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STANDARDIZED SPECIFICATIONS OF PURCHASED ITEMS

Masateru Tatsudan

Industrial Machine Section,
Machine Designing Department
Japan Steel Works, Hiroshima Plant

INTRODUCTION

Line of products at the Hiroshima Plant of the Japan Steel Works covers a wide range, consisting of plastics materials manufacturing equipment, various kinds of plastics processing machinery (particularly, medium and large-sized injection molding machines), various kinds of machinery for chemical plants, paper machines, etc. The plant comes under the category of so-called manufacture of variegated products in small quantities. Therefore, unlike the mass-production systems, it is generally believed difficult to expect much results of Value Engineering.

However, with a firm conviction that even in a plant where variegated products in small quantities are manufactured, considerable cost reduction of the essential production items could be realized by accumulation of novel results of cost reduction, if "Value Engineering for pursuance of functions" is properly adopted so as to include even parts, the General Manager of the Hiroshima Plant on his own initiative inducted Value Engineering into the plant in 1967, establishing the Value Engineering basic promotion plan. From the standpoint that it is most efficacious to realize cost reduction by applying Value Engineering at the designing level of products, the target was set to train all the designing personnel as Value Engineers and to bring about a revolution in cost consciousness among the designers.

At the Hiroshima Plant Value Engineering promotion was centered on the Designing Department. Value Engineering seminars were held ten times and on-the-job training courses were conducted nine times. As many as 138 task force project teams were organized, which showed great activities. We have now 310 Value Engineers. During a period of five years the total amount of cost reduction realized on the essential production items has reached $952,000, in addition to which many intangible merits have been gained. In order to firmly establish and to further develop Value Engineering, various countermeasures are now steadily being pursued.

In such an environment, the designing group of electric installations and instruments for essential production items has met with good results in cost reduction, by following the activities pursued heretofore by the Value Engineering teams. In order to achieve greater success, the consensus of the group's opinion reached was that it would be most efficacious to apply the Value Engineering techniques to the "Standardization of Purchased Items and Standardization of Specifications of Purchased Items", which had been a pending problem.

The case history presented herein purports to explain the progress made from the inception up to the finalization of standardized specifications of purchased items, the results obtained and the problematical points, by citing examples relative to the above.

MOTIVATION OF APPLYING VALUE ENGINEERING TECHNIQUES TO STANDARDIZATION

Our group's work consists mainly of designing the electric installations and instruments for essential production items and is centered on designing the electric installations and instruments systems and determining the specifications of purchased items for the above, which must conform to the specifications of machines designed by various sections of the Machinery Designing Department. These electric installations and instruments are almost all purchased items.

Our group has achieved good results in cost reduction of electric installations and instruments systems or independent items by team activities such as workshop seminars and on-the-job training programs. However, in order to "realize greater effect with more ease in cost reduction", the group's consensus of opinion reached was that it would be most efficacious to tackle the problem of "standardization of purchased items and simplification and standardization of procedures for order, inspection and acceptance of purchased items". Also, in the plant practically everyone's thinking was flexible as to entertain a question that during the process of Value Engineering, "Could not the basic steps of Value Engineering relative to hardwares be applied also to the office routine procedures for the softwares?" On the other hand all the members of our group and the entire Supply Section personnel were all Value Engineers, and based on the prospects that our negotiations for improvements would work out smoothly, we formed a Value Engineering team under the guidance of a superior and tackled the problem, "Standardization of Purchased Items and Simplification and Standardization of Office Routine Procedures of Purchased Items".

