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CONFERENCE

PROCEEDINGS

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VALUE MANAGEMENT

and its effective use

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CHAIRMAN'S WELCOMING ADDRESS

By A.J.Garratt

This is a magnificent renaissance of the Society of Value Engineers. It's pleasing to see this superb turnout today. Congratulations to all of you for coming along.

I think there is something very significant that we are seeing today, both in the name of the new organisation of the Institute of Value Management, and in the title of the papers. We are at last getting away from the original concepts of Value Engineering and Value Analysis, there is nothing wrong with the original concepts but they were somewhat limited. Value Analysis is now just about 26 years old and I won't bore you with the history of how it started in the large General Electric Company.

Historically, the first thing ever worked on in Value Analysis was a thermostat unit for a refrigerator. The story is interesting because after Value Analysis had been developed in General Electric and was raring to go, the usual thing happened. Not a single Division of General Electric wanted to know and it was only due to a little bit of nepotism because Larry Miles happened to have a nephew in the Refrigerator Division, that they ever got started at all. They started on one small unit, in which they swore if they got half-a-cent off this, they would be interested, but of course, as we all know, they got 25% off and Value Analysis and Value Engineering was born. This began initially in Purchasing and later in the Engineering part of the General Electric and hence the name 'Analysis by Value'. Subsequently, when they wanted to talk about new ideas, they coined the word Value Engineering, and we have had this word with us ever since.

I think it has been a little unfortunate for the technique that the word 'Engineering' ever got into it, because as we are seeing today, it is taken in a much wider context and the developments in the last ten years at any rate have been very largely extending this concept into other areas of activity. If you like, what we can say is that we have begun to emancipate ourselves from nuts and bolts and this is all very much to the good. The whole of today's programme is going to be devoted to papers very much on this emancipation theme.

Contents

Introduction

The Institute of Value Management is indebted to the speakers, chairman and delegates for their contributions to the conference and for the speakers' permission to publish these proceedings.

The content of the papers and questions have been condensed to produce a readable narrative, with the minimum of changes, whilst retaining the spoken idiom.

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The Effective use of Value Engineering in Marketing and Design

By D.Hunt and J.H.Lee

Dalton Hunt is Managing Director of Value Control Ltd. which is well known in both the U.K. and Europe for it's work in introducing and developing value engineering and cost effectiveness procedures.

John Lee is Group Value Engineering Manager of Pye of Cambridge Ltd. and performs an internal consultant role for the Pye group of companies.

Value Control Ltd. have worked with Pye for some years to provide training and to assist with research and development of new approaches with value engineering and cost control.

The Effective use of Value Engineering in Marketing and Design

By D. Hunt and J. H. Lee

Part I Value Engineering in Design by D. Hunt

The elements of innovation, technical excellence and cost are interwoven and need to be considered together. Belief that the concurrent use of cost must lead to the degradation of the product is wrong. Design in any of it's forms involves a balance of the marketing, technical, aesthetic and economic considerations, and is incomplete if any of these are neglected.

In manufacturing industries, costs are controlled not only by the efficiency with which manufacture takes place, but by the decisions which are made in the marketing, research, design and detailing stages; each decision to an extent controlling the next. A high proportion of cost is generated in these stages by the choice of market, product specification, design approach and the choice of materials, dimensions, shapes, sizes, tolerances and finishes specified.

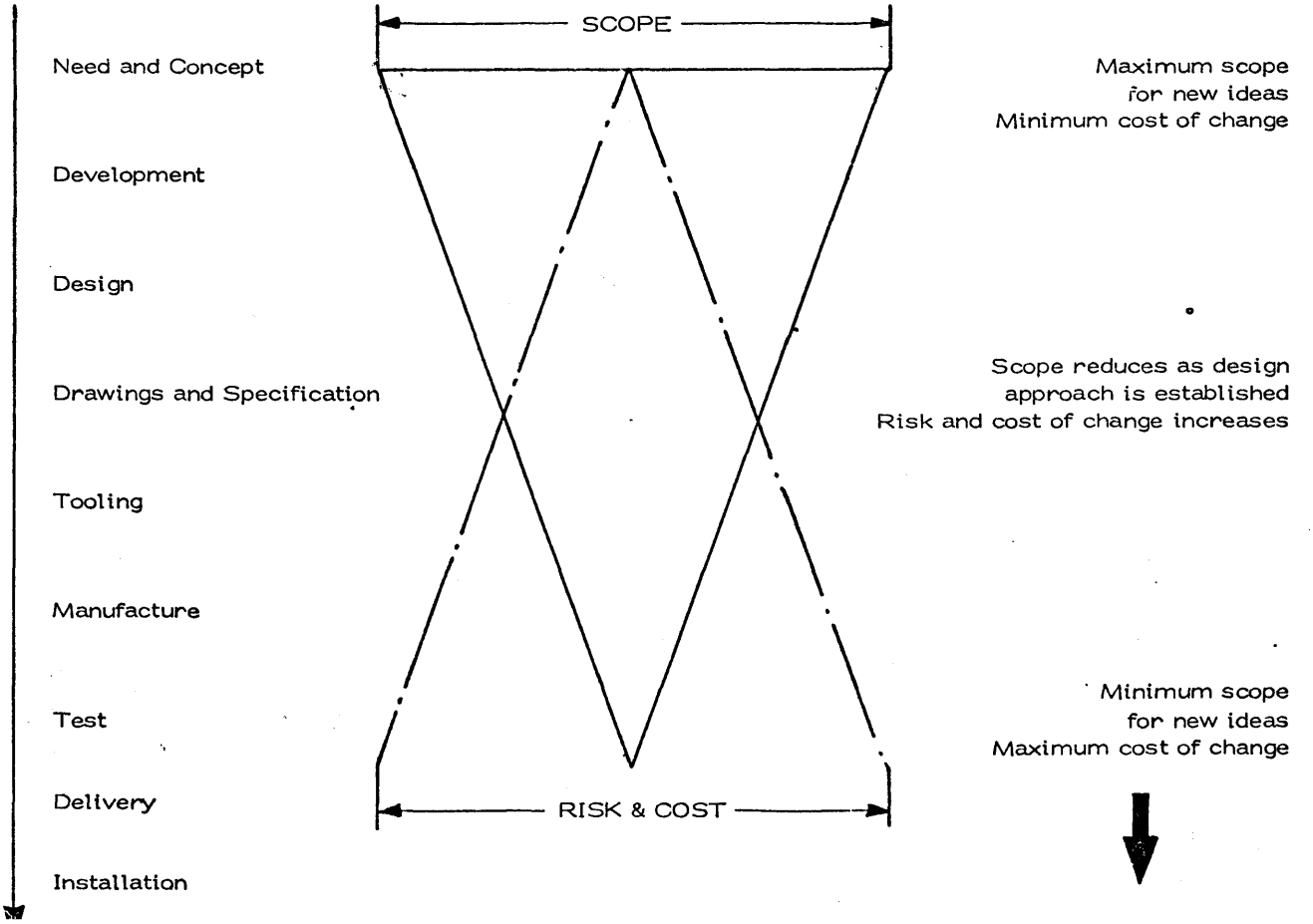
As decisions are made, a cost path as well as a design path is established, which can be only partially affected by the manufacturing methods and techniques used subsequently.

The reasons for introducing Value Engineering procedures as early as possible and throughout these stages are therefore clear:

1. The decisions made prior to production planning largely control product cost.
2. Design cost information is usually non-existent or inadequate for today's circumstances. It should be provided as a service to designers in a form which permits engineering comparisons and cost decisions to be easily made.
3. The cost problem – the single largest factor affecting the development of society and responsible for many of it's attitudes – is a corporate problem and cannot be solved by any one discipline alone.

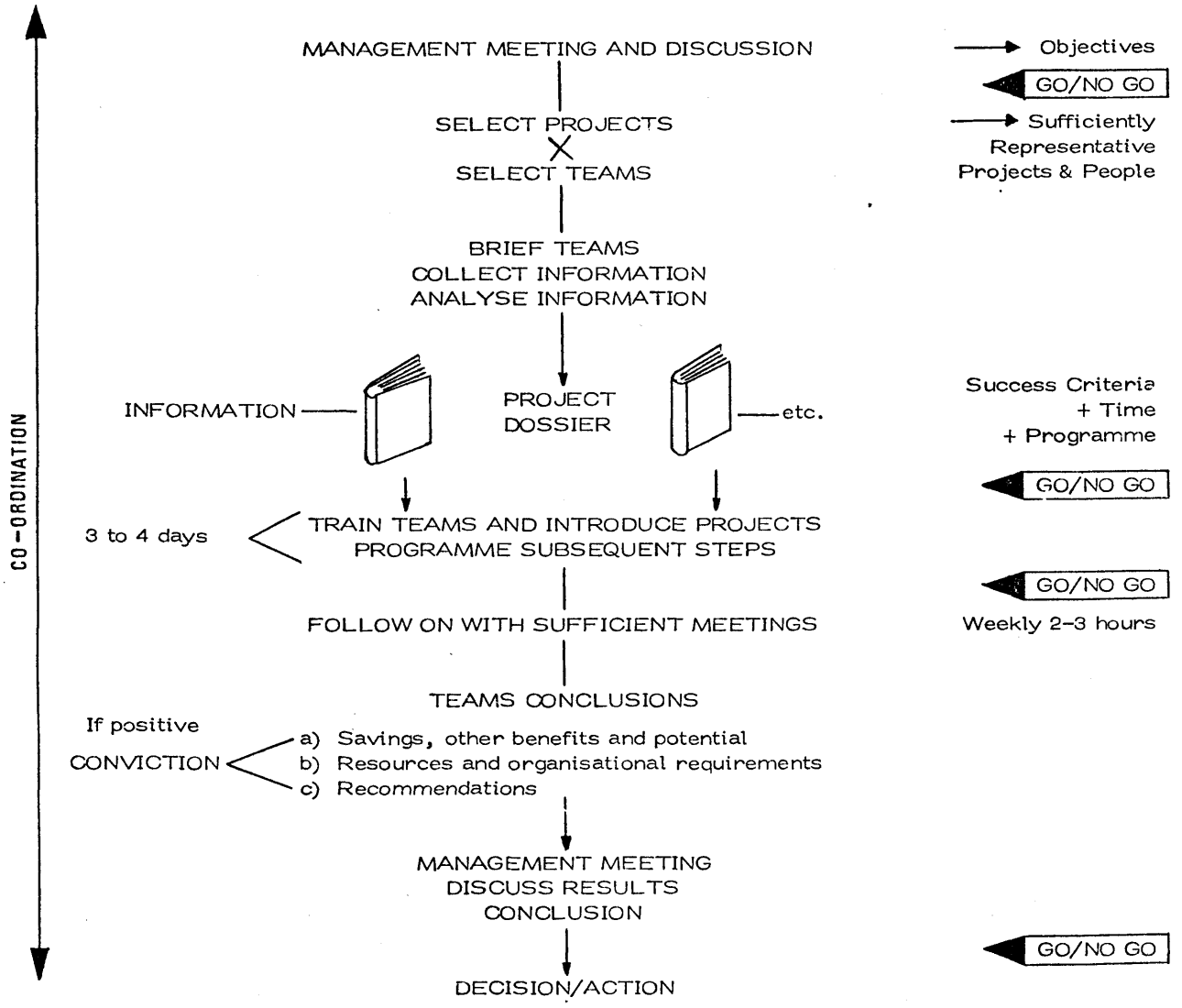
Unfortunately, undeveloped attempts to introduce Value Engineering to marketing and design engineers, have met with mixed results. If success is judged by short term savings, then VE (or VA) has been successful. If it is judged by the degree to which it is used as an integral and continuing part of the design process, then it has often failed.

FIGURE 1 The Relationship of Time to Cost of Change



Bearing in mind that VE programmes should be directed towards avoiding unnecessary cost in new products (Fig. 1), it has been apparent to my Company from experience in the UK and abroad, that the key requirement is to gain the interest, conviction and then commitment of marketing development and design engineers. Strangely, getting technical improvement and savings is not difficult, and illogical as it may seem, does not achieve the lasting use of VE procedures which is required. In recent years, therefore, we have switched our approach from a mainly technical one to an organisational one which has a technical content. This approach manifests itself in the form of a Pilot or Trial Studywhich we use to introduce Value Engineering to an organisation wishing to start or to make a new start with VA and VE.

FIGURE 2 PILOT STUDY OUTLINE



From Fig.2 it will be seen that the study has a number of stages beginning and ending with decisions by a management team. It is very much an experience in which the mixed teams involved - made up from marketing, design, production, purchasing, accounting etc. - make their own decisions and report back to the management team themselves with their recommendations.

The teams involved, separately and collectively are expected to provide the following information on the pilot study:

1. An indication of the potential reduction in cost which will result from VE if widely used.
2. An indication of the other benefits to be obtained; shorter delivery, easier production, performance improvements, etc. etc.
3. How Value Engineering can be fitted into the existing procedures and what would be involved in terms of operating methods, co-ordination, training, steering, type and form of cost information, etc.

5. Details of any short term savings arising from the Pilot study and which can be immediately introduced.

Commitment to VE is not entered into until after the study. This permits an open mind to be expected of every individual and manager involved. It also removes risk and anxiety from the management team who can state the pilot study to be 'a short experiment for us to find out if and how we might use Value Engineering in the Company'.

Many of these studies have taken place. Each one has been adapted by us to suit the particular attitudes, traditions and objectives of the company concerned. The outcome has always been a high level of commitment by the managers and staff involved and has led to the introduction of a VE organisation which suits their particular style and purpose and which they will use willingly because it is not imposed.

One group of companies we are privileged to work with is Pye of Cambridge Ltd. They have considerable practical experience with pilot studies of the type I have generally described. J.H.Lee, who is Group Value Engineering Manager has prepared a paper showing the results of a similar study in one of their companies.

Part II Case History using Pilot Study Methods

by J. H. Lee

It's true that in our companies, managers are not asking nowadays, whether Value Analysis is a good thing, but they are asking how it can be integrated into their company structure, because that is where it has failed in the past.

The way to do this, we feel, is not by imposition. There is no one way of integrating Value Engineering into company structure. Our companies are so diverse, that one common way wouldn't work. They want to try things out and decide for themselves how to do it, and the pilot study scheme which Don Hunt has just described, is a very good way. I think it was Confucius who said 'you look and you see, you listen and you hear, but you do and you understand'. It's this doing and understanding that really brings out the answers.

I would like to illustrate the value of such a pilot study by describing to you some of the stages and conclusions recorded, particularly in the Design and Marketing areas, in one of our companies producing sophisticated electronic products for use in television distribution, networks and studio equipment. The objective set for this company was to find out how to integrate Value Engineering procedures or the best parts of Value Engineering procedures, into the company structure. The method chosen to do this was to use an existing product and to assess the knowledge gained by the use of Value Analysis principles. This assessment of knowledge was put, not just in terms of how would it affect the product cost, but how will it affect:

Technical performance of the product?
Development programme of the product?
Will better communication be achieved?
Is cost consciousness improved?
Etc.

Another aspect dealt with the question of whether we will get better job fulfilment by the use of procedures of this nature. Thus the pilot study was evolved. Three specific areas were high-

second is the action - where people become involved and the training forms a nucleus of this, not training into a vacuum, but training into an ongoing situation with an objective. This objective is in two parts: how will it affect the product certainly, but more important, how does it affect you as a group of people, and how would you like to be able to work better as a group of people in the future and how can you arrange your company structure to enable this to be done?

The chosen product was part of a television distribution system. Conventional television distribution systems, taking television signals to broadcast transmitters or to closed-circuit displays, require two separate links - one for vision and one for sound. This piece of equipment, when incorporated, eliminates the need for more than one link; sound and vision travel on the same link - this giving considerable saving in costs and simplifying exchange switching. A very good value product in it's own right.

The product (fig.3, 4 and 5) is a typical piece of electronic equipment - 19" mounting, printed circuit cards, modules, sliding in, interconnected into the back. It consists of the Coder, Decoder and a Monitor Unit

The Function Cost Analysis (fig.6) set the team into action. This is the functional cost breakdown of the coder and two distinct areas came out. One was to provide power at 26% and the other was to provide housing at 20%. The team noticed a very interesting thing about this. It wasn't the sophisticated functions of the coder or the decoder that were the high cost areas, it was the more mundane things such as 'provide power', 'provide housing and support' and 'protect' functions which were coming out as high cost areas. Naturally, this created interest and the team worked their way through the team procedures and came out with some very interesting answers, which we all believe will come out if the Value Analysis system is worked in the correct way.

