value engineering and analysis
VALUE ANALYSIS

What is it?
How Does It Work?
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>What is Value Analysis?</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>What is the Function of Value Analysis?</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Tests for Value</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>How is Value Analyzed?</td>
<td>2</td>
</tr>
<tr>
<td>5.</td>
<td>What are the qualifications for a Value Analyst Engineer?</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>To Effectively Start a Project, What Does the Value Analyst Require?</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>Specifically How Does the Value Analyst Proceed with a Project?</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>What Does the Value Analysis Engineer Attempt to do?</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>A. Eliminate the Part</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>B. Simplify it</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>C. Alter it so that a high speed method can be used</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>D. Alter--so that standard parts or materials may be used</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>E. Determine where the design might reasonably be altered for automatic assembly</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>F. Use a lower cost material</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>G. Use lower cost processes</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>H. Use a higher cost material, which, by its nature and properties will afford a simplified design and facilitate lower cost assembly</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>I. Miscellaneous Lower Costs</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>J. Check it against other methods of fabrication</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>K. Check it against unique, less well-known methods of fabrication</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>L. Check unusual but available forms of raw materials for use on the job</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>M. Survey the purchasing with the buyer</td>
<td>11</td>
</tr>
<tr>
<td>9.</td>
<td>What does the Value Analyst do with the Information Developed?</td>
<td>12</td>
</tr>
<tr>
<td>10.</td>
<td>What Safeguards are taken to prevent projects stopping prematurely before results are accomplished?</td>
<td>13</td>
</tr>
</tbody>
</table>
PREFACE

It is the job of Value Analysis to help members of all functions—manufacturing methods, engineering, purchasing, and others—to "grow" better habits, attitudes, and value-abilities sufficient to eliminate an additional 25 per cent of cost from products without in the slightest diminishing quality.

To accomplish this, we need...

..."Better Attitudes and Habits"
..."Better Information"
..."Better Techniques"
..."Value Specialists As Needed"

WHAT IS VALUE ANALYSIS?

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

Nor is it a substitute for the effective cost reduction committees which daily are increasing our Value.

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

Value Analysis must bring new information into the project from new areas within the company and from specialist suppliers outside of the 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 the company, and to a large degree outside, are assigned specific functional areas. Their engineering is put to work on our job instead of our competitor's. Their suggestions are provided with a dollar sign for our evaluation.
WHAT IS THE FUNCTION OF 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.

TESTS FOR VALUE

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?

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 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 simply defined as...
...something that makes the product work better...
...or sell better.
WHAT ARE THE QUALIFICATIONS FOR A VALUE ANALYST ENGINEER?

We have learned the qualifications for men to successfully accomplish this type of work. They are:

1. Engineering or methods and planning experience supported by a general understanding of the properties of materials and their uses.
2. A good creative imagination.
3. Enough initiative, self-organization, and self-drive to start and complete their projects with little if any supervision.
4. A feeling of the importance of value.
5. A mature personality, stable, not easily discouraged.
6. The desire to work and deal with others and the general knowledge of how to do it.
TO EFFECTIVELY START A PROJECT, WHAT DOES THE VALUE ANALYST REQUIRE?

1. Annual production and ordering quantities.

2. Six copies of all drawings including:
   a. Each part showing the material
   b. Assembly drawings
   c. Wiring diagrams, if any
   d. Test and Adjusting specifications
   e. Other supplementary specifications and data if necessary to completely define the product.

3. Breakdown showing detailed shop cost build-up including:
   a. Material
   b. Labor
   c. I.M.E.
   d. If other than basic raw material is used--the name of the vendor and the price.
   e. A memorandum concerning special labor accounting--whether adjusted or unadjusted, variances, etc.

4. A breakdown of assembly and sub-assembly shop costs.

5. Copy of planning cards or general description of the type of process.

6. Actual samples of the individual parts and the assembly using the parts, where practicable.
SPECIFICALLY HOW DOES THE VALUE ANALYST PROCEED WITH A PROJECT?

VALUE ANALYSIS JOB PLAN

1. Information Phase
   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 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. Pointing 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. 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.
WHAT DOES THE VALUE ANALYSIS ENGINEER ATTEMPT TO DO?

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 square 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 parts 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.


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. Forty cent brass may replace 65 cent 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 per cent.
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.
4. Design parts for barrel plating rather than hooking in still tank.
5. Use Multi-slide machines to eliminate secondary operation.
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.
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 per cent 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.
5. Electro-forming.
7. Fabrication from copper or brass tubing.
L. Check unusual but available forms of raw materials for use on the job.

