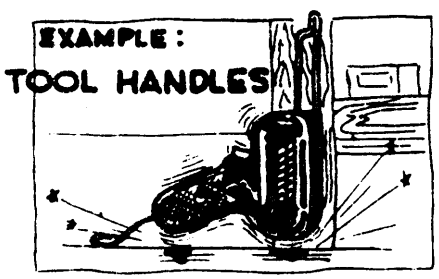
CHEMICAL DEPARTMENT

NOW MIXES RUBBER & PHENOLIC PLASTIC.

THE RESULT IS "**RUBBER PHENOLIC**"

FIVE TIMES GREATER SHOCK-RESISTANT

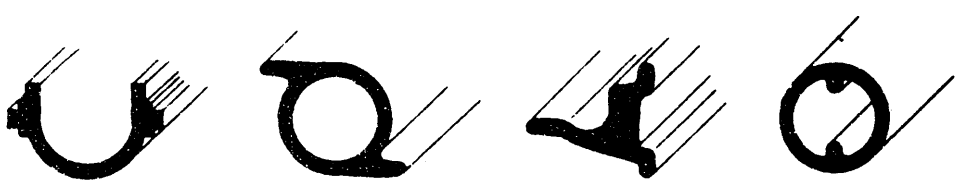
PROVIDES LOWER COST & BETTER PRODUCTS



CARBON STEEL EXTRUSIONS NOW AVAILABLE

HUNDREDS OF FORMS IN PRODUCTION IN FRANCE.

TYPICAL PROFILES:



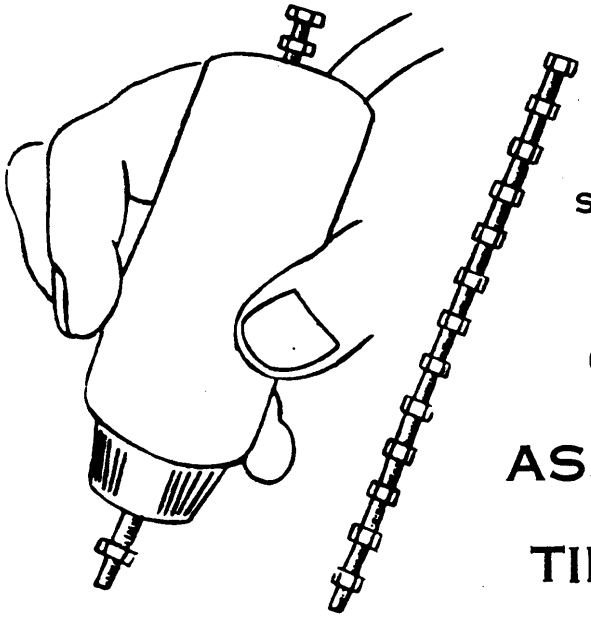
A NEW ENGINEERING TECHNIQUE

SIMPLIFIES MANY DESIGN PROBLEMS.

COST: ABOUT 27C/LB DELIVERED IN U.S.A.

NEWER PRODUCTS

SCREWSTICKS



FOR SMALL INCREASE IN SCREW COST

CUT ASSEMBLY TIME 50%

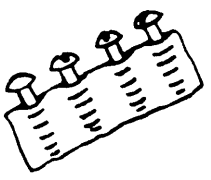
DIA. NOS 0,1,2,3,4,5-¼" MAX. LGTH.

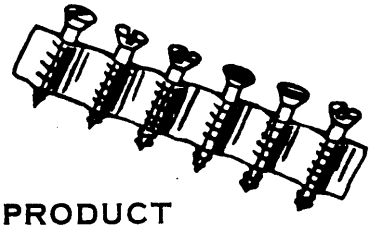
STEEL, BRASS, ALUMINUM

CLASS 3 FIT-REG., SELF TAPPING

SHIP

TAPED SCREWS





WITH YOUR PRODUCT

INSTEAD OF PACKAGED SCREWS

SAVE
- HANDLING COSTS
- TIME

ELIMINATE
- PACKAGING
- COUNTING
- WASTE

AVERAGE COST 35% ABOVE BULK COST

AVAILABLE IN ANY QUANTITY, SIZE, TYPE

SEE YOUR BUYER

A Value Analysis Approach

This, then, is Value Analysis...first, clearly determining the functions required; secondly creatively and effectively searching for the best combinations of ideas, processes, specialty materials and specialty suppliers who can, at lowest cost, reliably accomplish these functions; then setting forth these alternates for decision-making people.

