Research on Innovation of Total Quality Management Implementation in Aerospace Manufacturing Enterprises——Based on PDCA Cycle

Teng Sun(✉), Qinghuang Zeng, Chang Li, Weiliang Shen, Guoyao Wang, and Jiaqi Li

Beijing Xinfeng Aerospace Equipment Co., Ltd, Beijing, China
15066110301@163.com

Abstract. With the Chinese government's high attention to aviation science and technology and the injection of a large number of important resources, China's aviation industry is booming. Under the current market background, the efficient and low-cost aerospace industry has become the core factor for Chinese airlines to enhance their global competitiveness. At the same time, PDCA cycle is a theoretical model of quality control management, and has made some achievements in the application of quality management in many fields. Based on the above background, to help promote China's aviation manufacturing industry comprehensively improve production quality, and promote the healthy development of China's space industry, this article on China's aviation manufacturing enterprises are facing the problem of analysis, and the method of using PCDA circulation, to total quality management implementation of aerospace manufacturing enterprises innovation research is introduced.

Keywords: Aerospace manufacturing · Total quality management · PCDA cycle · innovation

1 Preface

Total Quality Management (TQM for short), the basic concepts of TQM are: we hope to be able to carry out market research, product design, production management and after-sales service at the most economical level, taking into account the conditions that meet the needs of consumers as much as possible, a reasonable management system that combines the management activities of research quality, production quality maintenance and service quality improvement in various parts of the enterprise. Therefore, in order to realize the comprehensive management of the enterprise, it is not only necessary to pay attention to the quality of the product itself, but also to pay special attention to the quantity of products, delivery time (construction period), production costs and quality, and the operation efficiency of each part and link of the product, and emphasizes Products provide services to users, take problems first, and use data results to prove advantages. Since the 1980s, total quality management has been widely used in various fields of

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aviation manufacturing enterprises, and it has also played an important and positive role in the reform of the quality management system of aviation manufacturing enterprises [1].

In recent years, the research and development tasks of aerospace products have been increasing day by day, and the technical problems that have arisen are not small, the requirements for quality are getting higher and higher, and new situations such as shortening product design life have arisen, and aerospace companies themselves also have Due to the inherent defects of the socialist market economy, there will be many unpredictable problems in the process of implementing total quality management [2]. Therefore, it is necessary to improve the understanding of the main idea, actively explore the major reform and innovation measures to implement total quality management in the entire aerospace manufacturing enterprise, and find the crux of the problem in time, and use the PCDA cycle method to find specific and effective quality innovations action.

2 PCDA Cycle Theory

The PDCA cycle is also called "Deming cycle" because it is a quality improvement method proposed by Deming. And because of its rigor and program simplicity, it has achieved a lot in quality improvement and has become one of the most influential quality improvement tools today. The most effective method for the problem [3]. The PDCA cycle system process is divided into: the planning (Plan) stage, the implementation (Do) stage, the inspection (Check) stage, and the management (Action) stage. It reflects that work must go through four stages: the first stage is the plan, including policy, objectives, leading ideas, themes, publicity plans, activity programs, etc. The second stage is implementation, that is, to actually do it according to plan; The third stage is the inspection, that is, the completion of the activity or during the activity to check what is wrong and what is right [4]. By checking the positive effect, find out the problem; The fourth stage is to deal with, the successful experience to be affirmed, form the standard, the lessons of failure to sum up, overcome later. The following work should be carried out according to the standard, and the unsolved problems should be transferred to the next cycle Fig. 1.

Before any work or activity, it must be carried out in accordance with these four stages, and then the ones that have been successfully implemented are integrated into the standard process, and those that have not been successfully brought into the next PCDA cycle continue to be solved [6]. The PDCA cycle process is not a simple cycle of operation, but a step-by-step rise, as shown in Fig. 2.

