

Consideration of Nuclear QA concept and Development Direction

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1. Introduction

After Industrial Revolution, Quality concept and technology have grown to be a promising prospect and favorites in all of the industry areas several various centuries from the industrial society of Mass Production Systems to information society based on immense knowledges. Today everybody seems to know about Quality, but in reality someone do not know its exact meaning, role, and its application. Therefore In this paper, it will be presented its exact concepts and origins of quality and quality assurance in nuclear, how it is used and how it is applied, and will be discussed its desirable future direction of development.

2. Quality Concept Development

Since mankind began to make things that would make life easier, in the early stage of civilization development, it was self-supported activities that were produced and used by the people who needed the goods themselves. As society became more complex in its form and size, a system of division between producers, sellers, and consumers was developed. As From handcraft industry to factory industry, J. Watt's invention of the steam engine made mass factory production phase an urgent need for management. Quality Control began to take an important role right after the mass production of the overall industrial structure began in the mid 20th century. As manufacturers themselves were responsible for the product quality, they did not recognize the importance and need for systematic quality control techniques. The definition of quality can be expressed by several meanings according to the purposes of the product. For example, quality means the fitness for use or the nature of determining the usability of the product etc. According to A.V., Feigenbaum, a Quality specialist in all of the world, the development of quality control in Western industry has taken six steps as follows: The steps are Quality control by operator steps, Workplace quality control, Quality driven Inspection, Statistical quality control and Total Quality Management. [1]

3. The Principles of Quality and Cost

Below table shows the relationships of quality, delivery and cost.

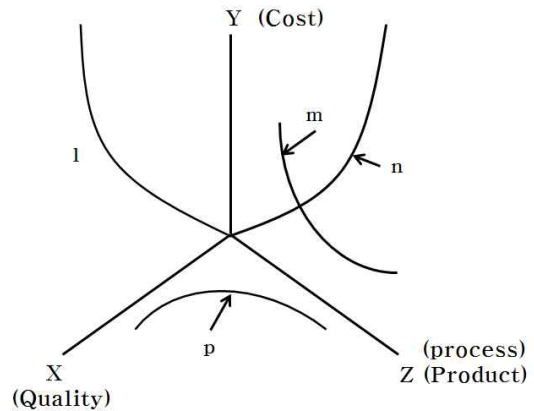


Table. 1. Principle of quality and cost.

In relationship cost and quality, better quality require costs rise up in above a certain level. Increasing the output per Lot reduces costs (m curve). To reduce the delivery date results in cost-up. If manufacturer want to rise the amount of production in short process, Quality is apt to decrease from the ordinary quality level. As quality, cost and processes are mutually affected, the manufacturers (project manager) shall manage them organically from the point of view of the entire organization.

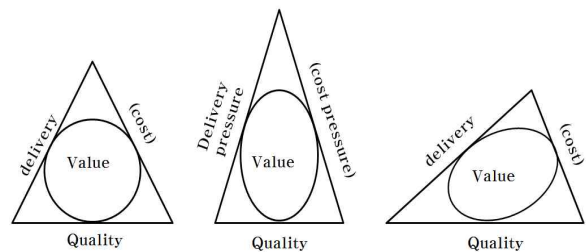


Fig. 1. The Relation quality and delivery

It shows that when the three components (the quality, the delivery date, and the cost) are balanced, the production and operation can be executed with maximum value added. In a regular triangle, the area size (value added) of the circle inscribed on the three side is the maximum. If the quality is disregarded or is emphasized only, the Quality is rather deteriorated.

4. The Development and Classified step of Quality

The quality is divided into the sequence of production steps as follows. 1) Quality of market: No matter how good a new product is developed in terms of its functionality, it will not sell unless it reflects the quality required by the consumers. Therefore it should be identified the quality and price required by the consumer. 2) Quality of Design: The design organization shall design quality that is precise to meet the consumer's needs, and is economically balanced in terms of quality in the company's ability to produce them, or in such a way designed quality. 3) Quality of Manufacturing: The quality produced by the manufacturing department based on its design quality is indicated manufacturing quality, or actual quality, or quality of conformance. Quality Control in the manufacturing sector means activities that are well adapted to design quality. Materials, machinery and persons appropriate to the design quality shall be selected. Quality of Manufacturing can be determined production method, operation status, and actual production activity distributed by several variability in production components. 4) Quality of Service: In modern society, where customer concerns are important, it is also very important to investigate market quality when performing services. It means the degree of activity that enables consumers to correctly use the products they produce and to respond quickly to product failures or quality problems.