Now the answer that came out of the Function Cost Analysis was that the 'provide power' function

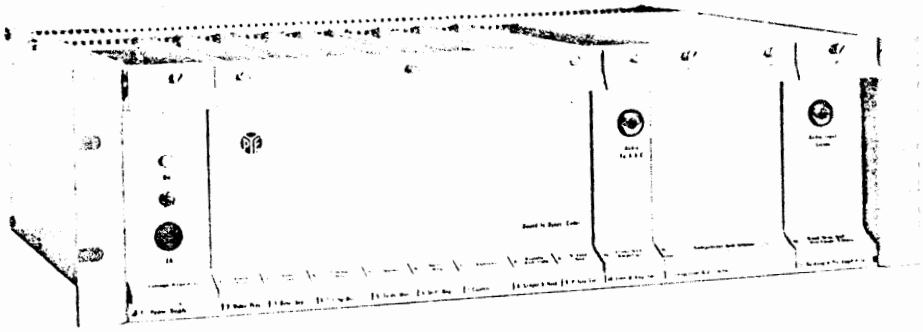


FIGURE 3

CODER

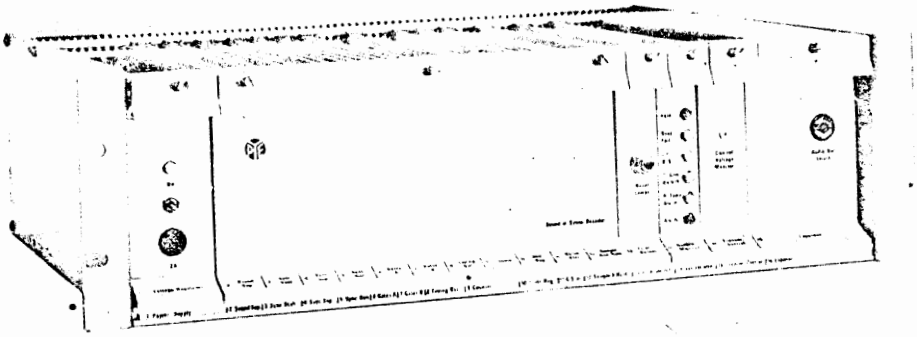


FIGURE 4

DECODER

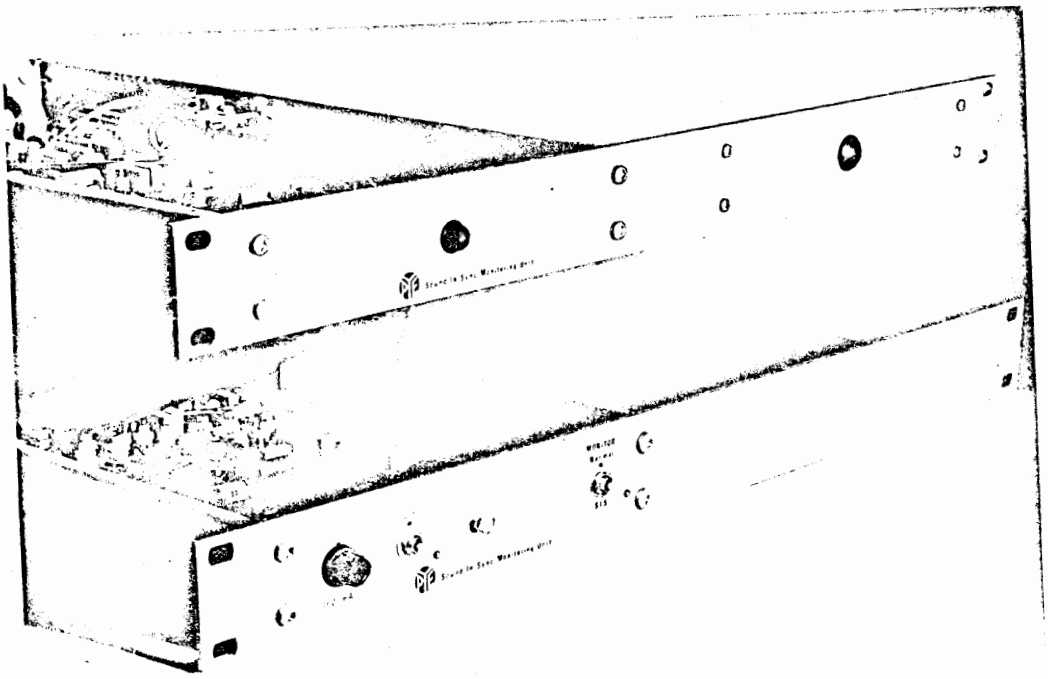


FIGURE 5

MONITOR UNIT

FIGURE 6

Description:

CODER

Item	Function	PROVIDE POWER	INDICATE STATE	PROCESS ANALOGUE SOUND	PROCESS COMP VIDEO	AD/DA CONVERT	CONTROL TIMING	COMBINE SEPARATE SIGNAL	MINIMISE DISTURBANCE	PROVIDE HOUSINGS INT.	LABOUR COST TEST	LABOUR COST ASSEMBLY	TOTAL LABOUR COST	BASIC MATERIAL COST

type modules. Teamwork produced re-design which used integrated circuit amplification and series regulation (fig.8). This and other modifications showed about a 60% saving in that particular area. The design engineer's comment on this was 'Well I knew it was an expensive area and I would have got around to it eventually'. 'I knew also that it was an outdated thing and knew it's modules would disappear from the scene eventually - I would therefore have been forced to do something.' 'However, the Function Cost Analysis showed me what a high cost area it was, which I didn't realise before.' It provided motivation. Fine, so that produced results.

The 'provide housing and interconnect' function is a typical proprietary type of framework (fig. 9), but the interesting thing here was the way that the connectors were mounted. The connectors were mounted in a system which enabled adjustment to be made in any position. The way our connectors were mounted didn't need that adjustment, but they were still providing it and hence the high cost areas on 'provide housing'. Mount sockets in more conventional manner, used edge connectors and this brought the cost of that down. Incidentally, the adjustable mounting system was a standard system used throughout the company, and they all thought it was a very good value system until shown up in the information stage.

Interconnection was very expensive. The flange plug (right on fig. 10) was replaced by the moulded version (left of fig. 10). For the first time, the team found out that in the group there was a company who manufactured plugs and sockets.

The product saving obviously added up to a considerable sum, but I believe more important are the comments of the team at the end of this particular exercise. The summary of these were:-

Product cost is certainly improved. Value is improved as well. The use of Function Cost Analysis as a diagnostic tool to provide better information at the right time is a must. Teamwork produces better answers quicker, without criticism or interference being felt. People understand one another. Inter-departmental problems are overcome. Better communications have therefore resulted. Job satisfaction has improved. People have been involved and therefore they become interested and enthusiastic. All things are done better when people are enthusiastic. Information flow is better. They also felt that the use of Value Analysis on existing products had it's part to play and an interesting point is that they thought it would provide a better framework for training. One could train people better around Value Analysis than straight into Value Engineering. The need for Management Steering Committee which was very strong throughout this pilot study was felt to be a real need and should continue. The involvement of the user and the marketing in product design will improve value.

So far, this has been a fairly classical Value Analysis case, from a product point of view, but in this pilot study we're also getting results from a process point of view. The product was almost incidental - it was a vehicle on which the procedures could be practiced, and the process is evolved in the group dynamics discovered and

point of view, but now we come to the really surprising bit. The team were quite enthusiastic by this time as you can imagine, but a little despondent about two particular functions that they located in the monitor system. One was the function called Display Digits and this was a function that almost 19% of the cost of that particular area was spent in 'displaying digits' (fig. 11). The second (fig. 12) included 60% of the cost on 'interconnection' external and internal, and 7% on 'control' - which was the provision of an ON/OFF switch with ancillary circuitry. The team had some success on interconnecting, but could not find ways of improving 'display digits' or 'provide control'.

About this time, a large customer made enquiries about the product - and in the normal way Marketing and Design, and the prospective customer discussed the whole tender. This was in the normal course of events. But this time, the Marketing people and the Design people were part of the team on the pilot study, and they had in mind the Function Cost Analysis, and they talked about functions to the prospective buyer and they produced a simplified version of the Function Cost Analysis. They showed this and they discussed it this time in meaningful terms. They weren't just talking about deliveries and discounts. They were talking about the proportions of the function cost against their worth, and talking to someone who really knew something about it, because he was going to use it. The function of 'displaying the digits' was discussed and this was the first surprise because the user's comment was 'Well, it's an interesting technical achievement, but you know I don't think we'll make all that much use of it'.

Here was the clue. The engineers had produced a very clever technical achievement, but the user didn't have a great deal of use for it. In fact he said that if on the odd occasion he wanted to display the digits, he could always do it through an oscilloscope. He questioned the cost of leaving the function out. Now here was another clue. He was willing to pay not to have them in this case. That was our first surprise. We had produced something that was technically good. Marketing accepted it as a selling point. Perhaps not realising that it was costing 20% of the total effort and then putting it to the customer, who, without that information, would accept it, because it was there. But given the information and encouraged to talk about it, the real truth came through, that it wasn't a great deal of use to him.

The second surprise, and this was perhaps even more surprising, although perhaps not affecting the cost quite so much, was the need for control. The control in this case was in the main an ON/OFF switch but with all it's complexities, the wiring, the fuses and one thing and another. The customer, when questioned again closely, said that he didn't really want an ON/OFF switch either. Now this was basic in any electronic product, a switch is fitted so that you can switch the thing on and off. He was questioned more closely on this. His reasons for this were that this equipment is part of the total television link, and even though it's only a small part of the television link, if you switched it off accidentally, 20 million viewers would lose their picture. That was the first thing; accidental switch off could produce disaster. 'Accidents can happen. If there's no control there, then accidents can't happen. Secondly, he said that in electronics it's

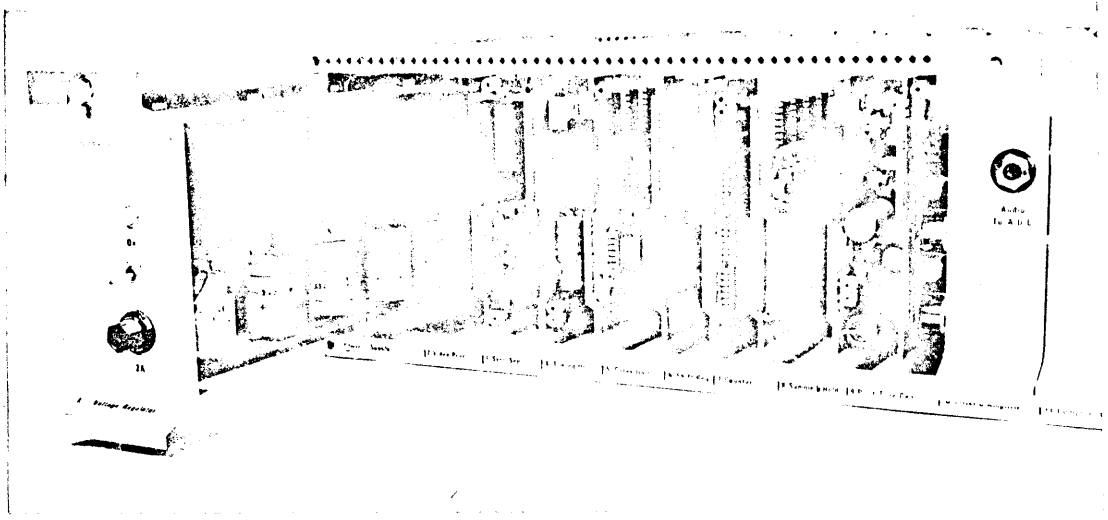


FIGURE 7

ORIGINAL
POWER
UNIT

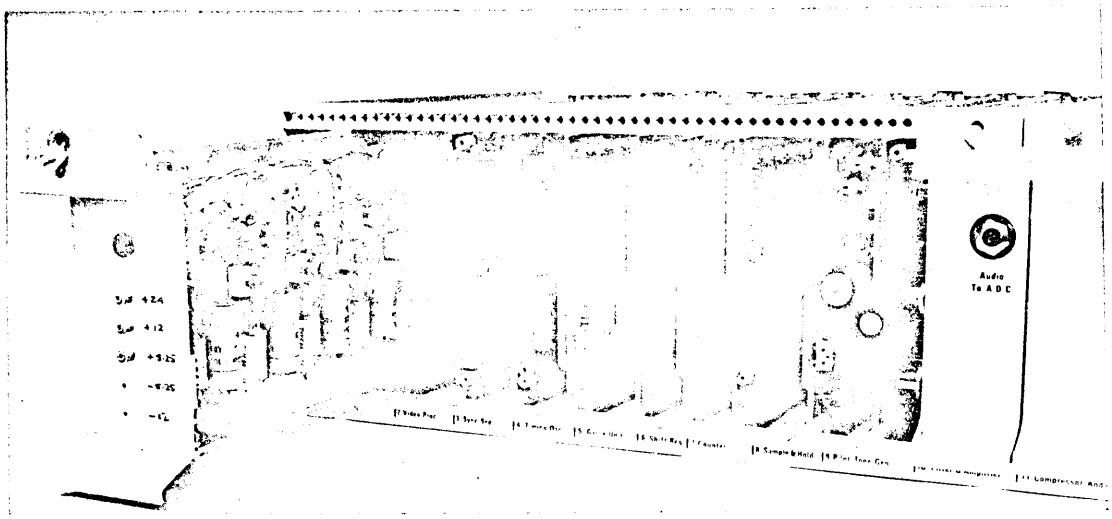


FIGURE 8

REDESIGNED
POWER
UNIT

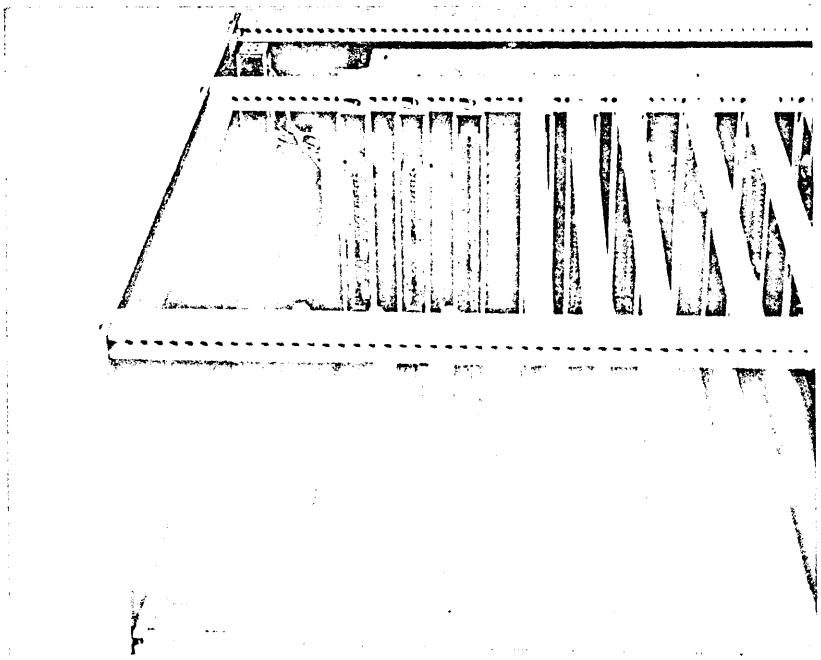


FIGURE 9

FRAMEWORK AND
CONNECTOR
MOUNTING

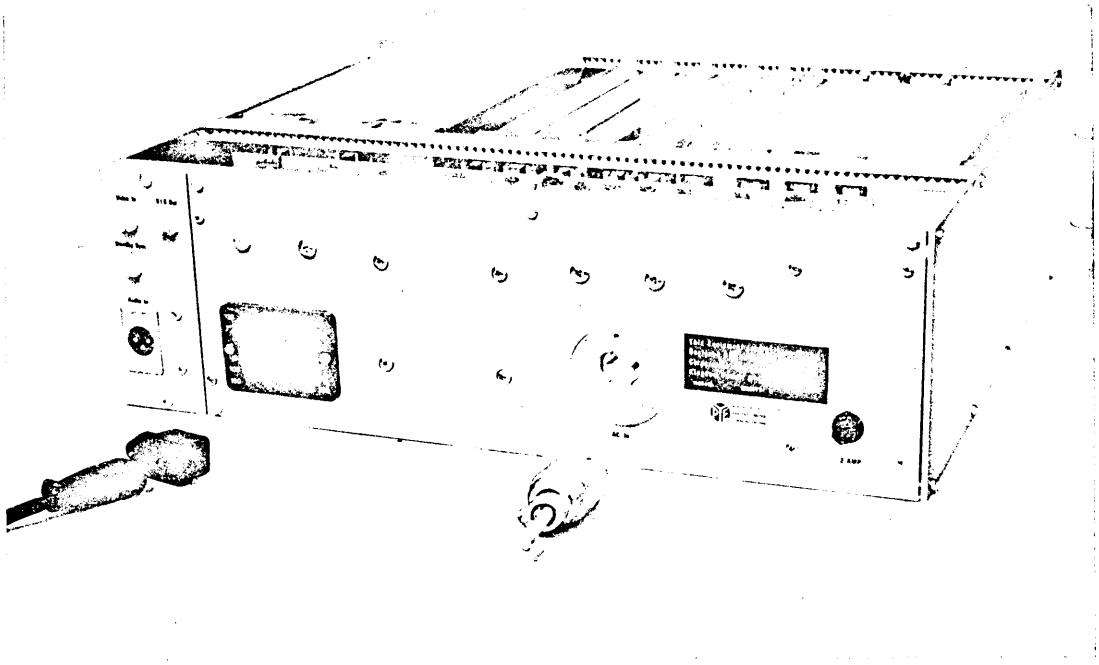


FIGURE 10

INTERCONNECTOR

FIGURE 11

Description:

MONITORING UNIT

ELECTRICAL CONTROL

Item / Function	PREVENT DISTORTION	SEPARATE SYNCS	PROCESS SYNCS	REMOVE DIGITS	MATCH OUTPUTS	PROVIDE POWER	DISPLAY DIGITS	SUPPLY SYNCS	PROVIDE SERVICEABILITY
% of Total Cost	7.46	15.2	7.03	9.7	5.18	23.5	18.6	2.60	10.73
'High' or 'Low'		H	H			H	H		H

FIGURE 12

Description:

MONITORING UNIT

SUPPORT AND PROTECT

Item / Function	MOUNT COMPONENTS	ELECTRICIAL CONNECT	EXTERNAL CONNECT	PROVIDE CONTROL	MOUNT IN RACK	IDENTIFY	LOOK GOOD	DISSIPATE HEAT	MAKE SAFE
% of Total Cost	13	20	41	7	2	7	4	2	3
'High' or 'Low'	L	H	H			H			

and life is better. Every engineer knows, but he's always provided ON/OFF switches. But perhaps most surprisingly of all, and this was a European user. He said that in Europe the Unions have a ruling that if a piece of electronic equipment has a control or an adjustment on it, then you use a certain grade of labour to operate it. If it hasn't a control then you can use a lower cost grade of labour. Now here was a clue for him, for if he didn't have to have controls in this particular unit he could use lower cost operators and the whole system then becomes more cost effective, not just affecting the cost of the total product.