HOW DOES VALUE ANALYSIS APPLY IN PURCHASING?

The Purchasing task is securing the best combination of price, quality, and service. The use of Value Analysis in no case lowers quality. It secures either the same or better quality at lower cost.

As the original Value Analysis program was incubated by a research program in purchasing, the aims were broad and far-reaching—to increase the knowledge of basic value; to determine how nearly each individual part, component, and material in the company's new products contains basic value; to establish methods for analyzing and measuring value; and to provide the necessary action to assure value on a company-wide scale.

Value Analysis became an intense detailed study by Engineering, Manufacturing, and Purchasing—in fact, by everyone having an influence on costs—to determine what different materials, changes of specifications, alternative fabricating processes, and design modifications would reduce costs; then, to bring these possibilities, each associated with the dollar sign, before the proper person for action.

It is not a substitution for any of the effective organizations and committees for cost reduction. It is an added tool to assist these organizations in engineering, manufacturing, cost, and purchasing, to secure even more plus values.

How does Value Analysis work?

It has been found that basic deficiency in value is best discovered by starting with a complete cost breakdown of the part under consideration. Each separate element of cost is then readily evaluated in relation to its functions. Frequently, any disproportionate cost will "stand out" and indicate the direction which further study and analysis should take. In any event, it is the job of the Value Analyst to isolate specific, definable problems in each project, to crystallize such problems and bring new information to bear upon them.

Now, what can we in Purchasing do?

1 - We can evaluate.

Evaluation cannot be done by studying a part or a product or a service. Evaluation means comparison. Only by understanding the function or the service and comparing to it each other means for securing the same function or service can anything be evaluated. Often it will be found by this technique that a material or a product isn't worth more than one-fifth of what it costs because there is something else that will do the same job equally as well for one-fifth the cost.

For example, a circuit breaker was evaluated. Its cost was $13. What did it do? It contained two circuits each interrupting 15 amperes at 110 volts.

How else can it be done?

"For one way, by using two modern individually designed circuit breakers for $1.50 each costing $3 for the same basic function. Obviously the $13 circuit breaker is no longer worth $13 or $12 or $10 or $8 because something else will do the same job equally well for $3 or $4."

Of course, when evaluating, a buyer will make it his topmost job to protect suppliers who creatively work with him to help him secure better value by the use of their genius and their efforts.

2 - We can buy function.

Too often we, in buying, feel that 10% to 15% off makes a good buy. Not so! By Value Analysis, which means studying the function, studying other means of securing that function, we find that 50% to 75% of the cost can often be removed and even with improvement in quality.

"Small pieces of copper tubing were being cut off, burred, and used in the factory. They cost 4¢. The buyer showed that specialty suppliers with specialized facilities could provide the same pieces of copper tubing for 1¢."

"Again, a small tapped bracket cost $13/M, but there are specialists who have built entire businesses around automatic tapping even in moderate quantities—so that no intermediate hand operators are necessary with their special equipment... Their quotation--$3 as compared with $13."

"A buyer was buying gasket material for 15¢ a square foot. He went into the factory to see how it is used. He found they were cutting out gaskets approximately 1 ft square and the finished gasket with all layout and cutting cost $4.15. He knew that gasket cutting with steel rule dies was an extreme specialty industry. Soon he was providing the gasket to the identical specification for 15¢ each with no tool cost in minimum orders of $10."

"We received this imposing looking box. We pulled out handful after handful of excelsior, finally four corrugated squares and then found the contents—four small steel stampings about the size of pencil erasers. Shipped from a <u>regular</u> shipping section on a <u>regular</u> order, this told a dangerous story—the story of 'Routine Execution' without thought of Value."