Through each cycle, summarize and propose new goals. This working method is the basic method of quality management and is suitable for all fields. The characteristics of the PCDA cycle are as follows:

1. PDCA is a cyclical process that starts over and over again and gradually rises. In the process of each PDCA cycle, it is a decision process for the old problems left behind. In this process, new problems can be summed up, and experience in solving problems can also be obtained, and then better access to the next stage can be obtained. One round, changing the new problems in this round into old problems, For example,

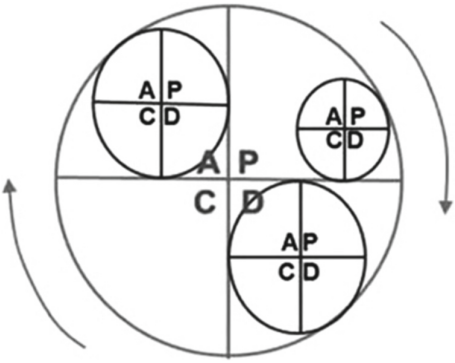

Fig. 1. PDCA cycle [5]

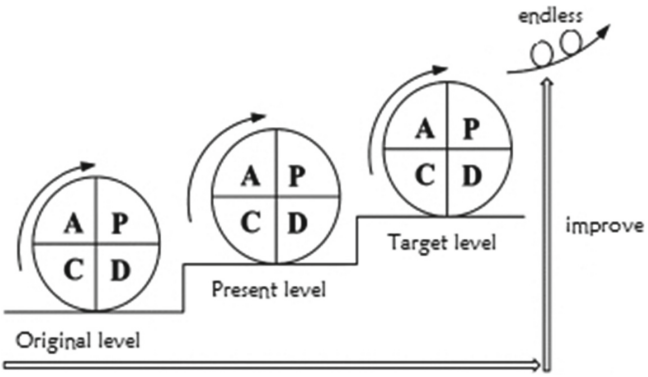

Fig. 2. PDCA cycle stepped up [7]

defects in the manufacturing of parts and insufficient technology in space research and development, etc., to continuously improve the quality system [8].

2. The PDCA cycle realizes the cycle process of the large ring and the small ring. Once a company or organization implements quality management improvements, it is a PDCA cycle that operates as a whole and a PDCA subsystem that operates within each of its internal organizations; but in the larger PDCA cycle, the cycle system operates at each stage Both operate in PDCA mode.

The above-mentioned characteristics of PDCA are quite in line with the needs of enterprise quality system improvement. First of all, PDCA is a kind of work process that starts and ends again and again, and the goal emphasized by the enterprise quality management system is continuous improvement. Same. The goal of improving product quality is not achieved overnight, and it is also matched with PDCA's spiral drive upward and step-like improvement. Therefore, it is an ideal method to use the idea of PDCA cycle in the improvement project of product quality system.

3 Current Situation and Problem Analysis of Total Quality Management

3.1 Application Analysis of Total Quality Management

The total quality management system refers to a quality assurance system for all employees and the whole process, with work quality assurance as the goal of products and services. And management methods. It is centered on quality management and based on the participation of all staff. The purpose is to achieve lasting results by satisfying customers and benefiting from the owners, employees, suppliers, partners, and other stakeholders of the organization. A quality management approach [9].

As a pre-management and comprehensive monitoring system, comprehensive quality management must be implemented in every stage of the entire production or manufacturing process. Therefore, quality management in production has a broad sense, not only referring to all products, but also the entire process. And all the quality in the system, including many aspects, such as commodity, business, personal, production process, working environment and so on. For aerospace manufacturing enterprises that regard product quality as their life, product quality is the first requirement for the survival and development of the enterprise. This feature of the total quality management system is exactly what the company needs to grow and develop.

3.2 Analysis of the Current Situation of Total Quality Management

At present, most of China's aviation manufacturing enterprises are state-owned enterprises, but due to the constraints of the state-owned enterprise system, there are many congenital problems in the practice and promotion of the national comprehensive quality management system, especially in the mechanical equipment processing and manufacturing, electronic equipment manufacturing of aerospace manufacturing enterprises. In the quality process, the scientific management link is relatively weak, many people's quality values are not perfect, the product quality awareness is relatively indifferent, the lack of sound product quality management system, at the same time, the enterprise culture is not suitable, so that the enthusiasm of the company staff in the production work is relatively low. Often do not pay attention to the details of production and manufacturing, quality management work is relatively lax, there is no certain work pressure and motivation.

In addition, in the 1990 s, a trend of implementing ISO9000 system international standards and building a national quality system put forward a more feasible path for the quality management of Chinese aerospace manufacturing enterprises. This will lead to cross-contradiction or marginalization of the total quality management system in the implementation process, and thus further increase the implementation difficulty of the total quality management system.