There were the two surprises for us, and these wouldn't have come to light by normal Marketing/ Customer conversation. Through conversation around meaningful information (Function Cost Analysis), and by encouraging the user to talk about his real requirements. Now I don't think our Marketing people and our Designers are any worse than anybody else's, but the things that really came out were talking to the right people, at the right time, and in the right kind of way, and this is helping them to become even better.

Finally, fig. 13 shows the monitor unit before and after the study.

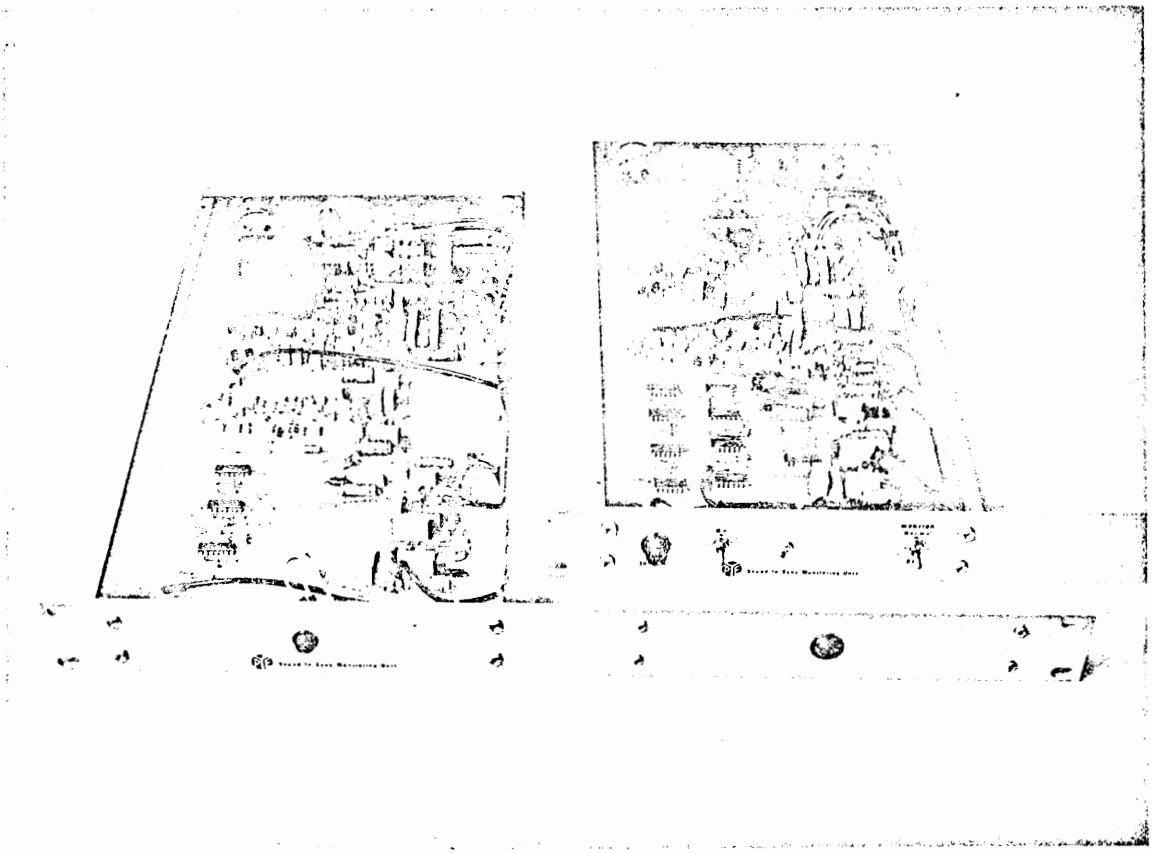


FIGURE 13

Right – Before – with 'display digits' and control functions

Left – Without (note considerable circuit simplifications)

Part III Value Engineering in Marketing

by D. Hunt

Without the needs of a customer, a product is of no value.

The procedure by which customer needs are determined and communicated to a product designer varies with the type of product and the characteristics of each company. In the case of industrial equipment, plant and special machinery it is always possible to improve the method of preparing a product specification so as to provide the designer with more precise information than may otherwise be available to him. This should result in a product which suits the customer's needs more exactly whilst at the same time eliminating the cost of unnecessary refinements. It should also improve the understanding and relationships existing between marketing, technical, installation and maintenance staff and reduce the real time of preparing and agreeing product specifications and design time.

Improvement can usually be made because of one or more quite common and traditional factors:-

1. Insufficient clarity regarding the designer's role and the extent of his responsibility.

2. The customer's views are usually transmitted to the designer through a number of people who may bias the information.

3. The designer's use of technical language and the customer's and sales staff lack of detailed technical knowledge tend to isolate the designer from effective communication with others. This in turn leads to imprecise specifications which attempt to say how rather than what is to be achieved.

4. A designer has freedom to add what he conscientiously believes is really required together with various personal requirements he considers important from a professional point of view. These may or may not add value so far as the user is concerned, although they may add some cost.

5. The designer's main efforts are concerned with performance and cost. The customer's total concept of product value is more rounded. He is concerned in addition with the availability of the product, delivery dates which will be kept, easy installation and operation, a small range of readily available spares which are easily assembled, etc. Failure to consider these factors during the design stages will lead to a less than perfect product which is not balanced to meet the real needs of the user.

The analytical procedures of Value Engineering, together with other procedures, can be used to provide a clearer, more informative specification according to each design situation.

Design Situations

There are three different marketing and design situations which need to be considered:-

1. A completely new concept such as the rotary

2. An existing concept which is not produced by the company in question. A pump manufacturer deciding to produce a range of valves for example.

3. The development of an existing product.

The latter is the most common and simple situation and the following explanation and examples refer to this. However, they are applicable to the other two situations in different degrees.

Approach Used

1. The first step is an analysis of the most similar existing product using Function Cost Analysis procedures in which the output functions of the equipment are identified and costed (fig. 14).

2. If possible it is desirable to examine a number of competitors' products in a similar way using Function Cost Analysis procedures. Cost is estimated on the basis of 'cost to us' not cost to the competitor and may have to be estimated by a competent production engineering estimator (fig. 15).

(Although competing products may differ considerab in appearance and design approach they have a common description which is the functions provided and this is why this system is used. The way in which these functions are provided will vary betwee different products and consequently examination of individual components of competitors' equipment is of limited value except in very similar products suc as the automobile. Even here functional compariso are likely to be more valuable today.)

3. Appropriate skills should be brought in to make operating studies of existing equipment includin competitors, i.e. Ergonomic studies, MTM studies, etc. (fig. 16).

4. Check lists and questionnaires are used to obtai the opinions and views of the equipment from th customer, the customer's operators, installatic and maintenance staff, salesmen and perhaps e the recipient of the customer's product or servi

These questions relate to appearance, operating conditions, installation, maintenance, spares availability, safety, application, environment, cost etc. (fig. 17).

Perhaps a third of the comments and suggestions will justify following up with deeper investigation.

These investigations should be made by analysts wh are not directly involved with the product marketin sales, development or design.

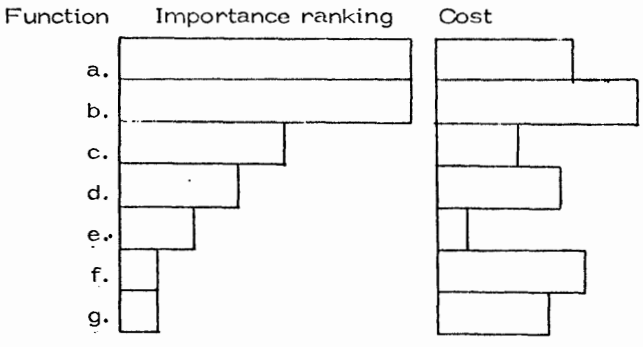
5. From these analyses and surveys it will be possible to prepare a benefits analysis showing direct comparisons between one's own and the competing products.

   a) By output functions (fig. 18)
   b) By other features (fig. 19)

6. If the cost effectiveness of each function or feature is taken into account, it will be possibl to choose the particular design approach from the various products which provides the best value solution. This is repeated for each funct the total providing the theoretical best design o

7. A team including customers can be used to place the resultant functions and features in ranking order. By visually relating the cost to each function the 'balance' of the design can be questioned.

e.g.



Can the cost of the function f. and g. be reduced considering their poor value in terms of high cost and relatively low importance?

Are the functions a. and c. adequately met and can they be improved even if this incurs an increase in cost?

8. Bearing in mind that eventually it is the designer who has the responsibility to produce the new design and to satisfy the customer's needs, the information obtained needs to be presented to him or the design panel and discussed and used as a basis for the preparation of the engineering specification for the new design.

The advantages of developing an engineering specification based more on facts than opinions regarding the customer's needs is of immense value. Ranking the importance of functions and features provides both a basis to work from and real guidance to the designer or design group.

The Function Cost Analyses and the theoretical best design analysis provides from the outset a clear cost target for the designer. Since this cost is apportioned to functional areas, cost control can be exercised during the design stages by the provision of comparative function cost estimate thus avoiding unnecessary cost reduction exercises after the design has been completed.

The many other considerations in developing and marketing a new product have purposely not been mentioned in these notes. The approach described is intended as an addition or refinement to existing marketing and design practices and is a small but important part of the total process (fig.20).

FIGURE 14

Description:

MACHINE C (Own existing design)

Cover Fitting and Removal Machine

Item	Function: Apply Force	Rotate Wheel	Clamp Rim	React to Torque	Support Load	Prevent Damage	Enclose Parts	Provide Adjustment	Look Nice	Provide Safety		£ Cost of Item
	BREAK JOINT / REMOVE COVER											
Motor		8	8									16
Gearbox		20	20									40
Cabinet	18			8	3	5	3	2	4	3		46
Toggle Switch		1	1			2						4
Air Cyl./Valve	25					1		1		1		28
Moving Gear	6					6		1				13
Top Guide Assembly				3		2		10	½	½		16
Isolation Switch		½	½			2				2		5
Cable Assembly		½	½									1
Assembly (Labour)											15	15
Cost of Function	49	30	30	11	3	18	3	14	4½	6½	15	184
% of Total Cost	27	16	16	6	2	10	2	7	2	4	8	100

FIGURE 15

Description:

MACHINE A (Competitor)

Cover Fitting and Removal Machine

Item	Function: Apply Force	Rotate Wheel	Clamp Rim	React to Torque	Support Load	Prevent Damage	Enclose Parts	Provide Adjustment	Look Nice	Provide Safety		£ Cost of Item
	BREAK JOINT / REMOVE COVER											
Motor		15										15
Gearbox (Drive)		15										15
Cabinet				8	3	5	3		4	3		26
Toggle Switch		1				1						2
Air Cyl./Valve	16											16
Joint Mover	4					1		1				6
Top Guide Assembly		3		1				1				5
Cable Assembly		2										2
Lever on Switch		1	1									2
Table Clamp			14									14
Roller Head				1								1
Hd. Lift Mech.								6				6
Assembly Costs											15	15
Cost of Function	20	37	15	10	3	7	3	8	4	3	15	125
Contingency	2	3	2	1	–	1	–	1	–	–	–	10
Cost of Function	22	40	17	11	3	8	3	9	4	3	15	135
% of Total Cost	16	30	13	8	2	6	2	7	3	2	11	100

MTM PATTERN DETAIL **FIGURE 16**

OPERATION DESCRIPTION	MACHINE A	MACHINE B	MACHINE C
1. Prepare to break joint	109	109	62
2. Break joint 1st side	694	473	550
3. Reposition for 2nd joint	144	144	104
4. Break joint 2nd side	694	473	550
5. Transfer to turntable	232	173	293
SUB TOTAL FOR JOINT BREAK	1,873	1,372	1,559
6. Prepare for removing 1st joint	183	154	158
7. Lever cover to tool	136	91	169
8. Remove 1st side	332	263	284
9. Prepare to remove 2nd side	49	78	50
10. Lever cover to tool	60	93	69
11. Remove 2nd side	332	263	284
12. Replace lever	52	–	44
13. Remove cover	210	85	189
SUB TOTAL REMOVE COVER	1,354	1,027	1,247
Fit New Cover			
14. Lubricate sides	–	–	–
15. Prepare head for cover	204	120	158
16. Handle cover adjustment	35	53	50
17. Fit cover	296	236	508
18. Place aside	254	116	185
SUB TOTAL FITTING NEW COVER	789	525	901

	MACHINE A	MACHINE B	MACHINE C

MARKETING INFORMATION **FIGURE 17**

COVER FITTING MACHINE

RATING DATA FOR MACHINE C

Application: How well does the machine accommodate the range of wheels in respect of:	Rating Summary			
	User	Mtce.	Sales	Tech.
size	b	–	b	–
shape	b	–	c	a
weight	c	d	–	b
ease of adjustment	e	c	–	b

Environment: How do you rate the machine in respect of:	Rating Summary				
	User	Mtce.	Sales	Tech.	
resistance to corrosion	e	e	–	a	*
resistance to damage	b	c	b	a	
resistance to dust	b	c	–	a	
ease of maintenance	b	b	–	b	
safety	c	b	–	a	

* Difference due to machine being sited in open and exposed to elements – a condition not designed for.

a excellent

b good

c adequate

d fair

e poor

MARKETING INFORMATION **FIGURE 18**

COVER FITTING MACHINE

ALTERNATIVE MACHINES – FUNCTION COST COMPARISON

Functions	Cost £			Best value design approach
	A	B	C	
Break joint	33	24	60	24
Remove cover	57	63	60	63
Support load	3	3	3	3
Prevent damage	8	10	18	8
Enclose parts	3	4	3	3
Provide adjustment	9	17	14	17
Look nice	4	1	4.5	4.5
Provide safety	3	1	6.5	6.5
Assembly standard	15	15	15	15
COST £	135	138	184	144
RATIO OF OPERATING TIME	108	78	100	90