Fig. 1 Present Outline of Flow Chart

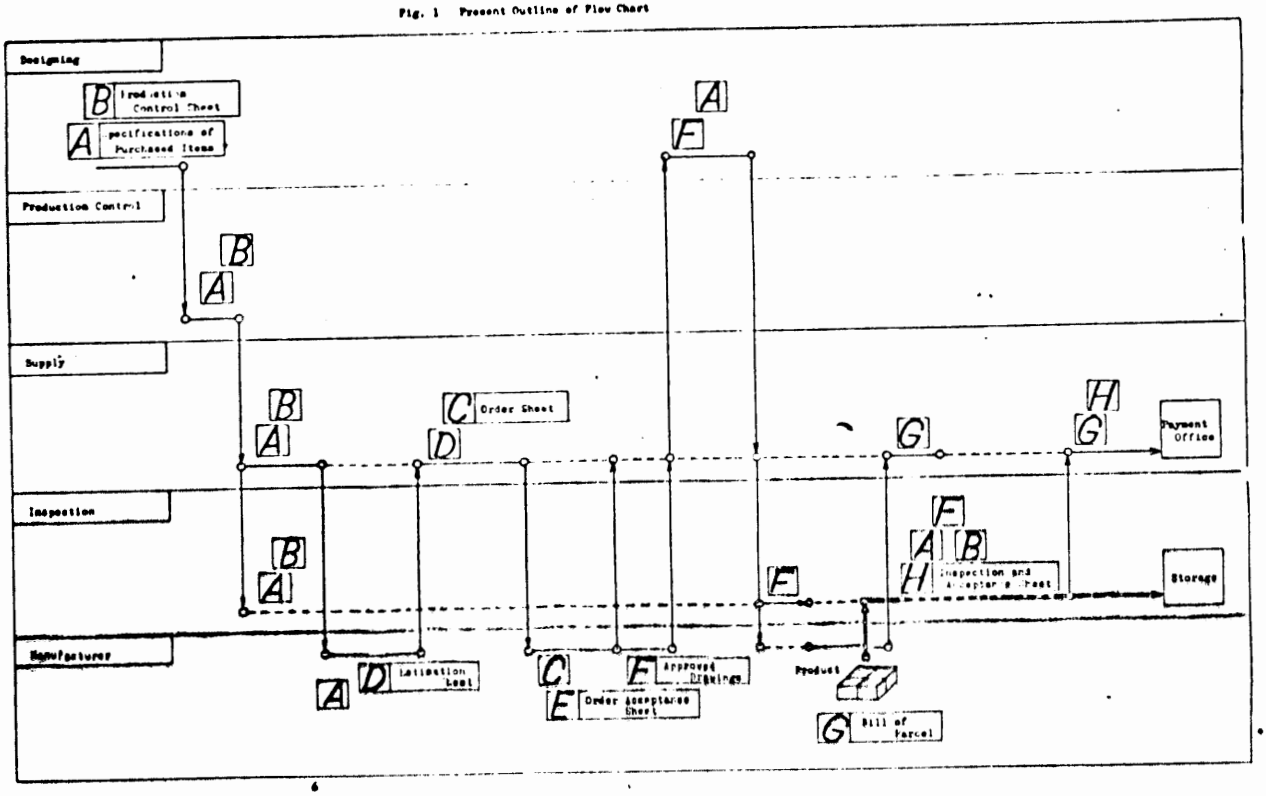


Fig. 2 Present Functional Diagram

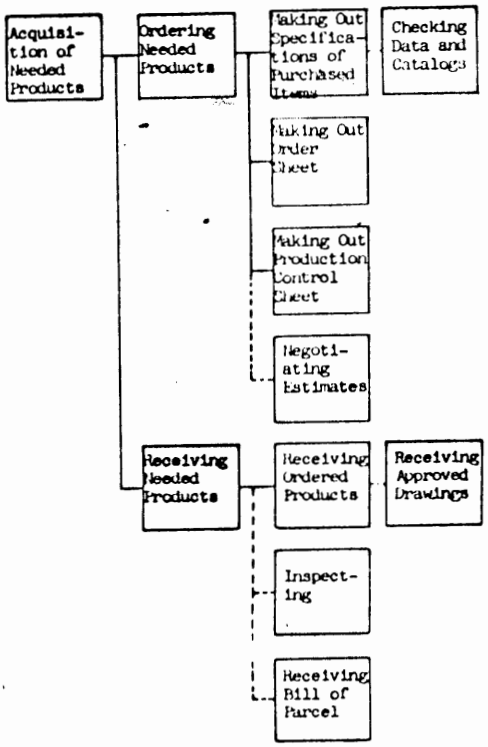
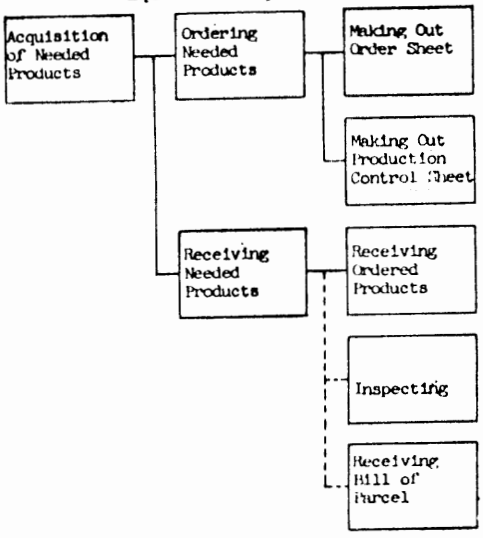


Fig. 3 Functional Diagram Based on Improvement Proposals



STANDARDIZING SPECIFICATIONS OF PURCHASED ITEMS BY APPLYING VALUE ENGINEERING TECHNIQUES

1. Selection of subject

Although it could be said that the electric installations and instruments which we design have been standardized to some extent, the items are numerous and variegated and they require considerable labor in drawing up specifications of purchased items.

