# Research on the Management Mode and Method of Equipment Test Quality Information

Kai Jin[1], Haidi Dong[2*], Jing Li[3], Shengzhi Yuan[4], Min Li[5]

{31726617@qq.com[1], donghaidi123@163.com[2*], lijing7292013@163.com[3], yuanshengzhi_hy@sina.com[4], mhlm524@163.com[5]}

College of Weapon Engineering, Naval University of Engineering, Wuhan, 430033, China

**Abstract:** The large amount of quality information generated during the technical preparation of the test object and the use and maintenance of the test support equipment in equipment testing is an important content of equipment testing information management and an important component of the equipment testing quality management system. This article starts from the practice of quality information management in the technical preparation process of the test object, analyzes the main problems in the current information management mode, explores how to more effectively carry out information management of equipment testing quality, and proposes the use of networked information management mode and data mining methods in information management, which can greatly improve the level of equipment testing quality information management.

**Keywords:** Equipment testing; Quality Information; Networked Information Management; data mining

## 1 Introduction

Quality information is the general term for data reports and materials on the performance, reliability, maintainability, testability, supportability, safety, producibility, and cost of equipment. Quality information management is one of the core contents of modern quality management. The quality information of equipment testing mainly includes the use and maintenance information of test support equipment, as well as the quality record forms, quality reports, meeting materials, operating procedures, plan plans, and technical summaries generated during the technical preparation process of the tested objects. The quality information management level of a unit directly determines its quality management level[1]. Quality information management is the collection of all data content in quality management work, and a large part of daily quality management work is to maintain quality information[2]. The main task is to collect the most comprehensive and up-to-date quality information as much as possible and fully utilize existing quality information to conduct in-depth analysis and research, identify problems, and make improvements, thereby improving the level of quality management.

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## 2 Equipment test quality information management mode and existing problems

At present, there are certain shortcomings in the quality information management mode of equipment testing. Various quality information formed during the technical preparation process of the tested object, such as product supporting information, product technical status information, quality problem information, performance indicator information, etc., are generally recorded manually on paper, transmitted through forms, and circulated to achieve quality information management. This quality information management mode determines that each unit and system can only manually search for their own saved paper quality information and conduct quality inspection and confirmation of the tested products. This extensive quality information model lacks overall coordination and control of the quality information management of the tested products. The specific problems are as follows.

### 2.1 Lagging of quality information

The quality information is recorded in paper form, which leads to a lag in information transmission. During the technical preparation process, the data and information generated by the personnel in the position are transmitted to the management, which is already an event or data that occurred at a certain point in time or in the past[3]. However, it is difficult to obtain the ongoing event and data, and some manually recorded data, due to the large amount of data and human factors, can easily lead to recording errors. In addition, product quality information is often transmitted through forms, manual circulation, and other methods. This approach not only slows down information transmission and reduces work efficiency, but also makes it difficult for many quality information, especially the processing of product fault information, to be effectively monitored and tracked.

### 2.2 Poor quality information sharing

The concept of "information island" refers to the complete independence between departments of a unit due to various reasons, and various information cannot flow smoothly between departments, thus forming an information island[4]. At present, there is a phenomenon of "information silos" in the process of quality information sharing. The correlation between systems is not strong, the development and utilization rate of information resources is low, data sharing between systems is difficult, data redundancy is severe, and each business system is relatively independent. It can only provide data information analysis for a single system, and cannot achieve cross system information sharing and utilization.

### 2.3 There are gaps in the analysis and utilization of quality information

The quality information generated during the technical preparation process of the test object is an inexhaustible treasure trove for the experimental team. Statistical analysis and deep mining of quality information can accurately identify quality problems and improvement points, especially the application of statistical technology is an important way for quality analysis and decision-making[5]. At present, there is still a significant gap in the systematic management of quality information resources and the integration of statistical techniques with corresponding feature data.

# 3 Two thoughts on quality information management of equipment testing

## 3.1 Networked quality information management mode and characteristics

At present, the actual situation faced by equipment testing is the high-density implementation of testing tasks, resulting in the continuous formation of massive quality information during the technical preparation process of the tested object[6]. So how to accurately and efficiently transmit and utilize this information to ensure the quality of the tested products is a problem that current quality management work needs to fully pay attention to and face up to. In order to further integrate the management process of the quality information of the tested products, on the basis of optimizing the traditional management mode, the management of equipment test quality information can be completed with high quality and efficiency through a computer network platform.

By building a computer networking platform, real-time data collection can be achieved during the technical preparation process; Integrate the quality management requirements of the tested products into various functional modules of the platform with a systematic management approach; By using various information processing techniques, generate new information resources that meet the requirements of inspection and confirmation from discrete and relatively independent quality data through statistical principles; Through this electronic means, quality information sharing and integration can be achieved, various elements and resource configurations can be optimized, and quality fluctuations can be monitored in real-time. This technological preparation process for network informatization is a new model of quality information management. This mode has the following characteristics.