MARKETING INFORMATION **FIGURE 19**

COVER FITTING MACHINE

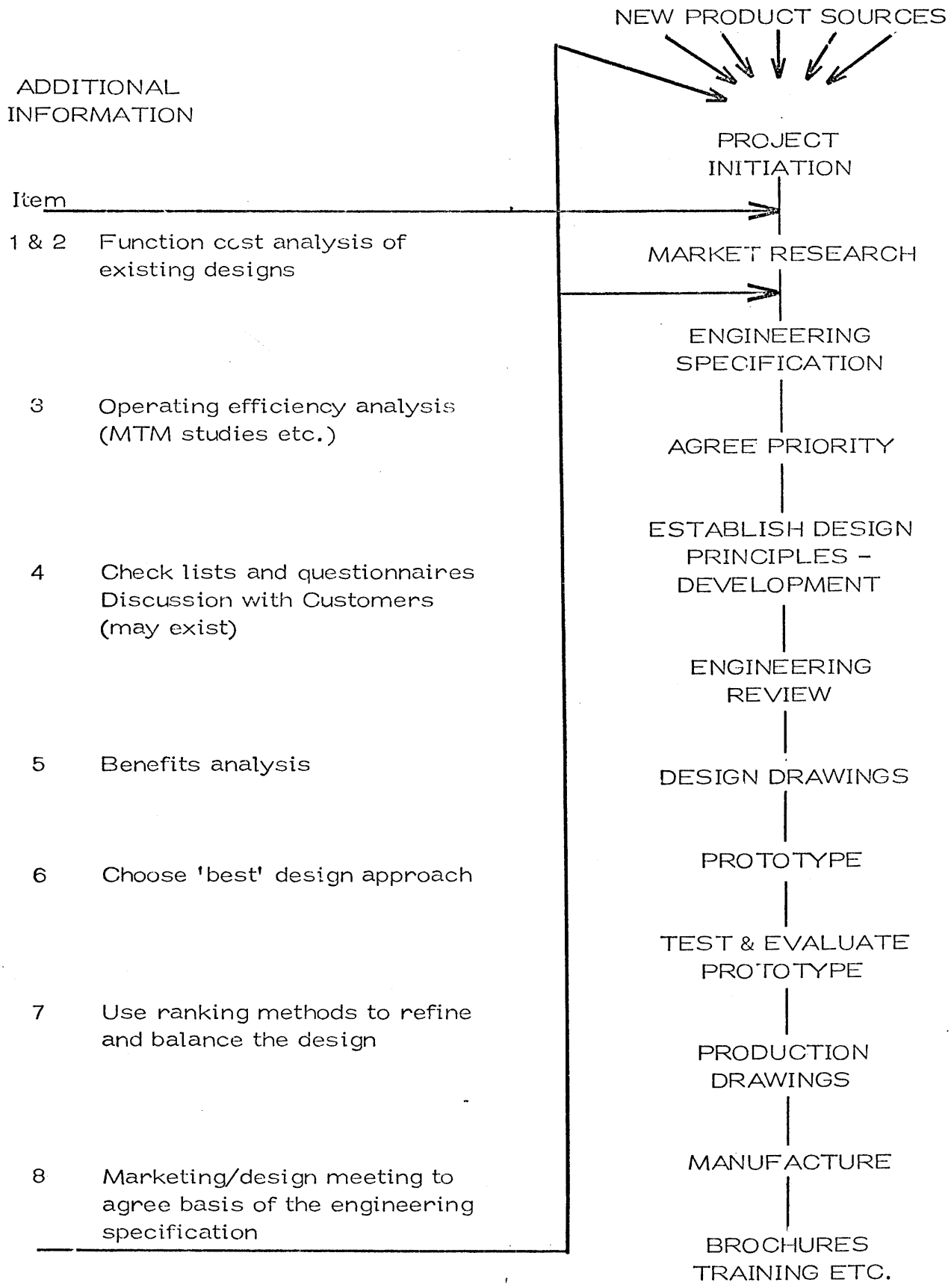
FEATURES/BENEFITS ANALYSIS

Feature	Machine A	B	C
1. Horizontal axis	No	No	
2. Vertical axis			No
3. Powered rotation		No	No
4. Powered joint breaker			
5. Foot operated controls	No		
6. Free standing machine			No

Feature	Benefit	
	Gain	Loss
1	* Both joints can be reached without re-positioning * Reduced handling. 20% less than vertical machine * Provides comfortable working position	* Higher initial cost
2	* Lower initial cost (ave. £30)	* Difficult to balance wheel in situ. * Require re-positioning to break 2nd joint * Increased handling. 25% more than horizontal machine * Slower operation * Poor working position
3	* Constant result:- low time (overall) low damage	* Higher initial cost * Increased risk to operator requiring

TYPICAL PRODUCT DESIGN SEQUENCE FIGURE 20

SHOWING ADDITIONAL INPUT OF INFORMATION



Integration of Business Functionsfor Value Improvements

By F.S.Sherwin

Fred S. Sherwin is a Graduate Mechanical Engineer, BSME, (Chartered Engineer) with 32 years diversified industrial experience in Product Design, Development and Manufacture. He spent 14 years in the Aircraft Engine Field, 3 years in Plant Equipment Sales Engineering and 15 years in the Electronic Systems and Components Businesses, affiliated with Wright Aeronautical Corp, General Electric Co. (U.S.), Raytheon and Plessey. His career in Value Engineering started in 1952. He was a founder and past president of the Society of American Value Engineers, A Fellow and Life Member. He has been with Plessey Co. since 1968 as Director of Value Engineering, Director of Quality Control and most recently Director of Engineering Support Services.

Integration of Business Functions for Value Improvements

By F. S. Sherwin.

In the early days, talking about Value Engineering and Value Analysis as it was called then, we used to come equipped with a lot of hardware and I had to bring along a piece of hardware just to feel at home and that's probably the last I'll talk about it today. We would show examples of how value could be improved by a systematically organised multi-disciplined approach, using various people. From that they progressed on to a recognition that it wasn't just product-improvement that was desirable but it was cost-prevention or product-assurance starting right back in the early stage of feasibility, design systems concepts, early research and development. Getting it into the Engineering organisations so that Engineers would have cost objectives and overall cost effectiveness in mind, and even progressing into total cost effectiveness of the system, not just procurement cost of hardware, but into the operational, maintenance and installation areas, which in some products today are a more vital part of cost. Then hardware costs become a less significant part of the total cost to the user. I think that's one thing that we need to stress in Value Management. To look at the total cost to the user. It may not be just his procurement of the original hardware.

From there we progress to a broader field of Value Management, where we are looking at the total business plans to ensure a higher degree of customer value they receive in the products and services that the suppliers produce. I mention services as well as products because Value Analysis, Value Engineering Techniques, are being applied today in the software areas. We are applying them into software related to computers, into procedures and areas other than just the product and hardware.

We recognise the need to create the industrial team, the teamwork concept. The title of my paper doesn't mean much more than this word 'teamwork'. Teamwork in industry. That's really what I'm going to be talking about.

Teamwork is fundamental to the whole process of getting value in the output of whatever organisation you are concerned with. It relates to many kinds of things, and among other things it means communication. Communication between people is a two-way process. It's the speaker and the listener; the listener speaking and the speaker listening, and it has to be a good exchange so that they both understand the whole picture.

Teamwork today, whether it be football, cricket or business is vital. I think the consistent winner is the product of individual competence and well disciplined teamwork. Individual competence is something that is developed by education and training and experience. Teamwork is something that needs to be inspired and must be inspired by management. I am referring here to both general management has tried to inspire teamwork, and with the first suggestion that they made along these lines in one of their staff meetings, middle managers put forward many reasons why the proposal was not a practical consideration. I think that functional line managers (middle management) have got to recognise that the total business benefits from doing the kind of things that are essential to stimulate teamwork within the business and it is a good thing for them too. Representatives of middle management are here, because they recognise the importance of middle management's participation. Because they have functional responsibility of the various activities that are part of the team, middle management's participation sponsorship, endorsement and active management motivation is vital to industry's teamwork.

From a Value Engineer's standpoint, since most of you are Value Engineers, this is an area where you constantly need to make your management aware of the significance of integrating the various disciplines of the business into a co-ordinated form.

In the past, businesses could survive on individual competence. Possibly because a wide functional responsibility was put in the hands of individuals. Thus integration took place within the individual rather than having to bring together a bunch of different people to integrate the knowledge. But today we are in a very complex world, technologically, in terms of production and so forth. Specialisation is here. This means that we have people with a depth knowledge in a variety of knowledge areas within the total spectrum, and so teamwork is essential for overall business efficiency, competitiveness and profitability.

Value Management, which is trained to inspire and direct the integration of these human resources into the efficient human system, ... and this is really what we're really trying to create in industry today, an efficient human system, ... is the key to building success, today and tomorrow.

Teamwork then is what we're talking about now. It's not necessarily the task team type of thing which is one element of teamwork which is important and should be used effectively, but a routine kind of thing which results from a co-ordinated effort of people from all the various disciplines within the routine activities of business Now the lack of teamwork in industry has resulted in a lot of business catastrophies or failures each year. Some of these things I'll highlight as they can bring up problems to which we need to find answers today in business.

A new product has failed to make the grade becaus marketing, engineering and production could not co-operate in an overall product plan which would

is that in this case marketing may have made promises about product delivery which the engineering department did not approve and therefore was not able to do the proper product evaluation, environmental testing, field testing and so forth. They were committed to a time-frame. Then production on the other hand is pushing to get the release from engineering so they can meet their total time-frame. The total time actually required was probably not built into the total product plan. Purchasing was not a party to the design and specification to any large degree. They went out, and because of pressure of time and costs and schedule, independently sought out sources and bought products which resulted in quality problems. These are the sort of things that can happen and have happened.

A product over-running it's development cost-time target because of lack of team effort and cost function analysis of customer requirement. This is something that often happens. Engineers as a creative entity love to develop designs, work on new approaches, push the state of the art and so forth, but there comes a time when that has to fit into an overall time-frame. A co-operative teamwork effort which injects the right kind of support to engineering and manages the engineering element of the whole product plan is important if a time-frame for engineering development is going to exist.

A product which costs twice as much to produce as the selling price allowed due to a delay in Value Management. Now, here I think it is very important to deal some motivation into the design and development in the way of Product Cost Targeting. This is a technique which makes production cost and the cost to produce an important element of the designer's responsibilities and objectives. This is a motivator which makes cost effectiveness, and the measure of cost effectiveness in engineering as important as performance objectives. So often the cost is delegated to a lower level of priority from schedule, performance, reliability and quality. Sometimes it's the tail of the dog that doesn't get built into the objectives at all. Cost Targeting is one of the administrative and managerial tools for helping to stimulate team-work because once the engineer has to meet a cost objective, he's going to need the kind of input to help him to do that and forces him to reach out to industrial engineering, to manufacturing, to production and to other people in the business.

The dissatisfied customers whose complaints are never corrected due to failure to close the feed-back in the correction loop, ... Value Manage-ment again. Sometimes this happens and they go all out building the same kind of problems into new products because of the lack of user feed-back information. I think we see that in some of the consumer products that we buy, many times.

If the above problems sound familiar it is because there are few businesses which have not experienced these situations in their past. Value Management is an attempt to ensure that at least the majority of these things are in the past rather than in the future. The integration of business functions, one of the keys, certainly to

This means integration among the various line functions, among the various staff functions and among line and staff functions because we are fractionalised in industry today. Now there may be a difference of opinion or understanding of what I mean by line and staff. Line functions are the prime decision making functions of business and these fall into several categories: Marketing (commercial, sales, contracts) is one element. Engineering (technical and industrial) - the whole engineering end of the business. Manufacturing and production, and the Material, the procurement, the purchasing. Now those are certainly four of the key decision making areas that affect the value of the product which we consider the key line functions in business. One reason for trying to integrate at least these four functions is the split responsibility that we find for cost, which is one of the basic problems that is creating all of this situation that we're talking about ..... Techniques, approaches and organisation and so forth, ... and when you ask yourself 'who is responsible for the product cost, ... why this particular electronic piece of equipment or mechanical piece cost so much, ... who was responsible for that particular cost'. We can only answer that in that it was a shared responsibility among a number of functions - at least these four that we're talking about. When you say, 'Well what proportion of responsibility do these various functions have for that cost', you'll find it varies considerably from company to company, from product to product, from situation to situation. Perhaps Engineering may have 50% of the responsibility as they establish the specifications and drawings. They lock in the material. They lock in the production methods by their release of the specifications to manufacturing. But certainly as we have learned today, and as you most certainly know, they can be influenced in what they design to a large extent by marketing, by the feed-back and the information they get from sales and marketing. That may influence the cost considerably. Maybe 20% - 25% of the responsibility is in the production area, based on what processes they select, what machines they select, what methods they use. The purchasing people by the number of suppliers that they consult and where they buy it and so forth, and most of you that have been doing Value Engineering work for some time, know that sometimes you can gain significant improvements in value merely by changing your source of supply - by going to a better source of supply.

So we have this split responsibility for product cost and like quality, where we have something which is a split responsibility in industry today, things that become sort of everybody's responsibility becomes nobody's responsibility and no-one then really accepts their share of responsibility for them. So that is the thing that creates the situation, the problem that we are faced with in industry today. How to get acceptance of responsibility and co-ordinated effort of these various people in this area of value which is the relationship of satisfactory functional achievement to the total costs (and I'd like to say) to the user or the customer and is ultimately the real definition of value.

Other line functions are the Financial that control the accounting area, and Manpower, Industrial Relations, Personnel and Legal. These are the

Staff functions are generally all those activities and people not directly involved in day to day operations and decisions. These are not always easy to identify - there's not always a clean split between line and staff. Some people in line operate part time as staff - some people in staff operate part time as line, and so there is that cross over. Nevertheless, these are some examples of the staff people; Quality Control, Reliability - Now there is an organisation which has in some respects in some companies a rather large share of line responsibility - it also has a number of staff activities and responsibilities; Value Engineering, O & M, E.D.P., C.A.D., O.R. and other specialists of this nature which seem to be around in industry in increasing numbers these days; Training people, technical and production specialists of all kinds and Standards people. These are the co-ordinators, motivators, the auditors and the innovators to a large degree. I think they serve a useful purpose in industry today because they do stimulate line people and do assist them in many ways, and there are many good reasons for having competent staff people. Incidentally, management has not always learned how to use staff effectively and that's a problem in itself.

The integration of the human system which means the difference between mediocrity and top operational efficiency and productivity, then, requires a management which is acutely aware of the need for and benefits of teamwork. Thus, one of the first things that needs to take place is that the management is made well aware of the problems that they are up against today. There is a great deal of management around that, unfortunately, is not aware of that, and so this is a problem that many people who are advocating certain techniques, teamwork and other integrated actions, came up against immediately.

Management must create the atmosphere that is conducive to teamwork, and this is very important, a sort of intangible thing is this in a business. You can see that in some businesses where the manager does create this kind of atmosphere, there is an inherent desire on the part of employees to co-operate with each other. It's like the Manager of a football club who gets his team working in a teamwork kind of a way so that they are all co-operating - not trying to grab the limelight, but operating as a total team for the benefit of the business, rather than their individual or parochial desires and interests.

Going on from there, you not only have that kind of recognition but they have to encourage team-work, specifically, demand it, plan for it as an activity; organise it and measure it. These are fundamental managerial techniques again applied in a value way to the use of people.

One way to ensure teamwork is by management establishing some organisational and operational model. It's nice to talk about things in a general sense, but when you can visualise them, as some of the things we've seen here on functional analysis it brings things into focus and highlights them. Thus some operational model or matrix showing the responsibilities of line and staff personnel is a useful thing. This matrix will be a blueprint of the human system showing the functional contributions, the relationships and the situation resulting. What I mean by this matrix is something I've seen being done fairly well in a number of fields. Reliability engineers have produced these kinds of matrixes about the things that need to be done to ensure reliability. As shown by Fig. 1 you identify down to the left hand side various steps, tasks, functions, or procedures of new products, design of developmer etc... The various things that go on as routine in business. Across the top the various organisatior or personnel or other identification of those entiti that make up the whole human element of the business, and then in the main block can be indica the organisation or person responsible for the function and the degree of his contribution. Now with this kind of a matrix you can visualise who needs to do what, when and how they fit in to all the activities. Before continuing with a more detailed example of a work matrix I'd like to discuss Staff functions in business and their responsibilities, relationships to line, because the make a significant contribution to teamwork.

Take four areas of staff activity; quality, value engineering, standards and industrial engineering. These are organisations which exist in most businesses. In Plessey Company about a year and a half ago these four areas of activity were groupe together in one Engineering Support Services Organisation at Company Centre. By putting these together in one organisation we are trying to encourage and set the pattern for integrated actior of these elements in the various operating Businesses of the company. The integration of these functions in any Business will go a long way to help Value Management because of the importar role they play in product development and production and their relationship to line functions. Moreover their activities must be co-ordinated because of the commonality of their objectives.

Why do we have quality organisations in business today? What is the function of Quality personnel and organisations? They are not necessarily there to screen out the good from the bad, which is generally the concept still in many businesses. They are there primarily to ensure that a system is defined and activities are carried out which will produce a quality product. Just because you may have a quality organisation doesn't mean it is responsible for quality - it is not. Many people in a business are responsible for quality. The qualit people are there to define a system and activities which will lead to a quality product and which will be carried out and implemented by those functions which have the responsibility for the quality product. This means a product which will meet the customer's requirements in performance and reliability and is agreed as achievable by the manufacturer and the customer. Thus quality is achieved with conformance to an agreed specification.

Value Engineering personnel and organisations are established primarily to ensure that a defined system of techniques is employed to produce a product of high value, meaning a quality product at least total cost to the customer. So in quality wor the emphasis is on quality and reliability at a desirable cost, and the Value Engineering people want to get a product that is at least total cost or better value with the essential quality and reliability.