"In another instance, a Value Analysis survey of all of the costs of the product resulted among other things in the development of a package costing 20¢ instead of 34¢. Still, an order came through for 9000 more of the 34¢ packages (<u>$1200 extra cost</u>!) Ordering personnel said, 'Yes, I knew the new one was approved but it takes a while for all of the approvals to clear and I thought we would use this lot, then change on the next.'--$1200 cash brushed aside! Again routine execution without thought of Value.

Value in packaging, as in materials and parts, is determined by the rule of function. What does the material do? What does it add? What useful service does it perform? How does it function?

Every element of material)
0
Every nail)
0 ...adds cost!
Every operation)
0
Every bend or cut)

Does every one of these elements actually function?

[2]Better Value Through Better Suppliers

"Comments:

The best supplier may be the 'smallest or the largest', the 'nearest or the farthest'. He has an alert organization solving his own problems, lives up to his commitments to us and is always pointing out to us the way toward more function per dollar. He delivers the material or services ordered at the agreed time, of the agreed quality, in the agreed manner and at the agreed cost. He will be very competitive because of his good management, proper equipment and effective organization.

1. How do we select suppliers?

   (a) Do they seek us or do we seek them? Do they sell us their products or do we sell them our needs?

   (b) Should we modify our system somewhat by aggressively searching out the proper suppliers?

2. Are our suppliers definitely interested in the job?

   (a) Do they know enough about the job so that they can be interested and enthusiastic about taking part in the program?

3. How effectively do we reach out and secure other products, processes and services for evaluation in lieu of those which we have been using?

[2]"Cutting Costs By Analyzing Values", National Association of Purchasing Agents, New York, 1952.

4. How effectively do we transmit to the suppliers the functional requirements of special parts and special products and solicit and get their suggestions for simpler lower-cost products to perform the same function?

   (a) In our business, what is the best way to do this?

   (b) Have we assisted our suppliers by following through on their suggestions which may often bring an equally functional product at lower cost?

5. How effectively do we use all of the available industry guide books?

6. How constantly and effectively do we call upon other Purchasing Agents who have specialized knowledge of suppliers and products that will improve value in our plant?

7. How effectively do we call upon management of other businesses to point the way for us toward better suppliers for specific items and better items for specific needs?

8. How carefully have we studied our vendor's facilities to make sure that he is best equipped to dependably provide the items we buy from him?

9. What suppliers have we selected who are leaders in ingenuity and ability along lines of our needs?

   (a) Are we giving them enough opportunity to assist us?

   (b) Are all of them who are highly specialized to our needs being used?"

Correct Human Relations Climate

Purchasing Value Analysts must look a little into engineering, a little into manufacturing methods, and a lot into the Purchasing area. In so doing, however, they always work through the engineers, the manufacturing methods men, and the buyers, never around them, thereby strengthening each man in his own field.

Good Value Analysis activity establishes the attitude of the Value Analyst and the human climate in which he works. In our complex competitive society, no one individual is "good enough" to do any job as well as it need be done. Be his field the design of mechanical equipment, the compounding of chemicals, the

adaptation of the best processes or the searching out of the best vendors, he cannot possibly be well enough informed to do the perfect job. Each can always do better by searching for, reaching for, and using help.

This attitude brought a managing engineer whose group had just completed a redesign of a very successful and widely used product to the Value Analysis Specialist saying, "Our new design is more efficient, requires less space, and costs less than the present, but we know that ten years from now we will look at it and say - 'How could we have been so blind? Why didn't we do some things differently?' Look it over and tell us some of those things now!" Actually, after Value Analysis, one major component was further improved and its cost reduced 20% as the result.

A product engineer used small springs costing $10,000/year. The product, the drawings and the story of function were provided to a spring company's chief engineer. "For that function, what do you say that we should use?" He made five suggestions varying in cost from $2000 to $10,000 per year. He supplied samples of each grade and a page of test data on each. The engineer glanced it over and said, "My Gosh! Why can't we have this kind of information for all of our decisions?"

