THE POWER AND FLEXIBILITY OF VALUE ENGINEERING

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ABSTRACT

In today's rapidly changing world, new design and manufacturing techniques are coming on the scene. We can choose to ignore them, view them as competition, or explore their techniques applying those that compliment our studies. The obverse is also true as some of these techniques borrow from Value Analysis (VA). This paper offers some insight and suggests a few combinations that compliment each other.

I started in Value Engineering (VE) some 25 years ago and the technique has provided me with employment, educated my children, offered me the stimulating experience of solving cost problems, as well as giving me the opportunity to pass on what I have learned to others.

During this time the World has not stood still, and the manufacturers, Government Agencies and contractors that use our technique have been inundated with newer buzz words that distract our users and in some cases lure them away to other disciplines that seem to offer them a more modern approach.

I am sure you are familiar with many of these programs.

DESIGN FOR ASSEMBLY
CONCURRENT ENGINEERING
TOTAL QUALITY
FAILURE MODE EFFECTS ANALYSIS
EXPERT SYSTEMS

PULL MANUFACTURING
ACTIVITY BASED COSTING
RATIONAL DESIGN PRACTICES
to mention only a few.

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Many of these programs are software driven and thus appeal to most engineers. Some of these programs compliment and enhance VA while others borrow techniques from VA to expand their scope.

Let's take a look:

TOTAL QUALITY

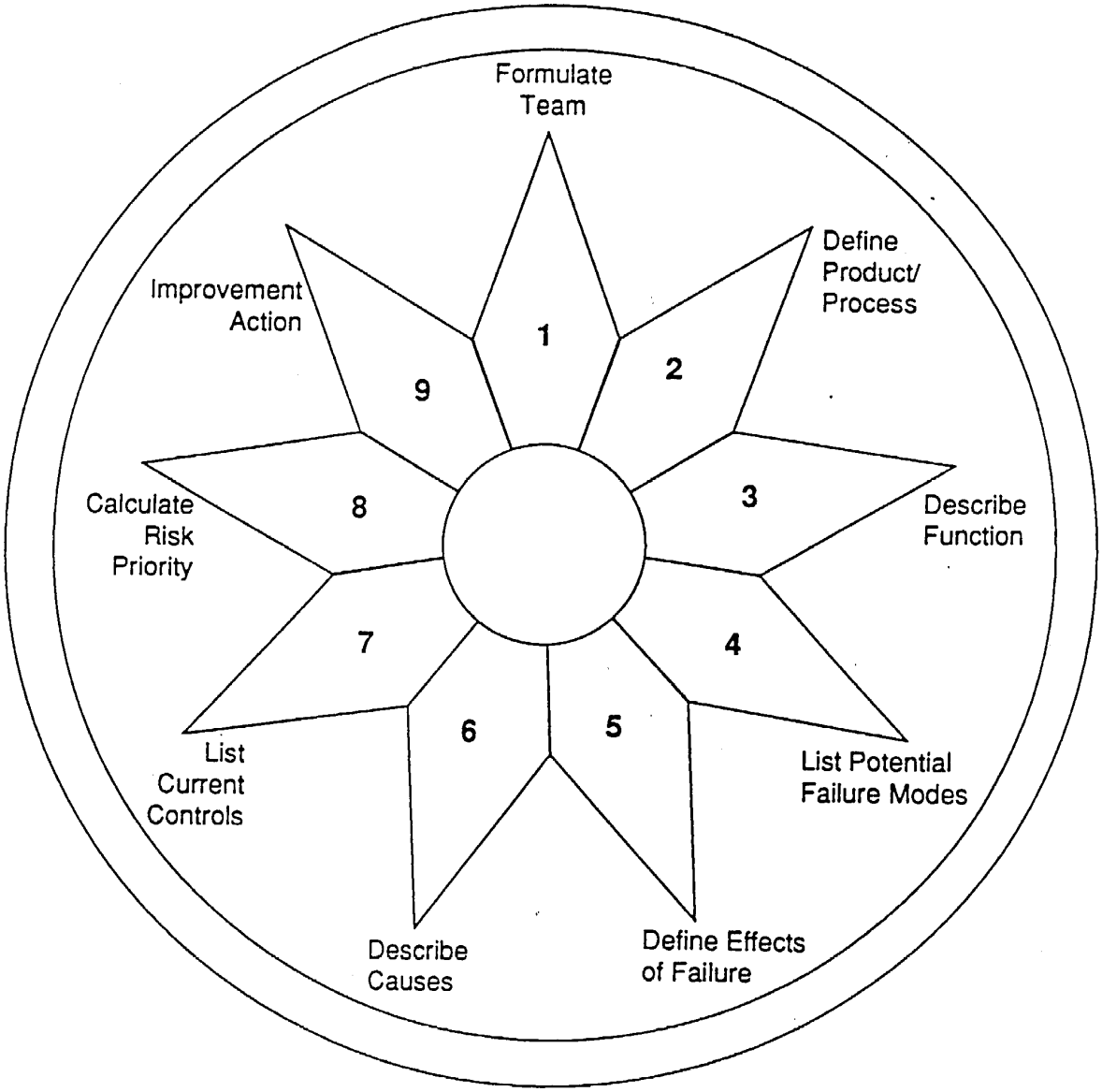
When companies embark on a Total Quality Program it is a massive effort to change the culture of a company. My feeling is that the VA Program should reflect this.