FIGURE 1

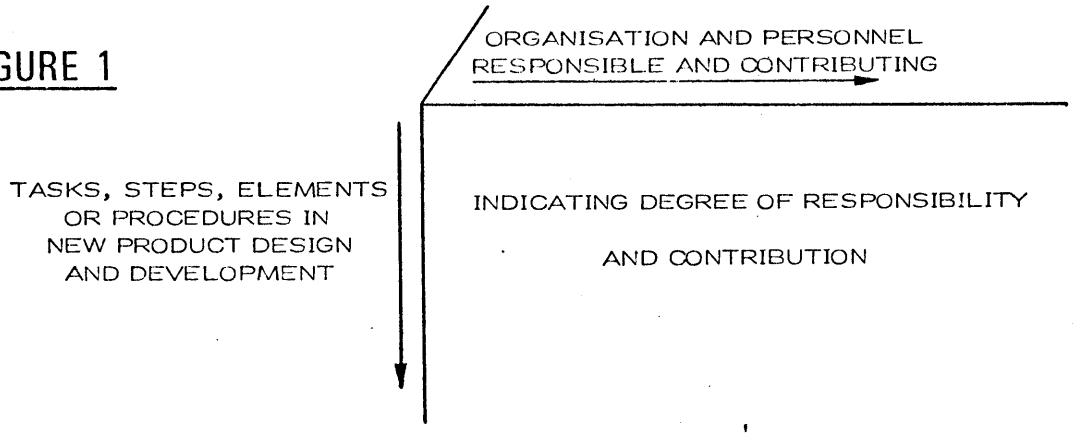


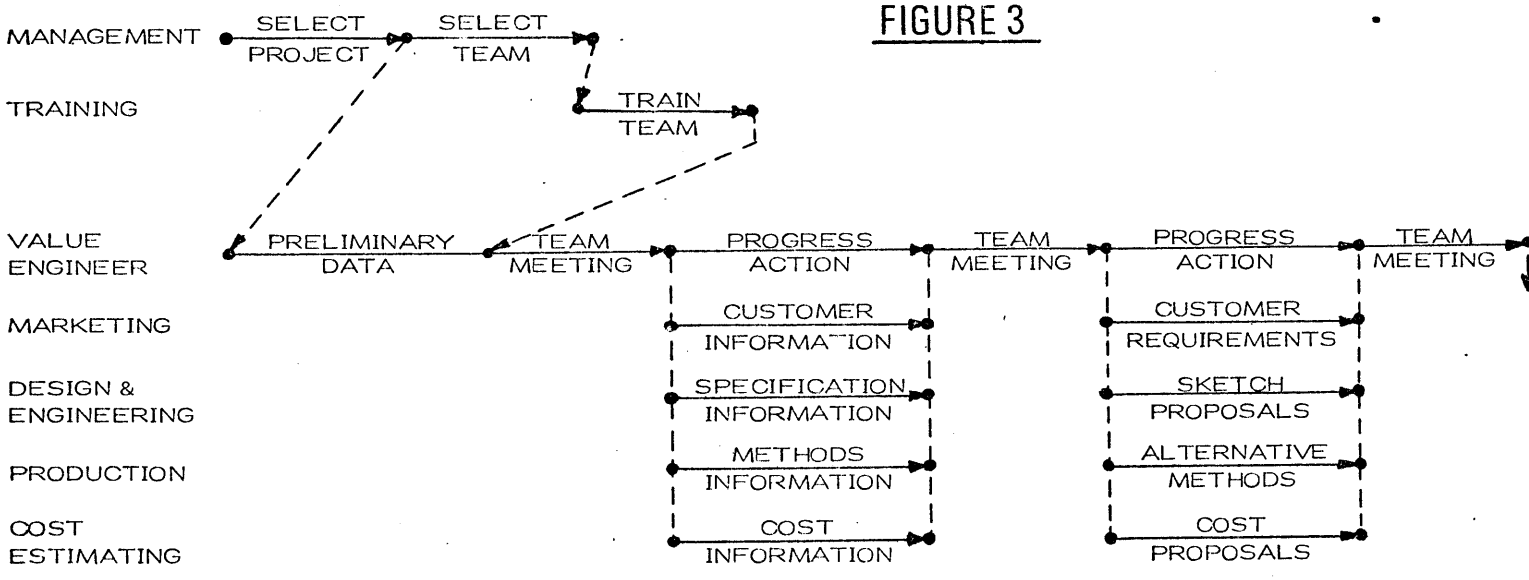
FIGURE 2

MATRIX OF ACTIVITIES
AND RESPONSIBILITIES

TASKS	GENERAL MANAGEMENT	MARKETING	DESIGN ENGINEERING	ENGINEERING	MANUFACTURING	FINANCE	QUALITY	VALUE ENGINEERING	STANDARDS ENGINEERING			
IDENTIFY MARKET REQUIREMENTS	C	P	C					C				
DEVELOP DESIGN CONCEPTS		C	P	C	C		C	C	C			
SET COST OBJECTIVES	P					C		C				
PRODUCT DETAIL DESIGNS			P					C	C			
ESTABLISH MANUFACTURING METHODS			C	P	C		C					
MONITOR PERFORMANCE AGAINST OBJECTIVES	P		C			C						
REVIEW DESIGNS		C	P		C		C	C	C			

P – PRIME RESPONSIBILITY
C – CONTRIBUTION

FIGURE 3



material, parts, procedures etc. The lack of standards in procedures, parts, approaches and techniques, have created a great deal of unnecessary costs in products, and I think that the Standards Engineering profession need to rekindle a drive with industry to demonstrate to management their significant contribution to the value of the product. Standards people have fallen backwards in the last few years in the creative application of their own area of contribution to the business. They have become trapped by their own promotion of standards as being a fixed situation. Any good standards programme certainly needs to be flexible and dynamic to keep up to date with change. There are a large number of case histories where industry is building products which are accepted by the customer - because they have been accepted historically. The continuation in multiplicity of numbers of parts and numbers of different approaches wastes a great deal of money.

Industrial Engineering is work concerned with a definition and implementation of integrated systems of men, material and equipment concerned with manufacturing so that products are efficiently produced. Again we see a similarity in the objectives and work of these four areas of staff or line support.

It is important that staff work is integrated into the industrial team because of their multi-disciplined approach. Fig. 2 shows an example of a work matrix with two degrees of contribution responsibility of various line and staff functions. The degree of contribution and responsibility is variable and sometimes I have seen three or four levels listed. That kind of a matrix gives a picture that shows when a certain function is being performed there are various people, organisations and activities within a business that need to contribute to it. Thus you then have visual matrix which shows what needs to go on at a particular step or element of a procedure or in a certain activity. Now this can be very much more detailed than this is. Matrixes of this type in the reliability field are very well detailed regarding specific things that go on; who contributes, who has prime responsibility, secondary responsibility, contributing responsibility, who must put input of various types into the procedure, etc. Certainly knowledge that exists in all these functions and people is needed in nearly every phase of the product's life cycle. I am not just talking about the product design but all the way through the product's life cycle from the conception through to the end of the product's life in every business.

Since the techniques of Value Analysis were really conceived to help solve the problem of integrating creativity and knowledge. They can form the basis for Value Management and the improvement of teamwork in industry. To illustrate this we can go into team V.E. studies which were well covered by the previous paper. Fig. 3 shows what goes on and what various functions of the business do, and how they contribute to the team studies. This is a useful administrative and planning tool to define the whole project. They can get more complex into critical paths or PERT networks. It also illustrates that teamwork as both a routine activity and as a specific product study is not just a group of people sitting around a table talking to one another. It involves meetings at which activities are defined, needs are identified and specific assignments are to the total objective. In other words there has got to be a complete understanding as to each other's capabilities to contribute, when they carry the ball, when they pass it to somebody else, how the team is going to move in order that they end up putting the ball where they want it to go. Between these team meetings the various members carry out specific tasks. The different stages of the Value Engineering study can be identified. Certainly teamwork, as previously illustrated, is extremely effective.

Fig. 4 shows the type of result which can be achieve by Value Engineering teamwork on a variety of products with both high and low production rates. The number of days shown is the time spent by the team in generating the ideas .... in doing the initia Value Engineering work. It is not the number of days required to complete the Engineering and to ge it into production .... that is the implementation period. The % savings is a good indication of the effectiveness.

What kind of results and benefits do we get from thi kind of value management discipline and teamwork being injected?

Product Specifications are more compatible with true customer requirements.

Specifications are more technically feasible (this is something that needs to be done as an integrated effort, early in product feasibility studies, i.e. the specification should be reviewed thoroughly from a functional stand point. So often we get locked in to temperatur requirements that are impractical and just tha little thing can create a loss of millions of pounds in engineering and development time which is one of the most important elements in cost in some of these system type programmes where a minimum amount of hardware is being produced).

Design and development schedules are more closely met. This is the time factor and I think that people have always said that we can' afford to do Value Engineering because we haven't got the time to do it. What I have four is that total time to get the product into production, and to get it delivered on time is often greatly improved by the proper integrati of knowledge and teamwork back at an early stage. Again, this business of 'we've always got time to do it over again if it's not right the first time.....'; but time, not only cost, is o of the fringe benefits that you get from teamw

Drawings and specifications are more comple and accurate, hardware is more producible, fewer design changes; we spend tremendous amounts of money with design changes, witho even planning to do it, a well integrated effort will reduce this expense.

Tooling is more attainable at lower cost. To is a very important element of cost, often neglected.

Manufacturing costs are lower.

Quality and reliability are better.

The U.S. Department of Defence Value Engineeri programme has been in operation now for 20 year or so with the last 11 years in a very intense phas The American Ordnance Association made a study the V.E. proposals submitted by industry to ident

improved and only in 1% was there a degradation. Now that's a very significant thing when it comes to management understanding of the benefits of Value Engineering. All of these other things listed were also improved, so the fringe benefits of the Value Engineering are extensive:

Quality costs are lower.

Production Schedules are more achievable.

Supplies (materials and products) are lower cost and available on time at the quality levels desired.

Customers are more satisfied

That's the essence of teamwork and Value Management.

FIGURE 4

PRODUCT	TEAM STUDY	TEAM COMPOSITION	NET ANNUAL SAVING	% SAVING
TRAFFIC CONTROL SYSTEM	15 Days 1 Team	Value Engineering Design - Electrical Design - Mechanical Industrial Engineering Purchasing (Commercial & Quality part-time)	£40K	44%
HOT WATER HEATER	5 Days 1 Team	Value Engineering Production Purchasing Design Inspection (Accounts part-time)	£131K	36%
PHOTOGRAPHIC EQUIPMENT	5 Days 1 Team	Value Engineering Research & Development Engineering Design Production (Purchasing & Marketing part-time)	£19K	26%
PAINT SPRAYING EQUIPMENT	5 Days 1 Team	Value Engineering Engineering & Design Production Purchasing Design	£16K	72%
ELECTRONIC TUNING UNIT	4 Days 1 Team	Value Engineering Industrial Engineering Electronic Engineering Mechanical Engineering Design Purchasing	£47.5K	74%
POWER STATION EQUIPMENT	30 Days 4 Teams	Typical Team Value Engineering Design Engineering Production Engineering Purchasing Foreman Welding Engineer Contracts Inspection Accounts	£75K	24%

DISCUSSION

Question:

B. Lilley - I.C.I. Mond Division

You seem to assume in your talk, and indeed to a certain extent the talk was structured around it, that line and staff management is something that is going to be the environment in which Value Engineering progresses. If you think that there is going to be a change away from the line and staff system, as Value Engineering becomes established, would you like to speculate on what that change might be?

Answer:

Fred Sherwin

In the first place I don't necessarily see business progressing away from that, but if they were to progress away from staff and line activities into total line, then they need to, under the theoretically ideal situation, have people within line that are doing certain things that are only being done and only happen because of staff being available to motivate and stimulate those things happening. What happens normally is that line people get so involved, and rightly so, with the day to day operations and routine of doing things that their motivation to do things differently, take that one step forward which means improvement, is not stimulated within their own line activity. But ideally, I think, like the use of Value Engineering or Quality Control techniques, the objective of staff is to make the routine use of these techniques an inherent day to day activity, so they're trying to work themselves out of a job constantly. Then you might say, staff can then back away and do the advanced thinking, the advanced research and the forward look that line doesn't have the time to do, which is really the ultimate thing that staff should be doing.

Question:

P.G. Buxton - British Aluminium Company

Many companies now are part of large groups and I wondered if you have any experience of teamwork operating within the group or individual companies?

Answer:

Fred Sherwin

Plessey is certainly one of them, Pye, I.C.I. and others have a corporate identity with many Businesses. There's always this question in corporate management's mind of how much do they force integration of those Businesses or how much do they leave them independent. I don't know that there's any pat solution to it but a lot depends on the style of management of the particular business. I think in answer to your specific question, there are things that corporate staff can do to help that integration and one of the things for example, is that we have Quality Council, we have Value Engineering Council, we have Industrial Engineering Council and these Councils are represented by the Senior people in these various activities. We meet monthly, quarterly and so forth and discuss professional problems, business problems etc. We therefore, acquaint these people with what begin to communicate with one another we find a flow of information taking place between the businesses which is useful.

Question:

A. Byford - Marconi Space & Defence Systems Ltd

It's been said by quite a number of influential peopl that if this Company improved it's management structure and it's way of operating it's companies, we would have no balance of payment difficulties at this time. This is the greatest area which this country has for improvement. Which areas in management, Company management would you pick out for Value Engineering in this aspect?

Answer:

Fred Sherwin

I disagree with one thing which you said during you question, and that is that management structure is necessarily the contributing factor. I think manage ment is the contributing factor, not necessarily the structure which the management operates. I think possibly the structure is alright but management itself is not thinking right. I'd say the biggest thin that could happen to improve business in the U.K. is that top business management that really influenced the policies and activities of businesses became more technically and productivity orientate rather than financially orientated, and that they recognise the human and teamwork problems we have been discussing.

Question:

A.G. Gregory - Warwickshire Training Services L

Would you say that there is a size of company belo which these techniques would not be applicable. Managerial or the cost point of view?

Answer:

Fred Sherwin

This is a question which has been discussed for years and we used to say when you talk about a million pounds a year company you may be getting to where it's marginal whether you want to have a Value Engineering specialist or staff. However, I think you've got to look at the product. You've got to look at a lot of other things but certainly the amount of money being spent is one of the big determining factors as to how much money you put into reducing the amount of money being spent. So in large companies we talk in product cost reduction sort of thing. They can, because of the sheer numbers of pounds they're spending to produce products, afford a greater investment in trying to get that money out, and therefore they can afford to have Value Engineers and other specialists in the company that are working towards those objectives, and make that kind of investment necessary. We are talking about financial investment. You don't get something for nothing, and I've seen a lot of people expect that they're going to turn a crank and have a Value Engineering programme and out of it is going to roll all kinds of pounds in savings. You've got to make an investment, and you have to make a

Human Factors in Management Resistance to Change

By F Bowyer

Independent Management Consultant

Human Factors in Management Resistance to Change

By F. Bowyer

There have been a lot of people talking about motivation, which of course, is the centre point of overcoming resistance to change and much management theory is formed about how to overcome resistance to change; people have been writing formulae even equations on how you can overcome resistance to change. I want to move right out of industry and I beg your indulgence for this, because I'm going to take the whole thing back to the individual. We've had a mass of theorists who have been talking about motivation and who for years have seemed to think that management was a specific and different area; that we could talk about industrial motivation as if it was something separate from individual motivation and that somehow or other once we got a hierarchy we could do things with people if we only used the right tricks.

Let us look at some of the factors we can consider. I am producing no facts and figures, no formulae, nothing that you can use and all I hope is that you forget what I say so that you re-think the whole thing and find an opinion for yourselves. If I can act as a trigger mechanism to your thinking, then I will have served my purpose in this conference.

The first thing we've got to worry about is the difference between motivation and manipulation. This of course is where many of the theories fall down. A lot of people, for a long time, particularly in management, have been writing theories of motivation which amount to little more than theories of manipulation. Now people are very sensitive to being manipulated. They are very easily able to detect manipulation however good a form it comes in - however much you say I'm doing this for your own good. People are very quickly able to detect when they are being manipulated. So I want to make that differentiation quite clear from the start - I'm talking about motivation and not manipulation. Motivation is from within. Manipulation is from without.

How are we going to build up some idea of motivation if everybody apparently is seeking to manipulate and yet motivation really is from within?