Proper human relations every day accomplish far more in the long pull.

Having taught Value Analysis techniques and having achieved objective constructive attitudes, it remains to provide specialists and buyers alike with the information which they need to meet their opportunities. This is done in several ways.

1. Specialty companies who can provide specific parts or services or materials and who are good enough to actually excel in their own narrowly restricted fields are constantly searched out and this information is made available to all.

2. Specialists in the various laboratories, engineering departments, manufacturing departments and purchasing departments throughout the company who have achieved a position of leadership through unusual knowledge and experience in a specific area are brought into contact with Value Analysis people.
3. Purchasing agents and buyers throughout the company are taught to call upon other buyers and purchasing agents in the industry, for specific information concerning suppliers who excel in their respective fields.

A manufacturing unit constantly used and specified a liquid cement hardener. It cost several dollars per gallon. The Value Analyst pressed a broad study of the material. He made its function known to supplier specialists and to other buyers and purchasing agents. He found that it was compounded of a few common simple ingredients. Its cost became 25¢ per gallon, the same performance for 1/10 of the cost!

Start with value analysis trained buyers.

The buyer must determine the minimum cost at which the function of a desired material or service can be secured. To do this, he must first know the desired function and then search out, learn and study every alternate method for achieving it; that is - the cost, the advantages and the disadvantages of each method. The Purchasing man carrying the initiative and working with those who are informed and those who are responsible makes an intense study endeavoring to promote lower cost by weighing the function obtained for every expenditure on the scale of functional performance.

He studies similar products or services or materials. He studies the use to which each feature of these items is put and he determines whether functional performance can be purchased at lower cost by eliminating, substituting, simplifying

or grouping. He studies the special functions which may be obtained from the special skill, knowledge and techniques of Specialized Suppliers. Using this broad approach, he can more nearly assure value on each specific item.

Value Analysis is so broad and its opportunities so nearly limitless that one purchasing agent calls it "revolutionary". This purchasing agent claims that, because of value analysis, 1957 style purchasing will be as "obsolete as the buggy whip" by 1967.

His definition of value analysis is: Value Analysis is the study of the relationship of design, function, and cost of any product, material or service with the object of reducing its cost through modification of design or material specifications, manufacture by more efficient processes, change in source of supply (external or internal), or possible elimination or incorporation into a related item.

The word "purchasing" isn't included, probably because value analysis is not exclusively a purchasing function in the same sense that buying is. Value analysis can and should be performed on all items whether purchased or made in the shop.

This broader concept of value analysis is now being put into practice in several companies. It is helping to change the basic nature of the purchasing function. Traditionally, purchasing has been regarded as the focal point of all relations with outside suppliers. The new approach is to regard purchasing as a central watchdog on all materials costs.

What value analysis should do for you and your company:

1 - Reduce the cost of both purchased and manufactured parts and materials.

2 - Stimulate product improvement.

3 - Give purchasing an opportunity to increase its effectiveness--and thereby to earn greater support of management.

To achieve success, you should know how to:

1 - Learn and use the right value analysis techniques.

2 - Persuade management to support a value analysis program.

3 - Break down internal resistance to value analysis.

4 - Select a competent value analyst.

5 - Organize for value analysis.

6 - Make use of supplier know-how in furthering your value program.

7 - Select a few specific products or services or processes for a start.

8 - Approach them on the basis that you are not buying the product or service or process per-se but that you are buying the functions which they perform.

9 - Use the value analysis approaches to determine the lowest cost of reliably accomplishing these functions.

10 - And Good Fortune to you!

WHAT QUALIFICATIONS AND CHARACTERISTICS CAUSE GOOD VALUE ANALYSIS WORK?

[1]"The necessary traits, characteristics, and experience, as spelled out and defined below, constitute essential qualifications for men engaged in value work.

"Knowledge. A practical understanding of the properties of materials and their uses and of manufacturing processes, their potentialities, and their limitations is needed.