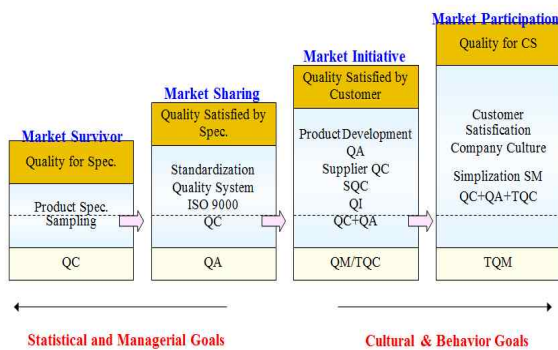


Table 2. Classified step of Quality

Above shows the classified step of quality concept and activities such as QI, QV, QC, QA, and QM. Nuclear QA are in position same to QM and equal to military

quality/aerospace quality level. Documentation and verification level will be explained next chapter.

5. Application of Quality on Nuclear

Applied principles of Quality melt into code and standards of the world. But, Nuclear quality concept are another one in its definition and applications in comparison the other code & std. Nuclear quality concept is known to like public goods such as water and air. Therefore, in nuclear division, the absolute concept has begun to be adopted since 3mile NPP accident. Nuclear quality has the highest and most rigid documentation and verification level in its system.

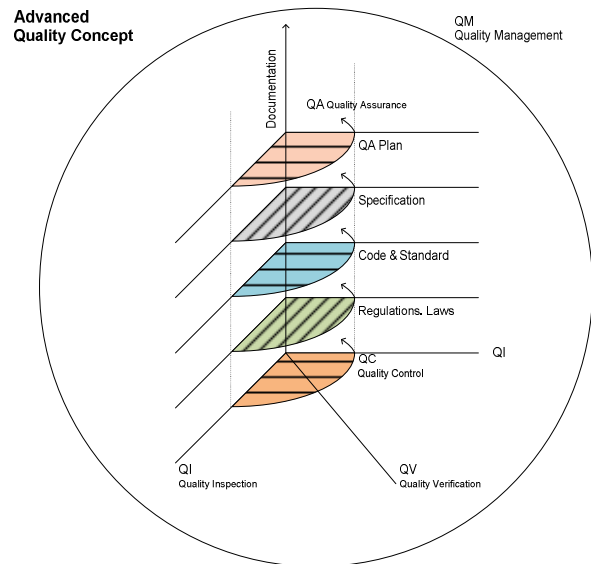


Fig.2. Nuclear documentation & concept dimension [2]

6. Development and Application of QA Criteria

These spread elements table shows the classified Quality sectors and application on PDCA cycle.

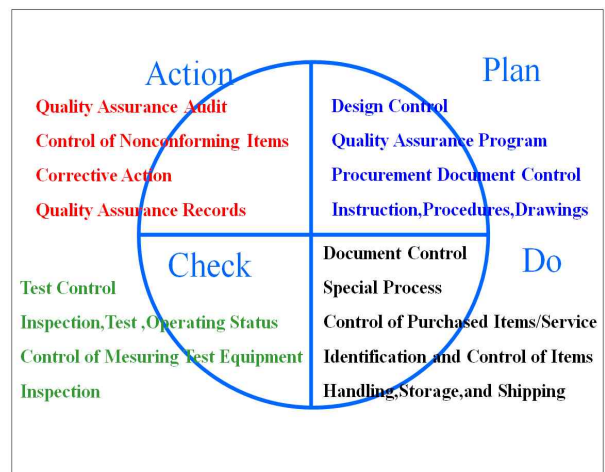


Table 3. Quality sectors and application on PDCA cycle. [3]

18 criterias are applied in Quality system and program developed ASME/ANSI code and standards. The action Activities contained audit, nonconforming items and corrective action in its performance. Generally most activities are executed successfully in accordance to each function. The action function has difficulties and some problem because quality is being and performing now and at this points.

7. Conclusions

We have considered the application and future direction of Quality basic principle and concept on nuclear division. It is desirable these elements/criterias contained this 4 cycle phases should be grouping by activities and each characteristics because the relations of each elements are all connected in its role on 4 dimensions. Moreover, Quality application technology and method on Nuclear industry and R&D part should be studied deeply and continuously.

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