We will think about needs for a start. Now, and here I am going right out of the industrial setting altogether. I think that we've got to start right from the infant. Every person in this room has still an infant within him, and that infant is still affecting him, whether he likes it or not, it is still with him. Whether his needs were satisfied or not satisfied as an infant has a great deal of bearing upon his present personality. As an infant, the first needs of course are for food, warmth and love, and probably of these the one that is most often lacking and causes personality deviations is love. The child gets the food he wants, he gets the warmth he wants, but in the form that he needs, he doesn't get the love he

I remember a pop song - and you've all heard it - from 'Fiddler on the Roof' where this rather ageing fiddler is saying to his wife 'Do you love me?' and she replies 'I've washed your shirt, I've ironed, I've put you to bed when you're drunk' and he comes back 'Do you love me?' But she won't answer that she loves him, she just keeps saying what she has done for him. Then he keeps pressing his point 'do you love me' and in the end she's more or less forced to recognise that perhaps she does. So often the infant is in exactly the same position. The parent does everything for him but never quite gives it the sort of love that it expects from a parent. It doesn't know any different. Intuitively it wants to be cuddled, fondled, kissed etc. and in this respect it needs love. It's the first requirement after food, to have love. And yet this deficiency or this deprivation of love could make that child into a boss, or somebody that you are going to talk about - an executive in a company that you have got to deal with, and who acts to you in quite an irrational way. You can't understand what makes this bloke tick because he doesn't tick in the way that you would expect him to. He would seem to have a most illogical and cantankerous way of going on and you can't fathom this out. There seems to be no logical explanation of what you can do with this man. You read up motivational theory and all this sort of thing and find all sorts of cliches on how you should tackle him but the point is that you haven't got back to the basic problem you haven't got back to his infancy. Now unfortunately we can't put everybody in industry on the psychiatric couch, but what I am suggesting is that an understanding in the way the personality is built up allows you to get an idea of what you can and you can't do and how you can overcome some of these things.

Maslow did some pioneering and very efficient work in working out what people's needs were. He found out that people's needs basically went into a hierarchy of needs - that is they were an ascending order of values - and that these needs were more or less the same for practically every race on earth. Some countries, the under-privileged countries like India, and Pakistan at the time he was investigating, didn't satisfy the basic needs of man and in other countries like Sweden and America and places like this they were very much satisfied. It was upon this degree of satisfaction that the person's personality was formed and you could more or less put him into some convenient sort of classification with which you could deal. He made five classifications - level 1, 2, 3, 4 and level 5 man, and as you would expect since this is a hierarchy of needs he said that the level 1 man, very much like the infant, was very concerned with his physiological needs. That he had a basic need to be warm and fed and have air and this sort of thing - that his main concern was this need for physiological satisfaction. Now in this country this seems a bit silly if you don't consider what you read in the newspapers about the famines and so forth in India as being true. It serves as a very

person has starved for many years, and has always wanted, he has been in a state of continual hunger, he feels that heaven would be a situation where he could guarantee his next meal, that if only he could have a meal for the rest of his life he would never ask for anything more. But of course we know this is a fallacy. Bring him out of that situation - put him into a situation where he starts to get regular food and he moves on to the next need level. He stops thinking about food and he starts to think about safety, security, property, his house, getting some security against want, against not having another meal, building up something inside the bank, doing something in some way to guarantee against disaster. So we move to the level 2 man who has a great need for property, resources and a great need to look after himself - Jack. Never mind the next man. Keep me all right. Then we move on of course, where even those needs are satisfied and he feels he's pretty secure. He's got a reasonable security of resources. What does he then start to think about? Then he starts to think about social needs - friends, people who admire him and so forth. People with whom he can feel identified with. He starts to think in terms of a social circle. He starts to think in terms of teamwork, in terms of being 'in' with a group. His group orientation is level 3 thinking.

Having come through the social needs and the need for friendship and so forth, he then may move on to level 4. Level 4 thinking is characterised by esteem needs and need for power. He starts to feel important. He starts to feel that he is the centre, if it's going to be a team it's going to be HIS team. He starts to feel that if he's going to have things done it's going to be HIS way. He starts to feel that if things are right as he says them, it must be right. 'Don't bother me with the facts, I've made up my mind'. Level 4 thinking. Of course this was very generic, and Maslow's work has gone a long way from there, but he did pioneering work in this field of motivation.

Level 5 man was extremely interesting because it brought Maslow to a whole concept of psychology, called humanistic psychology, which had not then been exploited at all. He wanted to look at what he and other psychologists could rate as 'normal' people and see what made them tick, and you've got to remember that prior to this work the basis of psychology was 'abnormal' psychology. It used samples of people who were known to be either mentally ill or neurotic, or at least evidenced problems. Well of course in Maslow, moving on to level 5 thinking and level 5 motivation, he took samplings of people that by every criteria of normality, he could fairly well guarantee as being the sort of people that we ought to be - the sort of people that it would be desirable to be. Very much evidenced in the sampling is that the level 5 person was one who was very much concerned with his own growth, his own development, the realisation of his own potential, that he was looking at people who had first a consideration of themselves in society in relationship with others without so much of the power complex, and the need to be right. In fact if you look at the level 5 man and took a characteristic statement of his life and his philosophy, he would probably say 'all that I know seems to show me that this is right, but if you know any facts that show me that this is wrong, I want them because I am prepared who liked to put things right, to tidy things up, to make things good. To put the picture straight and he wasn't afraid to fight if fight was justified - but he didn't like fighting for it's own sake. Unlike level 4 man he didn't like esteem for it's own sake - he didn't have to be made important. That was not important to him any more. What was important was getting somewhere, doing something, achieving something. Realising his own potentials. It was seemingly self-centred, this view that Maslow found of the level 5 man. So that in moving up through such a hierarchy of needs, we move up through these various levels from a very basic sort of person who was grovelling around looking for his next meal, to a person who was hoping to completely realise his own potential, without ever obviously being able to complete the situation, but always striving to do so. And this in turn sparked off a whole psychology which was quite new, because the psychology that was sparked off was around people who were operationally effective. The sort of people that we ought to be.

Another thing that interested Maslow was that whereas previously in looking at people who were problem people, or people who had problems or people who came for assistance because they were neurotic or something like this, everybody has been looking at people who were afraid to look into themselves. In Freud's terms if you took the lid off the person you were scared stiff of what was inside. It seemed that everybody who started to look into themselves were scared of the bogies and the demons that they found there, and of their own irrational urges. In the humanistic psychology when you looked, Maslow found that they were able quite rationally to look into their own processes, and find that the fact that, we were all basically murderers, was neither good or bad. This didn't worry them - they realised that evolution had gone such a short way along its chain of development that they could say 'I want to kill that person' as quite normal and is a part of being, that they could deal with this and accept it, whereas the person lower down, if he was level 4 or level 3 would have a terrific guilt complex about this thing, whereas the level 5 man could move through such an emotion and even probably see himself acting it out without being compelled to do it, like the level 3 man or the level 4 man would do. So here was another thing that he found out, that people were seemingly basically good as opposed to the Freudian view that people were basically bad. Now this was no detriment to Freud's work because this too was pioneering work, he had his work cut out to break through into the unconscious in the way that Freud did. The development of such work that led people to the concept that we all had a good person inside us, if we would only release it, and this is not good in the 'goodie-goodie' sense, or the religious sense, but good in the sense that we have a potential which we can realise.

Now a problem attached to this development was whether we had to go through all these levels, whether in fact you had to go through level 1, level 2, level 3, level 4 before you can get to level 5, or was there a bit of all of these in us at the same time. And there does seem to be mounting evidence that provided you are above a certain level 2, everybody above level 2 would have quite a good view of level 3, level 4 and level 5 thinking, and that therefore, these do co-exist, and we can start to use them before we arrive at these various levels. In fact in a situation of education and affluence that we've

but because of infancy trauma and things of this nature, there may well be people who are stuck at level 3 - this is the identification of the group. So that from a point of view of measuring people we can say that this is a convenient boxing system but it mustn't be too rigid. If you make it too rigid you trap yourself again, you are in the same dilemma as the modern theorist on motivation when they try to put everybody into a single sample or a few samples.

The Maslow hierarchy of needs, co-existent in modern psychology with the drive theory. It is very difficult to work out a satisfactory model. I've tried umpteen times to try and get a model that correlates Maslow's hierarchy of needs and the drive theory and it's a very difficult thing to do. The drive theory presupposes that we're all driven by certain things. That we are compelled to do things because of certain things innate within us. With Freud, the drive theory that mostly occupied his mind and seemed to have a lot of validation in the sampling he took, became famous as the 'pleasure principle'. That everybody was motivated ultimately to pleasure. That the whole of their life was devoted to seeking pleasure in some form or other. This really got knocked very very quickly, because so many people found out that people didn't seem to be motivated by pleasure at all, and that their organisms seemed to be striving even for pain. That they seemed to be working not on any pleasure principle at all, but that they actually seemed to enjoy being miserable, and so whilst there may have been a sample of people who were striving for pleasure, the pleasure principle didn't hold good as a general concept. Another thing that was fundamental to Freud's work was the reduction of tension. Man seemed to want to get into a state of relaxation - that he wanted to release tension, so that if he was angry he had to fight, or if he was energetic he had to run, and so on - that he wanted to release his tension in some way or another so that he could be in a state of relaxation. Even this didn't hold up against modern research, because people seemed to deliberately put themselves into positions of tension, they seemed to seek out tension. They seemed to go for situations that would deliberately and artificially create tension. Other drives have been identified, particularly by McClelland, who identified the need to be loved, this is fundamental to everybody. There is a great need to be loved, and this is a big drive. Everybody seeks love in some form or another. It may change as you get older, but in some form or other everybody wants to love and they want to be loved. So the need to be loved is basic, a basic drive. The need for power has also been identified, and this very easily ties in with your level 4 man. So there's a need for love and a need for power. Another drive that is sometimes identified is a need for achievement. Now we are starting to talk about needs.

If you're going to think about overcoming resistance to change and the human factors involved, you will find yourself repeatedly dealing with 'what are this man's needs?' What is this company's need? Are these two needs compatible? Where can I facilitate the integration of these needs? As the person grows up and is either loved or unloved, and as I say the important part here is not that he's unloved by society measure, which doesn't count for anything at all, but by the individual measure of that and the other' has no bearing on it whatsoever, What matters is the child's need for love and how the child needs it to be expressed - not what society thinks. As he grows up, so that child starts to have expectations, which is the next link in the motivation chain. He has expectations of his parents, which is probably his first expectation - he expects them to be this way or that way, or do this for him, or do that for him. A little later he comes to have expectations of himself. This is obviously a little more sophisticated. What do I do? How do I react? How could I react in this or that situation? Much later he comes to have expectations from society, by society I mean anybody other than his parents. Society in these terms are his mates, his friends, his relatives, the people who come and visit him. All these people who he sees, he comes to have expectations of them, and in expectations of society he will in turn come to have expectations of his work situation, which brings us back into industry. He will come to have expectations of other people - in fact in relationships with others, and in having expectations of relationships of course, you move again into the whole theory of motivation and action, interaction and behaviour.

You cannot grow up in this way without considering, albeit sometimes unconsciously - perhaps consider is not the right word, without formulating either consciously or unconsciously a self-philosophy. Having got all these expectations of people - of parents, of society, of yourself - of the work situation of your relationship with others, you start to think about 'My way', 'Your way', 'Our way'. Now our way is not really a way in the philosophic sense. Because it is a compromise. My way, I can defend to the death and understand. Your way I uphold for you to have without interference from me because it is your way, and therefore sacred to you as my way is to me. Directly we try to make our way, one of us has got to give way, and in our way we come up against a philosophic compromise. Let's think of our way, Marriage is an 'our way'. This is what makes it such a dicey problem because it's a combination of two ways - two people trying to get their ways to fit in. Company policy and individual aspirations is an 'our way'. When you start to think of company policy and what you want of the company then you're talking about an 'our way' situation.

Why are you all here? Answer that in the mind. You may be here because you want to identify with the Institute of Value Management. You may be here because you feel that you daren't be left behind, in the new techniques. You may be here because you feel you are important going to a conference. You may be here because it means getting a day off work. The reasons for being here - there are many many reasons why you are here. It would be hopeless to try and write a motivation theory that fitted everyone in this room for being here at this particular point in time. You may be here because you're very level 4 and you're very important and you want to go back to your company and show how much you have learned at this conference and to start parading around that telling people where they ought to go and what they ought to do. On the other hand you may be level 5 - you may be here purely because you think you can pick up knowledge. So you see in starting to think out 'my way' - Frank Sinatra made a song of it - you've always got the problem of thinking of the other bloke's way, and

'Company policy' is very much an 'our way' situation. Company policy is best defined, I feel, as guide lines for decision making, which means to say it is wide open for the compromise of ways. If company policy is written down as this, that and the other, all facts are established and inflexible, then of course there's no hope of a compromise. We can have Union problems, we can have middle-management problems, we can have all sorts of problems with resistance to change, because what you've done is to say to a bloke 'I don't believe in your way, you're going to toe the line the company way'.

If you're going to work on a compromise situation, if we've got to try and work out a way between us to achieve something, we have a communication problem. There is hardly anything you can do between people that is not fraught with this problem of semantics - of me saying one thing and somebody else interpreting it in a different way. So that the problem of establishing our way is very much tied up in the problem of communication. Problems in implementation are nearly always a problem of getting the individual way to match with the corporate way, and getting them both to understand what the individual way is, and the individual to understand what the corporate way is. This is why communications management has such an impact, because people start to learn how to talk to one another in a way that is meaningful and they come to some sort of compromise that is effective. Another problem is lip-service, now I don't know of any problem that is as great in management as lip-service. I would rather a bloke stated outright that he hated my guts and I knew exactly where I stand with him, because I know then what I am fighting, rather than a bloke that would say 'yes Frank, I'll do it' and month's later 'yes I will get round to it', and a month later 'for this reason or that I didn't do it but I can assure you that it will be dealt with'. You cannot really deal with lip-service because there is always the promise that something is going to be done, and what the bloke is really saying is 'I don't want to do it'. It's the communication problem again, because he in his personal way, feels that you are asking him to do something that is wrong. Management policy being as it is, pressures him to do what he sees as wrong, not to argue about it, so that he feels compelled to say 'I will get round to it' or 'I will do it' as a means to resist the action. So communication too can be a very big stumbling block.

Now I said that as the child grew up, so it's personality retained some of the problems of infancy. You've got to remember that in dealing with people you are always open to the violence of their individual reactions, and the way that we grow, we leave some areas of ourselves undeveloped, and this can be very disconcerting to the person who expects to find a logical and reasonable man, and finds that he is neither logical nor reasonable. That a very rational proposal that he is putting over is received very adversely and the bloke becomes very emotional. He just cannot understand why this individual should react in this way, and of course unless there has been a lot of research into this man's background and we have a very good idea of his personality, you will not know what touched off the explosion. Behaviour in a certain situation, is a very complex thing, it is first of all based upon the situational role in which we find ourselves. People have talked about roles, line or staff, identify? How do you feel that you should react to such-and-such situation? You will find if you look at your own roles that they are very very complex. If we take a matron in a hospital, her role with the probationer nurses, the staff nurses, the doctors, the patients, the visitors, are all different. The same role but she has a different face to every one of them. You will find if you look at your roles that you have different hats that you wear too. There are some of these hats you put on in which you can be very touchy indeed. Particularly if your professional role is challenged or queried. So that role has a very big part to play in determining how you will react and how you will behave. Earlier we talked about the formation of personalities based on expectations. What are your expectations of your role? Are you Value Engineers/Value Managers because it will make you more important? Because it will challenge you to make the utmost resources that you've got? Because you have a flair for this type of work? Because if this is the case, obviously in being approached, particularly where you're resistant in any way, this will govern your behaviour - the way that you identify. What do you think of your personal role in life? What do you think of your professional role? Also of course you're governed by your conscious and unconscious goals. Now it is bad enough dealing with peoples goals that can be expressed. Management by objectives makes a big thing of asking people to express their goals - to say what they want to do in certain situations and certain departments, in certain cost areas etc. There are a lot of unconscious goals that people themselves don't know they have. Very few people who have a need for power really recognise it. Yet, where management is very resistant to change, you've got to recognise it, or woe betide you. If a person has had goals and they have not been achieved they may be very disillusioned. They may have a chip on their shoulder. They may react badly because of their apprehension that life is going the wrong way - that it's not exactly what they wanted. They may compensate. If I can't have the candy well I'll make do with the cashew nuts, or something like that. They may just go for something slightly less. They may go for something quite irrational. If I can't have promotion I'll make hell around here. That may often be the case and in overcoming resistance to change you may be dealing with this situation. If they are compensating in some way or other, like lip service, it is very difficult for the person to deal with because you do not quite know how they are compensating, why they are compensating, and since it's often an unconscious process, short of putting them on the psychiatric couch, you've got little chance of finding out. However you do intuitively sum the man up. Overcoming resistance to change is very much a matter of 'getting to know you'. If you get to know people pretty thoroughly you have a basis for working. You can start to find out how this man reacts. 'I know he's touchy on this point so be careful' etc. 'He's very enthusiastic on this.' However, don't think that here I'm pleading for manipulation. I'm just pleading for a knowledge of the facts. I still wouldn't say start to manipulate, based on how you know his character, because I don't think motivation is synonomous with manipulation. I said too that everyone wanted to realise their potential. This is possibly the one place where you can act ethically without manipulation. Since motivation is from within, if you can help a person to realise their potential, you will be assisting their self-development and assisting the company and yourself at the same time, and

it may be unconscious - it may be something that they want to do and haven't got the tools for it, and you can provide the tools. So if you assist a person to self realisation, they grow, and they grow more mature and responsible. Behaviour of course is very conditional upon age. If you've been battering your head against a brick wall for years and years to get something done, you get tired and you give up. You may be 100% right but if you keep on long enough you just get so fed up that you get frustrated and you stop, and this is also something you've got to contend with when you're dealing with people who are resistant to change.