"Imagination. A good practical creative imagination commonly includes ability to retain extensive amounts of information concerning ideas for approaches and solutions to product problems, types of materials, properties of materials, processes, costs, and so forth, all arranged in a suitable order so that differing combinations may be creatively brought together and examined for applicability to problems at hand.

"High Degree of Initiative. In value work, there are no definite beginning and ending points, and specific instructions on how and where to proceed are usually nonexistent. Further, this type of work is not well-enough comprehended by general management for a rate at which it should be accomplished to be spelled out. For these reasons, it is essential that men in value work have a high degree of initiative, which must include what might be called self-drive, so that work activities will be started and carried through to completion with little if any supervision.

"Self-organization. Initiative and drive are not enough; work must be effectively organized. Because of the lack of precedent and the lack of knowledge of organization for value work, conventional management supervision provides no experience for effectively instituting and executing the work. Therefore, the individual doing the work requires the ability to organize his activity effectively, as well as enough initiative to carry it out.

[1]Miles, Chapter 9.

"Personality. The work requires a mature, stable personality which is not easily discouraged. The entire field of activity in value work comes within the area of change. The amount of opposition to change usually prevailing cannot be conceived by anyone who has not attempted to operate in this area. The individual doing value work will be confronted with negative attitudes and delays of all sorts, with belittlement, and even with ridicule. The basic nature of anything new and the inherent attitude of the people with whom he will be dealing decree this. As Charles Kettering said, 'The consensus of any group of people concerning something new in their field is always wrong'. Or, as Thomas Edison said in 1926, 'It requires about seven years for the average individual to accept a new proven solution to a problem'. Because of this very exhausting aspect of value work, it is strongly recommended that it be performed by two or more persons working together. Each can then have an emotional environment of support, at least part of the time, which helps him feel that his work is a satisfactory and worthwhile endeavor.

"Cooperative Attitude. A desire to work with others and a general knowledge of how to do it are other requirements, since the work is largely an endeavor based on working with others. It begins with acquiring an understanding of the job and proceeds by developing information which is often not available in ready form but which must be obtained if good value alternatives are to be produced. Knowledge concerning desired functions and methods for accomplishing them must be collected. Significant information must be communicated to competent commercial and technical people, and their wholehearted support (often with quotations) must be enlisted in expanding the area of knowledge in the direction of their skills through the preparation of value alternatives. In many instances, the work includes the difficult assignment of getting information without giving offense.

"Experience. All indications to date suggest that some five years of industrial experience in engineering, in manufacturing, or in special procurement dealing with particular specifications, opportunities, arrangements, and negotiations between buyer and seller (or equivalent experience) is essential. It seems also that actual experience in working with the normal situations that affect the development of value alternatives is required. These situations involve decisions between varying ways of accomplishing a function, between varying sources of supply, between differing systems of make versus buy, etc. Without experience along this line, there is a lack of background for efficient and effective search of possible combinations and for presentation of new and good value alternatives.

"Belief in the Importance of Value. Starting with certain native inclinations and modified by childhood and business experience, any person develops interest in certain lines and disinterest in others. In essentially all cases, human beings are interested in food, although in some cases of unusually unfortunate environments, even loss of interest in food is developed by people. Some individuals are interested in flying, while others vow that they will resist it to the death. Similarly, some people develop an interest in providing new products through the development of new functions which their ingenuity can translate into a practical product. Other individuals develop an interest in making products more economical so that distribution may be widened with resultant benefits, not only to the company involved in selling the products, but to mankind in general, through more universal use. At the present stage of experience with value work, it appears that there exist marked degrees of difference in the beliefs of various individuals in the importance of low cost--or its equivalent, high value--in the general sense.

Experience has shown that men who have strong belief in the importance of value are much more likely to be sufficiently motivated to develop the initiative, self-drive, and enthusiasm necessary to accomplish their work well. Such strong belief also seems to be an important factor in creating emotional stability in this very frustrating type of work. Hence the conclusion that 'belief in the importance of value' is a significant trait."