Therefore, we selected "Standardizing Specifications of Purchased Items" as the subject most efficacious to attain the standardization of purchased items and simplification and standardization of routine procedures of purchasing. Instead of adopting the short-cut method of trials and errors of "gathering information → drafting improvement proposals", which not infrequently had been the tendency in the past we agreed to work out improvement proposals by following the seven basic steps of the Value Engineering techniques.

2. Gathering information

As a result of gathering necessary information concerning purchased items, we found that the most necessary papers were those concerning production control and those containing specifications of purchased items. It also became clear that from the standpoint of a designer, specifications of purchased items are most important, but from the standpoint of those assigned to the Production Control Department and Supply Section, production control sheets which control the flow of production items are more important.

3. Functional analysis of the present state

Based on the basic steps of Value Engineering, we made functional analysis of the present state. Fig.1 is an outline flow chart showing the present arrangements for purchased items and Fig.2 shows the present functional diagram.

4. An ideal system (the target for improvements)

In drawing up improvement proposals, we gathered all necessary information available, centered on the present functional diagram. One condition to maintain the present organization was attached. Many ideas were advanced for the simplification of designing and of purchasing procedures. As a result of consolidating them, the following three (3) items were determined as the target for improvements:

(1) Not to make out specifications of purchased items each time
(2) Negotiations on estimates to be finished in advance
(3) Exchange of papers with manufacturers and trading companies to be restricted to order sheet only

5. Drawing up improvement proposals

Based on the target for improvements, discussions by the team were repeatedly held, and as a result of continual communication by all sections concerned, including the Supply Section, with manufacturers and trading companies, we were able to draw up concrete improvement proposals as follows:

(1) Not to make out specifications of purchased items each time

As master sheets, standardized specifications of purchased items are to be distributed in advance to manufacturers and trading companies. Instead of making out specifications sheets of purchased items, instructions will be given by indicating in the production control sheet the number registered in the master specifications sheet.

(2) Negotiations of estimates to be finished in advance

Agreement on the prices of items registered in the master sheets will be made for a given period, and negotations on estimates will not be made each time.

(3) Exchange of papers with manufacturers and trading companies to be resticted to order sheet only

All drawings such as approved drawings, reference drawings, etc. necessary for inspection will be registered in the master sheet. That is, manufacturers and trading companies have only to ascertain the numbers indicated in the order sheet made out by the Supply Section and then manufacture and deliver the products, in accordance with the specifications contained in the master sheet. Funtional diagram based on the improvement proposals is shown in Fig.3.

6. Examination of achievements

The judgment of the results of application of Value Engineering to the softwares is said to be far more difficult than that to the hardwares. Even though various assumptions are made and achievements in monetary value are calculated, they are invariably not convincing enough.

The results obtained by implementation of the improvement proposals are stated on the next page.

7. Implementation of proposals

By the improvement proposals thus obtained, the specifications of the purchased items to be standardized began to take shape.

Our Value Engineering group, much encouraged by the afore-mentioned situation, made out specifications sheets for purchased items (master specifications sheets) of electric installations and instruments to be standardized.

AN EXAMPLE OF STANDARDIZED SPECIFICATIONS OF PURCHASED ITEMS

1. Selection of the types to be standardized

Explanation will be made herein concerning standardization, by taking pressure gauge as an example.

In selecting a type of pressure gauge, selection from among various types made by manufacturers has to be made, considering various conditions of use stated hereunder. What is the pressure (the number of kg/cm^2) to be measured? The pressure of what kind of material is to be measured? Under what surrounding conditions is it going to be used? How will it be mounted? However, the types manufactured by general makers are applicable to various industries and are therefore numerous and variegated. This situation may at first seem to be very convenient to the users, but conversely, it becomes an obstacle to standardization. For example, in measuring the pressure of 10 kg/cm^2, the size of the dial plate of instruments varies such as 100 ø, 150 ø, 75 ø. We cannot simply say that a large one is suitable or that a small one is suitable. In standardization, it is important to make judgment as to which one meets our requirements or which one meets the conditions of use, etc. We selected the types to be standardized by using Forced Decision Making Method of Value, which is one of the Value Engineering techniques. However, when we finished selecting the types, in spite of the fact that selection from among various types was carefully made, the total quantity turned out to be quite large. Thus, problematical points arose in making out specifications and in their applications.