The thing I want to finish on is still back to the child. Within everyone of us there is a child that is partially undeveloped. In many senses we've grown up - we've passed examinations, we've got qualifications etc., so on the face of it we are adults, but if you remember that within everybody that you deal with is a child, and that this child can be quite irrational at times, particularly concerning new things. Then you move into an understanding of the need for that child to grow, and every time you can assist that child to grow so you bring that person nearer to maturity, and remember you need it as well so it is a reciprocal process - everybody does it to everybody else.

People can be what is known as deficiency-motivated or abundancy motivated. If you are deficiency-motivated it means to say that for a long time you did without something and then you had to try and go through life making up for it. A million loving arms of all the women you could meet could never make up for the kisses and cuddles that your mum and dad didn't give you, but you just keep on trying and trying and trying. Abundancy-motivation is where you feel that you've got a lot of good things and if you only added golf and piano playing you'd have two more good things, but you are not compelled to seek them - you've got good things and you just add to your enjoyment. So in overcoming resistance to change, the best thing to do is to provide the opportunities for growth and self realisation. If you can do this, you don't have to worry about formulae or motivation.

DISCUSSION

Question:

A. Byford - Marconi Space & Defence Systems Ltd.

I would like to challenge the speaker's statement that if two people come together then only one has to give way. I think that both should have to give way, though there are, of course, varying amounts that each has to give way. One has to give way a lot, one may have to give way only a very little but I think to get the most acceptable solution to the two parties they both have to give way, otherwise one of the parties feels that he has been 'done'. I think that if you want to arrange that a suitable compromise occurs, then you as a person have definitely, if you want to achieve success, got to know, as our friend says, the other person, because that is the best way of achieving what you want in terms of successful negotiation.

Answer:

Frank Bowyer

I can only apologise for the quality of my communication because I certainly intended to say or to give the impression that people should both give way - that the compromise situation is both people coming together and seeing that they've got to negotiate and to come to some compromise situation, and I certainly agree with the questioner that there can be no lasting or even ethic compromise without both people making some contribution to that solution.

Question:

C. W. Hogben - British Post Office

I was interested in this question of self realisation; not possible. We are not all of the calibre and there's not the opportunity for all of us to become Managing Directors, so there's a limit, and I feel that a lot of the trouble is where people cannot achieve their potential. What do you do when this happens?

Answer:

Frank Bowyer

I think that there isn't sufficient realisation of how fundamental the need is for people to realise their potential and how easy it is to facilitate this. Even the good listener, just as little as that, allows somebody to realise that part of their potential has been suppressed or dammed up. So that it is a difficult thing to do. You don't have to be God to do it. You'll admit that the Managing Director has a lot more scope, but even the most humble person in the organisation has a fantastic ability to realise other people's potential. It is very much, as the last person said, a question of getting to know people and allowing them to blossom. If you're all ready to expand and nobody gives you the opportunity there might be people within the organisation who realise this need and allow it to happen, thus you can do a lot to facilitate people's potential growth. So it doesn't have to be quite as dramatic as needing to be Andrew Carnegie or somebody like that to allow you to grow. It can be done in quite a simple way, and there is a lot that most people could do - and even just listening is one of these ways.

Question:

C. W. Hogben - British Post Office

Would you think that there's a limit - an environ-

Answer:

Frank Bowyer

It depends whether you can get them to grow big enough to step out of the environment. A person that is being limited by the environment, his property of growth is not really enforced by the environment, because he is not big enough to be able to shake it off and get the hell out of it. So the thing to do there is say 'look let's give him the confidence to step out'.

Question:

P. Higson Smith - Value Control Ltd.

Coming back to the economics in an industrial scene, can we afford to tackle the behaviour of people in individual level, or must we accept quite a lot of the time that we have to let the individual go by and look at it only as individuals relate to each other as they work in teams, as they work in organisations?

Answer:

Frank Bowyer

You've touched on a knot of the problem that is very much bothering the behavioural scientists and which is causing a lot of friction. You see, for years and years management has first been considered an art, then it was considered a science, then a behavioural science, then an economic necessity and so on and so forth, and all of this time the accent on how you treat people has been changing. Now this is a very big issue raised, because of what is happening now. If you went from 1960 to 1970 in management, you were looking at the age of techniques. Already this is beginning to be seen as something that has not had its day completely but is certainly on the wane, that people are becoming more important and as people become more and more important the individual is coming out as being highly important. I could quarrel with an earlier speaker who said 'what management needs more and more is to concern itself with technology and production', I am saying if you look after the people in the proper way, production and technology will look after itself. The point is that you can't have it in any one box. You see this is the problem that you've got to both take care of teamwork and the individual. If you tried to train a football team as a football team, without any concern for the individual, you are hopeless. Synergy, this jargon word, comes from the bloke on the wing swinging a long pass in to somebody who has practiced for hours nodding them into the net. They score a goal between them. It is a goal that is not the product of either of them individually, it's teamwork. It is two and two making five because neither of those two people could have scored that goal without the other person, so this is synergy. The ability to match individual skills together in such a way that the result that comes up is greater than the individual contribution. So you've got two and two making five. Resistance to change on the other hand gives you negative synergy. Where you've got two and two making three because you've got someone pulling back or using power or doing something that damps down the effort. So I agree with you, it's a very big problem relating to economics, and it's also important that we're moving into this area of developing the individual.

Management Development through Value Engineering

By W.J.Huxley

Senior Training Advisor

Engineering Industry Training Board

Management Development through Value Engineering

By W J Huxley

I want to talk not about Value Engineering, not about Value Analysis etc., I want if possible, for you to take yourselves out of your specialisations - some of you are experts - some of you are specialists. So please, if you would, step outside your particular specialisation. Let's talk about management development.

I've been concerned specifically over the past three or four years with supervisory management development in engineering companies. The Engineering Industry Training Board has to do with the whole package of industrial training, and, rightly or wrongly, administratively we started off by categorising people. Categorising them into Management, technologists, technicians, administrative, clerical people, supervisors, craftsmen and operators and we had to start somewhere, with making some recommendations about minimum standards of training. Having done that, we then had to say, 'how do we get companies to reach at least those minimum standards of training?' It has been stated that if companies had started training and developing their management properly, we wouldn't have a balance of payments deficit etc. That is quite right, but I would now reverse the question and quote 'where is the body of expertise within this country, or in any country, that you could look to, to get this training and development done?' Now, I would agree with the comment mainly, that is, that if we can get the management right in this country, then the other forms of development of staff would fall into place and we would make a profit. And that's what it's all about - making a profit. The aim of business is to survive. The way they do this is to make a profit. Now I said I want to talk to you particularly about management development. What has that got to do with Value Engineering and Value Analysis, Value Resourcing and now we have this lovely phrase 'Value Management'? (I'm delighted about the phrase and particularly I'm delighted about the second word.)

During this conference we have had some derogatory remarks about 'training'. Somebody said that training has got very little to do with Value Management. But you know, if you're in Management, training is one of the things that Management is all about. You have to get, as a Manager, a job done through other people. You have to set your policy, set your goal and you cannot do every job yourself; this is why you employ people. This is why people are responsible to you, and Management is in fact either telling, showing, or doing something with the people who are responsible to you. You can only get the job done through other people, and training does not stop at going on a 5-day practitioner's workshop - training does not stop at going to Harvard for two years, or going to a Business School for a week, or going to a college for a few weeks of supervisory training etc.

The effective way that a company develops it's staff is mainly on-the-job; on-the-job; doing the job; gathering information from everybody and anybody within the organisation. I would ask you to think outside the normal squares in which most of us think, and think of training not as the off-the-job part of the formal training. Training is going on all the time and if any people have had anything to do with formal management development within an organisation, then I suggest that any job description that the manager has, should include a specific key area, that is, training of their own staff. It is not the job of the training department to train people, it is not the job of a consultant to train people, it is the departmental manager's specific and personal responsibility to develop their own staff to reach the goals of their particular department or section, or whole organisation. So, can we think about training not just as the formal part of training, but the ongoing all the time day to day work. Now some of it's organised - some of it isn't.

As an adviser all I can do is to get as much information as I can and pass it on to you and present examples of organisations that do the same job, saying, 'Now would you like to take advantage of that particular method?' This is one of the main jobs of the training board, and of the consultant.

Most of the writings and discussions and the thinking about the subject of Value Analysis and Value Engineering have been based around objective results. There is no reason why it should not be so, and why the techniques should not be built around objective results. Profit is no dirty word as far as I know, but there is definitely another angle from which the whole concept can be viewed. What brought this other angle to my mind was a study of some of the aspects of formal industrial training undertaken by the Chrysler Corporation in Detroit. I was not looking at Value Engineering or Value Analysis, but for a method of evaluation of any particular training that this company did; and as you perhaps know it's terribly difficult to evaluate training. Is it worth while spending all this money employing a training department? Is it worth while sending this person on a Management Course? Is it worth while training apprentices if you like, for a year off-the-job, followed by various modules of training etc.? It's terribly difficult to evaluate. People validate the formal part of their training, but to evaluate management development, or management training, is terribly difficult. It's the measure of how much more effective a man is in his job when he has received some information.

I was looking for evaluation techniques on any form of training, and I could not find any, after three weeks. Course Validation, yes, Evaluation, no. But on the very last day I was shown a status report on the 'Value Control Course', as they call

it over there, and they'd only come up with 16 million dollars saving in a year'. Now maybe the Americans exaggerate, so I cut it down and made it 10% of that figure; even so, I think, they must have a method of evaluating a particular training programme, so then I go into this question of how they conduct their Value Control Courses, and how they operate Value Control in Chrysler.

I returned to U.S.A. to evaluate the Value Control at Chrysler. I looked at the five-day practitioners workshop which most of you have been on. Now, they're all pretty much alike. The contents of any five-day workshop whether it's run by Value Engineering Ltd., or Value Control Ltd., or anybody else who runs these particular courses, are pretty similar all the way through. Fig.1 shows a typical timetable for such a workshop. You, who have been on a practitioners course know that they go through all the individual steps to undertake a project, whether it's on a unit of production, or a system, or what else. If the words 'V.E./V.A. Seminar' were changed to 'Basic Management Techniques Course', not just for Engineers, not for assembly people, not for production people, not for design people, but for all management, we could put over to people basic management techniques which show the effectiveness of putting these theories into practice. Again doing a very shallow analysis, those items in the timetable which are marked with * were conducted by people completely outside engineering, or completely outside Value Engineering. Chrysler are thinking about the whole of their Management style rather than just saving 16 million dollars a year.

If we look at the Chrysler workshop timetable in detail, we find the very first session after the welcome by the Vice-President is a session on 'Listening' - now what has that to do with Value Engineering? A full session on 'Listening' - given by whom? The Sales Training Manager'. (Maybe it is a good idea to remember from time to time in any management situation that you've got one mouth and two ears.) Another session is entitled 'Human Relations', 'Habits and Attitudes', and there's another session on human relations. Now this was given by the Management Development Adviser trainer of the Chrysler Company, and you may think that Human relationship and 'attitude' has nothing to do with Value Engineering, but it does, because this is what it's all about. Because we haven't got any technical problems. The only problems we've got are people problems. I don't think that Management top line ought to be more technically minded; I think we've got too many engineers on boards - we've also got too many financiers. Somebody made the point over here, that a good manager ought to be able to recognise other people's talents, and not only to recognise, but to make use of them. No manager is good enough to be able to do all the jobs in his organisation, in his particular department. He should delegate, he should make use of people's strengths and try to obviate people's weaknesses. This is the way to tell him. However, again I say that if you go to this particular section, you've got all those good basic management techniques which completely innocently, the company had built up into a basic management development programme, but unfortunately in no case did they highlight the actual management technique. Now if we go through those again - I could have made this a day's session if you'd wanted to, but is there any management programme that doesn't include these? (See fig.2)

FIGURE 1

V.E./V.A. SEMINAR

(5-DAY WORKSHOP)

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
1. *Welcome etc.	1. Cost Visibility	1. *Blast-Create-Refine	1. *Human Relations Motivation	1. Follow-up Phase
2. *Listening (Sales Training Man)	2. Cost Analysis	2. *Film + Workshop	2. Evaluation Workshop	2. Final Report prepared
3. Introduction to V.A./V.E.	3. F.A.S.T. Diagram	3. Creativity Workshop	3. *Planning Phase (incl. 'selling ideas')	3. Dry runs etc.
4. Job Plan	4. Function Workshop	4. Evaluation Phase	4. Value Management concept	4. Report to Board
5. *Targets	5. Function Evaluation	5. *Purchasing Techniques	5. *Cost versus Profit	5. *Q + A
6. *Human Relations Habits and Attitudes	6. *Creativity Phase	6. *Unnecessary Costs	6. Reporting Phase	6. Critique

The first thing that happens on one of these sessions, as you probably know, is that we form syndicates, and the very formation of a group brings in a technique right away - here we've got group dynamics. We're in a team. We're in a team for a week. We've got to set goals, objectives, and the first thing we do when we form a group - is to find a leader. So there is a team leader and immediately we are talking about management development - about management - you have the problems of chairmanship etc. (And I suggest to you that we've had a marvellous example of chairmanship today with Arthur Garratt, and particularly with Arthur in his communication. He's made himself quite clear. He's set the terms of reference before we start, and what's more he's set a target within time constraints, no less. And that isn't a bad way to do business, is it?) The leader must decide what you want to do - to decide who's going to run it and to decide when it needs to be done, so we're making a good start straight-away, and immediately of course, what comes into it? - Communications. Everybody bandies this beautiful word about. Communications. And Frank Bowyer is quite right it's at least a two-way thing, in fact, I think it's more than a two-way thing.

Immediately on the formation of a team you have this communication problem highlighted - You have got leadership highlighted and I put it to everybody who has been on a management development course, that there have been four sessions on communication and four sessions on team leader-ship and four sessions on chairmanship, and people have stood behind a desk and talked to you until you are blue in the face, about them. In a workshop such as this the 'trainees' do it. You don't get somebody like me talking to you across a desk, and being theoretical. You've got to do it. You have a specific task to do - you set yourself an objective and you have a boss to guide you through it and as we progress through the workshop the participants are forced to perform the management skills. You have to perform during this workshop most, if not all, of the management techniques that you, as managers, and your bosses as managers should be using each day. You are forced to actually carry out these techniques, not have somebody just tell you about them.

Let's just have a look again at what's involved in these management techniques:

FIGURE 2

COMMUNICATIONS UP-DOWN-ACROSS

TARGET-SETTING (TIME-LIMIT)

HUMAN RELATIONS

TEAMWORK (GROUP DYNAMICS?)

DELEGATION

ANALYSIS

DECISION-MAKING

PLANNING

CONTROLLING

MONITORING

REPORTING

EVALUATING

These are the nuclei of any management training programme, whether it's formal or whether it's informal. As I say, the most common way in which these are put over is for management to be sent off to various courses based on case history, academic theory or directed reading etc., but to put over these techniques in a

Job-orientated way, within a workshop
Product-orientated way, within a workshop
Company-orientated way, within a workshop
Individual-orientated way, within a workshop

is the most effective method I know.

If we expand on the normal practice when a team is formed, we should remember, I think, that the team leader is not necessarily the most senior man in the organisation. Nor is he necessarily the man who knows most about the particular project you are undertaking. The task is to guide the team through the job - plan to reach an agreed objective on time. This brings up the question of how important are people. When one undertakes a session such as this, you have an agreed plan because the syndicate agrees what the plan is. The individual steps in the methodology of V.A./V.E. are there for the syndicate. If you've ever under-gone a training session like this, you agree that you've got to aim at a certain per cent saving. Now whether the actual figure is correct or not, really doesn't matter, but you do make an intelligent guess in the matter - don't you? In the situation where you have a team leader, obviously if you're going to reach an objective in time, that is, at the reporting stage, that plan must be agreed all the way through, but every step which you've taken in the actual analysis and in the job plan all the way through can't be taken by every individual member of the syndicate. So what happens? We get the boss delegating! How important is delegation in management? I know your boss keeps things to himself - doesn't he? He doesn't give you the chance to expand - does he? In this workshop delegation is a must, and it is recognised that the chairman must delegate. Normally the team consists of people from different departments, Engineering, Production, Assembling Marketing, Finance, Design, anything else that you like. Why doesn't your company send a Buyer on a training course for Value Engineering and Value Analysis? It will give him some insight and be better for him. But during these syndicates, at least there will be an appreciation of the fact that they are communicating; they are together, and for the first time sometimes, when you get a mix of people on a syndicate, at least they will get an appreciation of the problems and the attitudes of various other departments. There was a question this morning regarding 'What does the customer want?', when someone instanced the cigarette lighter. Where you had one value motive, that was to get a light. Your wife had another one, because she wanted to give a present. And the third one was maybe not so important but maybe your daughter likes to play with the box or put her jewels in it or whatever it was. Why not have somebody undertake a workshop from Marketing; who understands what the customer's needs are. And let's throw in another word which hasn't been used today and which I say ought to have been used. We've been talking about people's needs. Gentlemen, if you're in business for profit don't just cater for people's needs - cater for their wants as well. Sometimes they're very different. You know you get the money out of a customer more easily by providing what he wants, not

Another duty within the team is that of scribe. Somebody has to start from scratch and get all the notes ready for presentation at the end of the week. To do all the paper work when you're doing your Value Engineering/Analysis, is a terribly important job. How many executives in line organisation can really communicate effectively, especially in writing? Management consultants run two and three-day courses on effective letter writing, effective memo writing, and they charge you how many thousand pounds for them, just for one session! If you undertake such a written communication exercise as in this workshop it's got to be done concisely, it's got to be done quickly and it's got to be done correctly, and you will get concise, correct and quick communication, so it's a very good exercise except that it goes further than being just an exercise. It's a very good method of making people more effective communicators, especially in writing.