3.3 Analysis of Problems in the Implementation of Total Quality Management

(1) The process control is not in place

The production process of aerospace product design is the most basic link in the product quality management system. It mainly involves product manufacturing, quality inspection, product assembly, quality analysis, process quality management, and user supervision and inspection. However, for aerospace manufacturing enterprises, the product manufacturing process is mainly based on working hours, and employees require actual effective working hours, lacking efficiency requirements and reward and punishment measures in the manufacturing process [10]. At the same time, the internal supplier management of procurement or outsourced parts is only formalized, lacking effective quality management or only managed through incoming inspection and other means, which also reflects the weakening of supplier quality management.

(2) Lack of quality management awareness

The all-round quality management system pursued by TQM, employee responsibility is the cornerstone of the product and the foundation of quality assurance. In some aerospace companies, due to the inertial thinking of quality management personnel, their employees do not have a scientific understanding of product quality, thinking that product quality management belongs to the quality inspection department, so product quality management problems occur, and they think that the main responsibility lies in Quality inspection department. At the same time, employees' participation in product quality management is relatively small, which seriously affects the overall product quality level of the company.

(3) The cost of quality is too high

At present, although the profits of China's aerospace manufacturing enterprises are gradually decreasing due to the impact of marketization, their costs continue to increase. The high cost of quality is also a reason that cannot be ignored, mainly in the following aspects:

(1) Because of the characteristics of users of Chinese aerospace product manufacturing enterprises, most companies only pay attention to the manufacturing progress without considering the production cost. Once there is a case of substandard products, they cannot analyze the cause well. And they desperately need to restart production before moving on to the next step, which requires a lot of money. Material and time limit, at the same time dilute the enterprise staff product quality awareness.
(2) A large number of large-scale machinery and equipment are used to process small parts, resulting in serious waste of resources.
(3) The traditional process production technology has not been updated, and the old process technology and manufacturing equipment are still the main part of new products, resulting in insufficient manufacturing efficiency and high production costs.

(4) The service system is not perfect, and the service cost remains high.
(5) The employees are not thrifty, and the waste of materials, facilities and fuel is still quite common.

4 Application of PDCA Cycle to Improve the Total Quality Management of Aerospace Manufacturing Enterprises

(1) Planning stage

①Analyze the current situation of aerospace production and find out the main problems of product quality. ②Analyze the existing main problems of product quality, and focus on introducing the existing problems, shortcomings and aspects that must be improved or adjusted. ③ Determine the goal of product quality improvement and formulate goals through research on product quality status of aerospace production enterprises and research on existing product quality issues. ④ Propose an executable reform implementation plan according to the objectives and specific conditions.

(2) Implementation stage

In the implementation stage, in order to ensure the effectiveness of the project implementation, the enterprise should fully mobilize the enthusiasm of all employees, and implement it in stages according to the predetermined plan. The implementation process requires the enterprise to control the process from a global perspective, ensure that each work is carried out in an orderly manner, and achieve process data collection and data analysis [11].

(3) Inspection stage

①Check and analyze, evaluate the effect of quality improvement and the degree of achievement of goals, and summarize the problems that arise in the process of quality improvement. ② Keep abreast of various relevant news to improve quality. For example, timely grasp the quality management standards of aerospace manufacturing enterprises and have an understanding of existing technologies.

(4) Disposal stage

① Summarize the problems and methods in the process of product quality improvement and compile them into normative documents for the company's future application. ② Make the quality improvement effective with new criteria or goals, and continue to optimize the quality situation according to the existing difficulties and re-analysis of the future environment.

5 Epilogue

At present, China's aerospace industry is entering a new stage of development, with opportunities and challenges coexisting, which also has higher requirements and expectations for the development prospects of China's aerospace manufacturing enterprises. Aviation manufacturing must deeply understand that quality is the way to survive for enterprise development, and effective and stable total quality management will be the source of enterprise development. However, total quality management is not a unified quality standard requirement. Therefore, in the process of implementing total quality management, aviation manufacturing should fully mobilize the subjective and active roles of all employees and fully understand the scientific connotation of total quality management. According to the actual situation of enterprise development, the PDCA cycle theory is used to implement the improvement measures of total quality management, and through continuous improvement, the product quality management level of the entire enterprise is gradually improved.

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