2. Gathering information from manufacturers and trading companies

In order to solve the above-mentioned problematical points, good communication was maintained with manufactures and trading companies and we requested them to supply us with price lists of pressure gauge. As a result, we found out that the difference in price by the scale of the dial of the pressure gauge varied to some extent by the numerical value of the dial.

For example, there was no price diffence between a pressure gauge of 0 to 6 kg/cm^2 and that of 0 to 35 kg/cm^2, if the structure of the container and the size (diameter) of the dial plate were the same.

3. Standardization of specifications of purchased items

By information obtained from manufacturers and trading companies, price lists became clear, and as the specifications of the specifications sheets for the purchased items to be standardized were decided upon, the work on the standardization was commenced in accordance with the following plan.

(1) Specifications of purchased items to be in one (1) sheet for one (1) type and to be classified by types
(2) Specifications of items whose price is subject to change to be clearly shown
(3) Those items not affecting price but largely affecting classifications (for example, dial plates) and minor matters such as Tag No., to be separately indicated in the order sheet

Standardized specifications of purchased items (master specifications) made out as above with the cooperation of the Supply Section, manufacturers and trading companies, bound together with drawings for each type and price lists agreed upon, were decided to be distributed to all sections concerned and to manufacturers and trading companies.

In the same manner, specifications of purchased items required for electric installations and instruments such as hygrometer, thermoelectrometer, flow meter, galvanometer, limit switch, pressure switch, level switch, electro magnetic valve, air pressure equipment, etc. were successively standardized.

RESULTS AND PROBLEMATICAL POINTS ARISING FROM ADOPTION AND IMPLEMENTATION

Thus, taking steady steps of Value Engineering techniques, communications were frequently maintained with manufacturers, trading companies and various sections concerned, including the Supply Section, and "Standardized Specifications of Purchased Items" was improved and implemented. After its implementation, the results we were able to grasp for a one year period were as follows:

1. Designing Section

Based on the specifications of essential production items which we receive from various designing sections, along with the designing of electric installations and instruments, we selected the most suitable items from the master specification sheet, and it became necessary only to make out production control sheet in which symbols are to be indicated. In the past, every time specifications were made out for purchased items, catalogs and other technical data were checked, but now time thus consumed is saved considerably. Speedy arrangements for purchased items can now be made. In terms of number of sheets required for making out specifications of purchased items, 150 sheets were used monthly prior to the improvement, but now it has been reduced to 70 sheets a month.

2. Supply Section

The order sheets are made out as in the past, but the time and labor for negotiations on estimates have been eliminated, as price and delivery time agreement for a given period has been entered into. The Supply Section, by reverting to the original point of Value Engineering (at the time Value Engineering was founded in the U. S. A., centered on purchasing) has been able to achieve results.

3. Manufacturers and trading companies

As in the case of the Supply Section, time and labor for negotiations on estimates have been eliminated. After checking the symbols designated in the order sheet with the master specifications sheet, they have only to commence manufacture and make delivery. They no longer need to submit approved drawings.

4. Inspection Section

As necessary drawings are found in the master specifications sheet which has been standardized, the need for changes has been reduced in inspection and acceptance of ordered products. Therefore, it has facilitated setting up inspection standards. Inspection has been expedited

5. Estimation Section

As it has become possible to obtain accurate costs of purchased items, improvement in accuracy of estimates was realized and comparison of estimates with actual costs could be simply made.

6. Problematical points

Such results as outlined above were obtained, but at the same time the following problematical points became evident.

(1) As the symbol indicating method has been adopted, if a mistake of a rudimentary nature is made in entry, it would cause a serious trouble. Such mistakes will have to be eliminated by the Zero Defects Program.

(2) In order to draw up master specifications sheets, full cooperation of manufacturers and trading companies will be required. If the understanding and cooperation of manufacturers and trading companies cannot be obtained, it will end with standardization only. Patience and time are required in communications.