With current product that is in manufacture, the technique I chose was to ask at the outset of the workshop. What three parts of this product do our customers see fail first? The answers came from the Marketing Team members as well as Quality and Engineering members. We post these parts so all can see and we keep them in mind during the workshop looking for ways to increase their quality.

The thing that first impressed me with VA was Larry Miles' statement that in the process of saving money we were not allowed to do anything to degrade the quality. Today we actually need to increase quality if we want to delight the customer. We audit these three parts at the end of the workshop to see if we have fixed the quality problems.

If there are still deficiencies, we invest part of our identified savings to upgrade these parts. Thisconcept was unheard of 10 years ago when companies were competing primarily on price.

With new products there is no track record to show us which parts will fail, so here we rely on FMEA, Failure Mode Effects Analysis, a very popular and rapidly growing technique that helps project teams predict problems their customers are likely to encounter with a new product. (See Figure 1) By identifying potential failures the designer can design them out before release to manufacture, thus creating "ROBUST" designs. FMEA employs several steps that are identical to VA.



FAILURE MODE EFFECTS ANALYSIS

FIGURE 1

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STEP 2 Define product and process

STEP 3 Describe function

STEP 4 List potential failure modes

VA

Form a Team

Information gathering phase

FAST

Which 3 parts fail first?

FMEA now goes into greater depth to:

- Define the effects of failure
- Describes causes
- Lists current controls
- Calculates risk priority
- Identifies improvement action to be taken

As you see VA is really the starter for FMEA.

DESIGN FOR ASSEMBLY

DFA is a technique that I consider highly complimentary to VA. It has been my experience that design engineers have some resentment for VA because they feel that too much of the workshop time is spent critiquing their design. They ask why don't you spend equal time challenging the manufacture and assembly of the product? My feeling is that they make a valid point.

The VA process starts with the identification of product functions and asks; How else can we perform these functions? This of course leads to design chances. Now if the design approach chosen is too complex the process serves us well, because it forces simplification which is the most positive thing a VA Workshop can accomplish. Some companies such as General Electric have a corporate thrust to simplify everything they do.

Jack Welch said it so well,

IF WE CAN'T BE SIMPLE,
WE CAN'T BE FAST,
IF WE CAN'T BE FAST,
WE CAN'T WIN!

Obviously the most dramatic thing you can accomplish in a VA Workshop is to drive down the parts count. Parts that are eliminated required no sourcing, have no material content, cannot be of poor quality and the list goes on.

The reduction of parts needed to satisfy product functions is the prime reason VA Workshops can produce major savings. 25% or more while cost reduction methods only yield 4 -5%.

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Now is time to follow the design engineers advise and look at the manufacture of the product.

Here we have to ask the question what manufacturing functions must be performed?

Remove material	Wind Motor
Thread components	Assemble Product

Here we have to ask - How can we do this more efficiently? The Brainstorming process takes place again.

After we have done our creative thinking and identified process alternates there are additional aids that can be employed. There are expert systems for a number of processes that allow us to evaluate a part for proper design for the process. For example there are 105 rules for designing a part to be injection molded in plastic. Some of these rules are:

1. The part should have uniform wall thickness hroughout the part.

2. Plastic does not like to be bent around sharp corners, therefore, transitions should be gradual with generous radii on corners.

and so on....

By checking best practice in part design we can uncover oversights in the original part design. You guessed it! These oversights represent potential savings in part cost if we correct the mold. The molding machine cycle will be reduced and in some cases a less expensive material can be substituted.

SHOP FLOOR VA

plays a similar role. I try to schedule workshops when the product under study is being manufactured on the factory floor. When this is the case I take the Team onto the floor to observe the processes and look for opportunities for improvement. When we come back into the work room I ask them to verbalize what they have seen and how they would improve it.

These improvements take the form of equipment rearrangement to facilitate product flow through the factory, to alternate ways of making holes, removing material and assembling the components. We frequently spend a day evaluating assembly. We determine the assemble-ability rating for the product frequently ranging from 35% to 50% on a scale of 100. This tells us that improvements are possible and where the high times are. We can then brainstorm these areas to find ways to reduce the time. Excessive times can be due to:

Lack of symmetry in the part.

- Difficult hand motions for the operator.
- Tangling of parts.
- Failure to provide a lead in where a part must be inserted.
- Requiring the assembler to rotate the product to assemble the next part.
- and so on ---

DFA can add considerable savings to a VA Workshop and is well worth the effort.

My advise to the Value Engineer is to keep abreast of all techniques that are emerging that have the ability to compliment the VA process. The world is getting more competitive every day and we need to utilize every last complimenting technique that will enable us to compete more aggressively.

A few companies are now bringing manufacturing operations back to the USA due to our increased competitiveness and the realization that they can better control their operation and shorten the manufacturing cycle.

It is absolutely essential that we preserve the manufacturing base in this country by preventing further jobs from moving offshore.

I am convinced that VA and other complimentary techniques can help us do this.