Let's talk about this question of creativity. One way to create a satisfying and vital company environment for the executive temperament, is to make it clear beyond any shadow of doubt, that a company expects an executive to express his thoughts frankly and freely. It is true, for me anyway, that high-quality decisions are not always made by men who are frightened to challenge the ideas of their associates. In a Creativity session, ideas, no matter how outrageous, are expressed in an aura of non-criticism. People do express their ideas and because the informality of this particular session insists that one must not criticise other people's ideas, then this really does give you an insight into other people's thinking. The unorthodox approach is quite often appropriate nowadays, in this period of accelerating change. (Ever since I've been alive there's been a 'period of change'. And what is more it's been a period of accelerating change.) This is one of the things management is all about - getting people to accept change.

Decision making. Is this a management skill that one needs? Is this one of the things that management is all about? Do you know a better way of teaching people to make correct, or tending towards making correct decisions, than going through these exercises? Analysing costs. Analysing the effect of one's actions. Analysing the facilities and abilities; to look at other ideas. Balancing them all up - not on your own, with the help of your peers, with the help of your colleagues, with the help of your superiors, with the help of subordinates, and then making a balanced decision. Sure, you make some 'flair' decisions on occasions which succeed. Decision making is vital in management. This is a way in which you play the percentage and you will make more right decisions if you balance everything.

'Planning'. Definitions of management; most include the definition that the job of a manager is to plan and monitor, etcetera. Planning must be a vital part of being a Manager. An ongoing, live, dynamic, basic plan has to be made during this workshop and it must allow for contingencies, for snags, for road blocks, human weaknesses and deficiencies. Further than that, subsidiary emergency plans need to be made from time to time. Isn't this what happens in business? You make a plan and you come across a snag, a road block, whatever it is, and you have to make

important part of management? To monitor the ongoing project; that is what you have to do. You are doing it during this workshop. Nobody's talking to you about it, saying 'good idea, isn't it Peter?', and when you get back you'll do it won't you? You do it here and so do all the people who are in the syndicate of the workshop with you. You do it. You see that it's effective because at the end of the week you come up with a profit. This is what it's all about.

Reporting and presentation. At the end of the week, in all of these five-day courses, you make your report, and say 'these are our ideas compared with the present situation'. How many ideas have been relegated to a bottom drawer before because of poor presentation? Some people may say 'if somebody is of management status, facts and figures alone should enable management to come to some decision'. How much better is it that facts and figures should support concepts and ideas. This is what facts and figures are for. Now, if somebody's management wants facts and figures, they've got them anyway. So both sides are taken care of.

The ability to follow-through. You know, you can have all the company central policies you like, but you as Manager, are juggling so many balls in the air at the same time - so many jobs to do, some of it has got to go by the board, hasn't it? You get so many pressures - you've agreed to carry out a certain plan but heck, hang on a minute, there's an old friend there - and yet you are still trying to keep these balls in the air. Some managers have not got this ability to follow-through. This is one of the most important things in management. If my boss said to me 'I want you to go and do two projects for me next week' I'm going to go out and do those two projects, because I decide for myself that I won't let these other pressures stop me. But you know, there are so many pressures - sometimes it might be completely outside of your control, that you cannot follow it through. Then there's the other extreme and you'll find that some Managers; all they're concerned about is keeping the balls in the air - they never drop any. But then again they never get any on that target up there either, and they're keeping the balls in the air and they're sitting on the fence a treat - sounds great - 'I don't get into trouble because I don't make any decisions'. This ability to follow-through is highly indicated here because in your syndicate you as a team leader have agreed with the people you are working with that, at the end of the week on a specific date, you're going to inform the top management of the results of your investigation. You've got to do it like that, because this top management are fairly highly paid and because money means an awful lot to them, they are not going to wait another day while you make up your mind. You've got to follow-through in some form and this is the perfect example of having to follow-through by a certain time. There are deadlines all the time of course. But at least you have a goal, you have a time by which that goal should be reached.

Every management development programme should be built round logical, sensible, attainable targets. Why don't you train all of your management around this V.A./V.E. workshop? This scheme will give a pay-off while putting over to people that they can use good management techniques in every manage-

similar terminology when you're talking to the buyer, when you're talking to the salesman, when you're talking to anyone whatever the other person's job is. At least they think along the same lines, and at least some sort of terminology is right. At least they do communicate better, at least they do delegate better, at least they do plan better, at least they do monitor better, at least they do follow-through better. Now this isn't going to transform a company overnight. This is a way in which we can convert top decision makers in industry to undertake management development, because I don't know of any selling point to Managers which is better than saying 'it was justified financially'. In the Engineering Training Board, to 'sell' our policies, at the moment I've got a captive audience because you pay a levy, but as soon as you get exempt you won't be paying levy, so I won't have a captive audience. I've almost certainly got to justify my recommendations to the company in terms of cash. It's no use going in and saying that you should use this particular theory of management development, but if I say 'if I can show you that the outlay in terms of time and money involved in training these people, can be justified by the saving, by the undertaking of projects, (whether it's software or hardware it doesn't matter) then will you be interested?' And there aren't many engineers who would say 'no'to that. And as far as I'm concerned, if I can use this as a financial evaluation of management development, then fine ,I don't care what the motivation of the M.D. is in saying 'yes I will go in for it' as long as we get the results.

We want to train people to think logically and undertake a good sensible management job, whether he's a buyer, whether he's a market man, whether he's a design man, no matter what he is. If a Value Engineering workshop applies a job plan involving all the phases, the information, creative, evaluation, planning, reporting and follow-up, and if the actual management technique which is used is highlighted, then we're going to get somewhere in spreading the Gospel whether you're in or out of Value Engineering as a specialist.

Let me give you a quotation from a very good booklet - 'Courses for Management - Value Engineering'.

Conclusions: Value Engineering is not a gimmick, nor is it a technique which should be handled within the confines of any one department. It is a company wide activity which can produce changes in attitude, and provide a way of handling significant problems effectively. It encourages people to think, and to use their creative abilities, and to effectively communicate with each other to improve their overall effectiveness and the profitability of the company

CHAIRMAN'S SUMMING UP

By A.J.Garratt

It has been excellent that we have had, I think possibly for the first time, a conference devoted to the spread of V.A./V.E., outside the nuts and bolts area. I was interested in this question - I think Don Hunt brought this up, of the Value Analysis of Value Analysis. This is something we obviously all have to practice. I would remind everybody that any biological system which does not evolve, dies. Or put it in another way, the only difference between a groove and a grave is dimensional, and it is absolutely essential that we must progress all the time with our Value Analysis. I would make a point that people are talking about the effect of balance on payments and so on. We must all realise that if Value Analysis and Value Engineering were practised on a massive scale in this country, we would get something like, judging by our experience in other areas, 20% savings on things that we manufacture. This is the equivalent to increasing our production 20% for virtually no cost. We would have no balance of payments problem if we could only sell V.A./V.E. right across the board, and you gentlemen, have all got to be disciples here, and go out and sell this particular gospel.

I would just say one other thing here that I think that one interesting thing that has come out today has been the different views of intelligent people. Where people have argued intelligently, with their own concepts, different ideas about how this all ought to be done, have emerged. We have to manipulate these differences in a constructive way. What we have got to do really is to control the chaos of the situation. Now British people are very good at controlling chaos - the whole of our parliament operates on this system. It operates, let us say, very effectively - with our mother of parliaments, which is complete 'control of chaos'. I think that we have got to remember one thing and this is the basic tragedy of life, that the people that ultimately we have to deal with are the general public. The I.Q. of the general public is 100 by definition. This is our real problem.

VOTE OF THANKS

By M.A.Flynn

Mr.Chairman, speakers, gentlemen. We have seen some very wide, differing new aspects opening up for V.A. and V.E. today. These have reached from taking in the role of management development, and the approach which Don Hunt had this morning with respect to marketing and design and preparation of specifications; better specifications for design engineers, and I am very pleased to see that he referred to some work that he has been jointly involved with us at Dunlop in his talk. We have seen how management development is considered now to be embraced in the principles, or we have seen how the principles can be embraced to a system of management development, and I think that within our company, and I am sure that many others of you are the same, we have in fact been moving along these lines. We have also seen how V.A./V.E. can be used to look at indirect costs, and again, in conjunction with Don Hunt and Value Control we have been developing a programme for looking at the indirect costs. This is perhaps, hopefully, one step away from this overall company concept which I think Bill Huxley referred to Chryslers in the U.S.A. are using in their company. So I think that we personally are on the right lines from what has been said today. I'm sure this must apply to many others of you in this room.

Taking up one particular point if I may which is indirect cost evaluation, and has particular relevance. We have in fact used fairly widely now in a number of divisions, V.A. principles to areas like works services and machine usage etcetera, and I can certainly confirm gentlemen, that if you get the opportunity to move into these areas in your company it is well worthwhile, it is rewarding and the results will be just as fruitful to you as they have been in your product areas. And finally I'd just like to say that at the end of all this, we are talking really about looking at the total cost of management and whether we take one branch looking at product studies or whether we take a separate branch looking at indirect costs, or whether we take a third branch looking at management development; at the end of the day these three have all got to come back together in terms of a better product or an improved product cost. For this purpose I think that V.A. and V.E. approaches have much to offer. It must be the leaders in industry who are dealing with this sort of problem, particularly in today's economic climate and I would like to thank most sincerely, on your behalf, Don Hunt, Frank Bowyer, Fred Sherwin, Bill Huxley and John Lee for the very interesting and very enlightening talks that they have given us today. I would like to thank Arthur Garratt very much for his Chairmanship of the whole day and I would like to thank the Institute of Value Management for arranging such an interesting session for us all to attend. I hope that we have more of these - I say 'we', we're not a member of I.V.M., PERHAPS WE WILL be very shortly, but I hope that we are invited and that I have the pleasure of attending them. Now I would like you gentlemen, to join me in thanking the panel, I.V.M. and Arthur Garratt for a very interesting and useful day.

LIST OF DELEGATES

Mr. P. Astle	Group Cause Industrial Engineer'	Automotive Products Ltd.
Mr. J. W. Barnham	Engineering Manager	Access Equipment Ltd.
Mr. H. Bleakley	Project Value Engineer	James Mackie & Sons Ltd.
Mr. M. Blunn	Manager Value Engineer	Pilkington Bros. Ltd.
Mr. P. G. Buxton	Senior Development Engineer	British Aluminium Co.
Mr. R. A. Bridgeman	Value Engineering Manager	Stone Platt (Crawley) Ltd.
Mr. R. Burgess	Project Engineer	I. T. T. Fluid Handling Ltd.
Mr. P. F. Burton	Head of Apparatus & Design	Plessey Telecommunications Ltd.
Mr. A. Byford	Senior Engineer	Marconi Space & Defence Systems Ltd
Mr. W. Challinor	Value Engineer	Baker Perkins Ltd.
Mr. C. A. Della-Porta	Technical Director	Premier Drum Co. Ltd.
Mr. P. Dixon	Lecturer	P.E.R.A.
Mr. K. J. Ellis	Senior Lecturer	Wigston College of Further Education
Mr. M. L. S. Flint	Value Engineering Manager	Plessey Telecommunications Ltd.
Mr. M. A. Flynn	Senior Consultant	Dunlop Ltd.
Mr. M. Gill	Management Accountant	I. T. T. Fluid Handling Ltd.
Mr. R. L. Goldsmith	Assistant Director	Directorate of Value Engineering M.O.
Mr. M. Goodwin	Value Engineer	Baker Perkins Ltd.
Mr. A. G. Gregory	Management Services Executive	Warwickshire Training Services Ltd.
Mr. D. E. Gurney	Principal Industrial Engineer	Plessey, Towcester
Mr. E. W. Guy	Senior Projects Engineer	Plessey Telecommunications Ltd.
Mr. B. Hall	Technical Representative	British Ropes Ltd.
Mr. T. C. Harding	Head of Value Analysis Division	British Post Office
Mr. R. W. Hare	Value Engineer Manager	Plessey - Avionics
Mr. K. Heath	Standards Engineer	Aveling/Barford Ltd.
Mr. D. Hickman	Head of Environmental Laboratory	Decca Radar Ltd.
Mr. P. Higson-Smith	Director	Value Control Ltd.
Mr. C. W. Hogben	Head of Section	British Post Office
Mr. R. Hollowood	Value Engineer	Serck Heat Transfer Ltd.
Mr. G. D. Horn	Machine Design Manager	I.B.M. (U.K.) Laboratories Ltd.
Mr. D. W. Hurst	Value Manager	Premier Drum Co. Ltd.
Mr. E. R. Ibbotson	Laboratory Manager	Decca Radar Ltd.
Mr. B. W. James	Chief Value Engineer	British Aircraft Corporation
Mr. M. A. Kendall	Value Engineering Co-ordinator	I.C.I. Mond Division
Mr. R. D. Lacey	Technical Manager	Avdel Ltd.
Mr. D. G. Ladbury	Value Engineer	British Leyland
Mr. J. H. Lee	Group Value Engineer	Pye of Cambridge Ltd.
Mr. S. A. Lewis	Value Engineer	Plessey Telecommunications Ltd.
Mr. B. C. Lilley	Engineering Manager	I.C.I. Mond Division
Mr. H. D. Matthews	Value Engineering Manager	Plessey Telecommunications Ltd.
Mr. K. I. Miles	Chief Value Engineer	Automotive Products Ltd.
Mr. S. L. Moon	Director	Directorate of Value Engineering M.O
Mr. W. Moore	Senior Apprentice	Serck Heat Transfer Ltd.
Mr. P. B. Morison	Project Engineer	Decca Radar Ltd.
Mr. E. G. Morley	R & D Manager	Plessey Hydraulics
Mr. J. J. Peck	Value Engineering Consultant	Serck Heat Transfer Ltd.
Mr. D. R. Pegler	Value Engineer	Serck Controls Ltd.
Mr. J. W. C. Perrior	Value Engineering Manager	Plessey Windings
Mr. D. C. Phillips	Production Manager	I. T. T. Fluid Handling Ltd.
Mr. M. J. Reed	Material Standards Manager	British Leyland
Mr. T. J. Rimmer	Manager Administration Methods	Pilkington Bros. Ltd.
Mr. J. K. Robertson	Engineering Manager Equipment Design	Plessey Telecommunications Ltd.
Mr. J. Rollitt	Value Analyst	T. J. Smith & Nephew Ltd.
Mr. D. S. Savage	Value Engineer	Avdel Ltd.
Mr. P. Sharma	Group Advisor Management Training	British Leyland
Mr. A. Stacey	Chief Value Engineer	British Leyland
Mr. F. Steiner	Value Engineer	Plessey Telecommunications Ltd.
Mr. G. Stephens	Value Engineer	Alvis (B.L.U.K.) Ltd.
Mr. R. Stradling	Principal Value Engineer	Plessey Telecommunications Ltd.
Mr. C. J. Taylor	Vehicle Cost Controller	Rover Car Ltd.
Mr. J. K. Turner	Production Manager	Whitehall Machinery Ltd.
Mr. R. V. Turner	Value Engineer	Aveling/Barford Ltd.
Mr. B. L. Underwood	Section Leader Value Engineering	Plessey Telecommunications Ltd.
Mr. D. J. Walsom	Technical Engineering Director	Samuel Pegg & Son Ltd.
Mr. B. J. Watts	Senior Consultant	Value Control Ltd.
Mr. R. M. Webb	Assistant Secretary	Institution of Production Engineers
Mr. G. W. Westbrook	Value Engineering Co-ordinator	I.C.I. Mond Division
Mr. J. Wilde	Chief Draughtsman	James Mackie & Sons Ltd.
Mr. A. Williams	Section Leader Design	Access Equipment Ltd.