For example Steel

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

Or Miscellaneous

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

M. Survey the purchasing with the buyer.

1. Are the available highly specialized low cost suppliers being used?
2. Have the suppliers' engineers been given sufficient facts and pressed for suggestions which would produce equivalent performance at lower cost?
3. Has the buyer taken advantage of the know how of other purchasing units using larger quantities of similar materials?
4. Should some minor changes suggested by the supplier which afford lower cost material, be considered further?
5. Has the buyer found the basic source, the manufacturer who may be in a position to extend minimum prices?
6. Are parts obtained in best economical lot sizes?
WHAT DOES THE VALUE ANALYST DO WITH THE INFORMATION DEVELOPED?

(See Item 6 of the Value Analysis Job Plan)

Quality of Value improvement is determined by...

1. How frequently and effectively are good practical tangible specific ideas generated.

2. How effectively is action secured.

The first is a Value Analysis Specialist job...

The second is a management job.

A manager, who is responsible in both engineering and manufacturing areas, appoints a man, sometimes in engineering, sometimes in manufacturing, sometimes in finance, to receive the Value Analysis suggestion sheets and see that each receives the attention that it deserves.

The Analyst at once starts the next job.
WHAT SAFEGUARDS ARE TAKEN TO PREVENT PROJECT STOPPING PREMATURELY BEFORE RESULTS ARE ACCOMPLISHED?

The necessary safeguard is the basic philosophy that "There is a lower cost way to get equivalent quality--only as yet it has not been thought of."

It is important not to waste time going around in mental circles. If progress towards lower costs seems stalled, some of the following or similar actions must be taken.

1. Select a well-qualified vendor--put the problem up to him and press him to produce. Get new information and a new idea from him.

2. Break the problem down into two or three specific but smaller problems and assign each to a qualified specialized vendor for solution.

3. Talk it over with the project engineer again. Jointly agree that a hypothetical 20 per cent of the cost must be removed and study with him how to start.

4. Determine how similar jobs are being done in other branches of the Company.

5. Determine how competitors are doing it.

6. Counsel another buyer who may have a similar problem.

7. Find in the Company a proponent of the idea and foster it through him.

8. Talk about it to a man in one of the laboratories--tell him the problem--get some ideas from him.

9. Discuss it with the Standards Department. Frequently they have assisting information.

10. Talk it over with a man in the Manufacturing Services Division.

11. Mentally review all of the new processes and products reviewed in trade magazines for their applicability.

12. Make a quick list of a dozen or a hundred suggestions no matter how impractical some of them seem--then study the list.

13. As the part is studied--imagine that you are forbidden to use it. How then would the job be done?
14. If it is big enough, talk it over with the boss. He will probably have some good ideas.

15. Don't accept first effort—challenge further endeavor. Value Analysis pays off after the first answer is "no".
One of the Value Analysis Techniques is an Organized Approach - A Job Plan. If outstanding results in getting better value are to be achieved, if 20 - 50 and even 75% of the costs are to be taken out of a product, we must have a systematic plan of attack, an organized approach. Today we find these organized approaches being established in all areas of endeavor. It is recognized that we need a planned program that has been tested and proven to work. Just as the best houses are built to a carefully thought out plan, so the best value is found by a systematic plan of attack.

The Value Analysis Job Plan consists of six steps. They are:

1. Information Phase
2. Speculation Phase
3. Analytical Phase
4. Program Planning Phase
5. Program Execution Phase
6. Summary & Conclusion

All of the techniques previously mentioned are integrated and used in the carrying out of this plan. Let's see how it works.

1. Information Phase

Every program in which a decision must be reached puts in first place a fact finding stage. Many times 3/4 of any job is securing all the information, all the facts you need to study the project.

Here in this phase we must

1. Clearly define the problem.
2. Establish the function to be performed - What the part or assembly has to do.
3. Get all the facts.

This involves

1. Contacting the engineer to obtain the specifications, to find out the basic engineering, what has been tried, what has been considered.
2. Contacting the manufacturing and/or planning man to determine how the part is made.
3. Going to the cost section for detailed costs.
4. To the purchasing section to learn what vendors are involved, or were considered.

Every effort must be made to find the real fundamentals of the problem and reduce it to its simplest terms.

Here we use techniques of

1. Getting all the facts.
2. Getting information from the right sources.
3. Working on specifics.
4. Use good human relations.
5. And of course we are going to encounter many roadblocks in the fact finding stage, so we must learn how to overcome them and still accumulate the sound basic facts we need. You shouldn't let roadblocks influence your thinking in this or any succeeding phase of the Job Plan. It's very easy to get panicky, discouraged and even give up the project at this point in the game, especially if you only have part of the facts; but as you progress and use Value Analysis Techniques and get all the facts, you will find a solution. We have never had a case where the cost could not be reduced, and with no sacrifice in the necessary quality.