CONCLUSION

Our Value Engineering team started activity in April, 1972. The project that required the shortest time was three months after inception, succeeding in the standardization of purchased items by obtaining the cooperation of manufacturers and trading companies. The standardization has proceeded with comparative smoothness and one year has elapsed. Taking one example of electric installations and instruments of a plastics manufacturing machine, in terms of costs, standardization has been achieved to the extent corresponding to approximately 40% of the total cost of electric installations and instruments. Also, during this period, in spite of the increase in cost of essential production items due to rising prices of purchased items, we were able to keep them to the minimum by the results of practical application of "reverting to the original position of Value Engineering".

In the future, we plan to proceed with the standardization of specifications of selective items of higher prices and of complex nature.

Someone might make remarks, "Is not this case history similar to the standardization of bolts, nuts, bits, etc. and standardization of their purchasing procedures?"

While recognizing the remarkable results obtained by the application of Value Engineering on the hardwares, in seeking increasing results of further reducing costs, we have applied Value Engineering on the softwares and achieved standardization by our own efforts through continual communications among all concerned, which is not a standardization assigned by someone else, and the Supply Section has recognized anew the effect of Value Engineering by reverting to the original point, etc., which we believe are special features.

Reference literature

Application of Value Engineering on Softwares - Society of Japan Value Engineers (Interim Report by Study Group of Softwares), April, 1969 published by SJVE

Owing to problem of space, the order has been inverted. That is, Fig. 4 is printed following the explanation of the symbols hereunder.

[a] ..... Classification of purchased items

- F: Finished product
- H: Semi-finished product
- B: Bar material
- P: Board material
- T: Pipe material
- C: Others (Castings . Forgings)

[b] ..... Reasons for alterations

- A: By direction of orderer
- B: Change in design
- C: Clerical errors
- D: Omission of entry
- E: For manufacturing convenience
- F: Countermeasures against manufacturing errors
- G: For material convenience
- H: For work convenience
- V: Changes made in Value Engineering

[c] ..... Components

[d] ..... Symbol

[e] ..... Classification

[f] ..... Items purchased page

[g] ..... History of alterations

[h] ..... Notations

[i] ..... Reasons

[j] ..... Date

[k] ..... Delivery date

[l] ..... Related shops

[m] ..... Warranty
- If defect is found in a product within one (1) year after delivery, deemed to be the responsibility of the maker, it will be repaired free of cost or replaced with a substitute product as soon as possible.

[n] ..... Papers to be submitted
- Results of tests performed ... copies

  Verified drawing ... copies

[a] .... Separate matters to be indicated -

(1) In the column of specification of items contained in the parts list, (1) nomenclature of parts, (2) the size of stock x maximum range of dial, (3) color of paint, (4) tag No. and (5) material of packing are to be indicated.

(2) Maximum range of dial to be determined, based of dial range of manufacturers, confining the dial within the range of 1.5 times or more the normal pressure.

(3) The color of paint will be indicated by Munsell symbol.

  Example - N1.2 7.5 BG4/1.5

Fig. 4 An Example of Master Specifications Sheet (1/2)

[a] P. H. B. P. T. C. [b] A. B. C. D. E. F. G. H. V.

Specifications of Purchased Items						Purchased Items Specifications Sheet No.						P1704671			
Nomenclature of product	Coin No. of materials: Pressure gauge					Drawings attached									
Job Order No.	[c]	Quantity	Drawing No.	[d]	Used for	Application data No.	Type	[e]	%	[f]	[g]	[h]	[i]	[j]	[k]
											△				
											△				
											△				
											△				
											△				

(1) Type - Bourdon type tube pressure gauge

(2) Case - Metallic sealed case with cover screwed

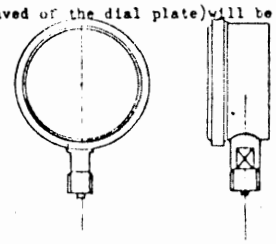
(3) Paint - Anti-acid, anti-alkali paint

(4) Dial plate - White background, black letter (for vacuum, red letter) Quality of material SGB

(5) Quality of material - Maker's standard for both stock and Bourdon type tube

Note. Type, color of paint and tag No. (to be engraved on the dial plate) will be indicated separately

Symbol	Range of dial plate	Type
1	1 ~ 1.9 K	AU 1/2 x 100° or AU 3/8 x 100° (Sealed type)
2	2 ~ 30 K	
3	36 ~ 50 K	
4	51 ~ 100 K	
5	101 ~ 250 K	
6	251 ~ 500 K	
7	0 ~ -76 cmHg	
8	-76 ~ 1.9 K	
9	-76 ~ 0 ~ 35 K	



[m]

[n]

[o]

Machinery Designing Department J. S. W. Hiroshima plant	Approved by -	Made out by -	Date formulated -