### 3.1.1 Real time transmission and sharing of quality information

Under the old management model, the quality information generated at the testing site could only rely on manual paper recording, paper circulation, and manual transmission, making it possible for quality information to only be circulated from one unit to the next. There was a lag in the dissemination process, and the real-time and sharing of quality information were poor. The new networked information management model enables massive quality information data to be circulated in real-time to multiple functional departments through a network information platform, enabling personnel from each functional department to participate in quality management in real-time according to the permissions assigned by the information platform. Quality information can be effectively utilized by relevant departments, achieving collaboration and resource sharing in quality work, and eliminating the phenomenon of quality information lag and "information islands"[7].

### 3.1.2 Management process optimization

Under the networked information management mode, it is possible to achieve electronic recording of the technical preparation process, while transforming the traditional management mode into information technology and further restructuring existing resources. Resource

restructuring mainly considers the restructuring of network resources, information resources, management resources, and human resources in the shooting range[8]. Enable quality information to be collected once, utilized in multiple ways, optimize management processes, integrate and merge processes, and improve operational and management efficiency.

### 3.1.3 Breaking through traditional thinking patterns

The networked quality information management mode can gradually transition the quality information management of the shooting range from extensive management to refined management, breaking through the limitations of manual management methods in the past, strengthening the detailed data recording and analysis of the entire experimental process, and achieving refined management in every step from task issuance to final withdrawal. Quantitative proof of the problem enables a clearer understanding of the essence of quality issues. By refining indicators, control effectiveness is improved, and the execution process of various indicators can be monitored, adjusted, and improved in a timely manner.

### 3.1.4 Embodying the quality concept of "prevention first, controlled throughout the entire process"

The old management model cannot statistically analyze some interrelated data, classify a large amount of data, extract data poorly, and utilize data inefficiently. It can only rely on manual extraction and organization, which consumes a lot of manpower and time. The new management mode realizes the use of statistical principles to collect relevant system information, classify and summarize it, and output it according to the user's inspection and confirmation mode, resulting in more accurate and intuitive output. And through the analysis and monitoring of real-time quality information, identify key and weak links, gradually transform quality management from post processing to in-process control or pre control, timely detect and solve any abnormalities that occur during the technical preparation process, resolutely prevent defective products from entering the next step, and improve the quality of testing.

### 3.1.5 The standardization and analysis of quality information makes decision-making more scientific

By organizing the existing types of quality information and developing standardized information formats for computer recognition, the randomness of quality information records during manual management is avoided. After collecting a large amount of information-based quality information, by embedding advanced quality management analysis methods into the management model, quality information can be accurately counted, analyzed, and integrated, making discrete quality information more intuitive and systematic for decision-makers to dynamically grasp the quality of products and the processing process of quality problems, And it provides a guarantee for the establishment of electronic data packages. Based on the analysis of a large amount of quantitative quality information, it makes the decision-making of experimental organizations and managers more scientific.

## 3.2 Application of data mining technology

Under the premise of implementing the network information management mode, in the face of a large amount of very complex data generated during the experimental process, simple

database query and retrieval mechanisms and statistical methods are no longer able to fully analyze and process the original data and information, and cannot provide the necessary support for decision-making, and cannot meet the requirements of information technology conditions for the support work of experimental equipment[9]. The phenomenon of rich data and poor information is becoming increasingly prominent, and data mining technology is an effective solution to this problem.

The application of data mining technology in experimental information management systems is mainly based on the established goals and existing problems of information management, using various analysis methods to mine the inherent knowledge and laws of equipment data information, and model them, and further apply them to practical experimental work. Data mining, as a data analysis tool, has unparalleled characteristics in statistical analysis, online transaction processing (OLTP), and online analytical processing (OLAP) [10]. It can automatically find models in the data and analyze the data. Data mining technology helps people intelligently and automatically extract hidden, previously unknown, and potentially valuable knowledge or information from a large amount of complex data.

In the management of equipment test quality information, we can use the optimal attributes of data mining technology algorithms to judge the technical performance of the current test support equipment based on the existing historical data, in order to determine whether to maintain or participate in the test, in order to avoid the impact of equipment quality issues on the smooth completion of test tasks. In addition, through association rule mining of data, we can also analyze and model the maintenance correlation of equipment components, which is used to determine the correlation between maintenance components in the same type of maintenance process, determine the correlation of damage to various components of a certain type of equipment during task execution, and most importantly, determine the possibility of multiple maintenance components undergoing maintenance simultaneously, thereby avoiding unnecessary losses in equipment use.

## 4 Conclusion

Quality information is an important support for conducting equipment testing and appraisal work. Statistical analysis and deep mining of quality information can accurately identify quality problems and improvement points, making decision-making more scientific. In the current reality of high-density equipment testing, a massive amount of quality information has been formed during the technical preparation process of the tested object. Standardized and refined management of this quality information and the study of new quality information management models are necessary conditions and important links to ensure the high quality and efficiency of the evaluation work in the range test. The purpose of this study is to effectively utilize equipment testing quality information resources and unify the management and integration of quality information related to testing, measurement data, and equipment maintenance information. By establishing a networked information management platform, scientifically and effectively collecting, organizing, and analyzing equipment testing quality information, fully utilizing the auxiliary decision-making role of information management in equipment testing, it is of great significance for improving comprehensive testing capabilities and levels.

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