After the Fact Finding Phase comes

2. The Speculative Phase

Here's where we put to use our creative ability, the creative approach. Once the problem is defined and we have all the facts, we are ready to find a way to do it. We try to answer the question "What else will do the job?"

Make use of the brainstorm, - No - negative - thought session.

Draw on ideas from other people.

Come up with as many ways of doing the job as you can. The more ideas, the better the chance that one or more will be the answer to the problem.

The techniques

1. Creative approach.
2. Use Specialty products and materials
3. Use Specialty processes
4. Use Standards
5. Blast, then refine

are used here.
3. Next is the Analytical Phase

After all the ideas are written down it is time to analyze and pass judgment on them.

One of the first steps in this analysis is to estimate the dollar value of the ideas. This will show you which ideas are the most worthwhile developing.

It's important to remember here that we're not trying to eliminate ideas, but we are trying to analyze to see how they can be made to work. A positive approach must be used.

Recently in a department where a creative session was held only six ideas were developed. This is a small number and a lot of judicial thinking must have been used. Then they looked at the six ideas. A review eliminated all but one of them. When this was done, they said "Now we'll call in the engineer to tell us what's wrong with this remaining idea." Obviously, this is a poor approach.

Ideas which will perform the function must be developed regardless of specifications, interchangeability, etc. Many times good ideas come from trying to develop others, which obviously wouldn't work. Usually if the potential savings is great enough, the specifications may be changed to permit adoption of the method.

Here we can use the techniques of

1. Evaluate by comparison
2. Evaluate the function
3. Know shop costs
4. Put $ on each idea
5. Put $ on tolerances

After you have analyzed and developed the best ideas, you will want to work on those that show the most promise. Here we come to the

4. Program Planning Phase

This is where you take the best ideas and plan a program to attain the information you need to develop these ideas into sound usable suggestions. You may feel here that you don't have enough knowledge to work on the ideas yourself. This is a natural feeling, since we never can know everything we need to know.

What must be done then is to recognize the problem and search for the person who can help you. There are many experts in your company, and the services of every specialist in industry is available at your call.
In drawing in help from outside the company in the form of vendors or specialists, don't just hand them a drawing and specification and say "what can you do with this?" Instead plan a program to inform him of the function you want, draw out his ideas on the problem, give him some latitude to work in, and you can really benefit from his new knowledge.

Here we put to work such techniques as

1. Use Company specialists
2. Use Company services
3. Get the facts
4. Get information from best sources

and of course we will encounter roadblocks to be overcome, and we must employ good

Human Relations

The program should be planned in the Manufacturing and Engineering area so that the most effective use is made of the time they devote to you.

5. The Program Execution Phase

is a natural continuation of the Program Planning Phase. Now we see that certain ideas are really beginning to develop and have a future. They should be reviewed with the thought "Is it really the best idea?" "With this new information could a better job be done?" Now is the time to "use your own judgement."

The planned program should be followed up in this phase. Actual work with vendors, specialists, engineers, and manufacturing people should be carried out. All the facts, ideas, plans, etc. are gathered to lead to the last phase.

6. Summary and Conclusion

Here's the last and one of the most important steps in the Job Plan. It consists of buttoning up the project, doing something with the facts you have, taking action on the results of your study.

To the Value Analyst this may take the form of a suggestion for adoption by the responsible people. To line people it will mean the implementation or adoption of the new design or method.
To sum it up, use the six steps of the Job Plan: the Information, Speculation, Analytical, Program Planning, Program Execution, Summary and Conclusion phases. It's a positive program which everyone can use to help them in their work.
TWENTY TECHNIQUES

1. Creative Thinking
2. The Value Analysis Job Plan
3. Overcome Roadblocks
4. Use Specialty Products and Materials
5. Bring New Information
6. Use Specialty Processes
7. Use Shop Cost
8. Evaluate the Function
9. Evaluate By Comparison
10. Get All Your Information from the Best Sources
11. Use Better Human Relations
12. Get All the Facts
13. Blast - Then Refine
14. Get a Dollar Sign On the Key Tolerance
15. Put a Dollar Sign On the Main Idea
16. Use Your Own Judgment
17. Spend the Company's Money As You Would Your Own
18. Use the Company's Services
19. Work On Specifics - Not Generalities
20. Use Standards
Does its use contribute value?

Is its cost proportionate to its usefulness?

Does it need all of its features?

Is there anything better for the intended use?

Is anyone buying it for less?

Can a usable part be made by a lower cost method?

Will another dependable supplier provide it for less?

Do material, reasonable labor, overhead and profit total its cost?

Is it made on proper tooling—considering quantities used?

Can a standard product be found which will be usable?

Courtesy of Value Engineering Services
RAYTHEON COMPANY