Design and Research on Integrated Platform of EMC Laboratory

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Abstract. The electromagnetic compatibility (EMC) laboratory plans to implement a proprietary EMC testing platform, which is customized according to the professional perspective of EMC testing. The integrated platform will fully utilize the overall advantages of knowledge resources from various angles to realize the automatic operation of various functions. The simple and tedious work of the engineers during the inspection process will be completed automatically, reducing the burden and devoting more time to creative and high-value work. At the same time, the platform will integrate higher-level related management systems and all EMC testing equipment to achieve overall data interaction among the testing department, design department and higher-level management agencies during the EMC testing process.

1. Status of electromagnetic compatibility laboratory

Electromagnetic compatibility (EMC) is an important factor that directly affects the efficiency of electronic equipment, and is also a key technology that restricts the design and development of electronic products in complex electromagnetic environments. Only by conducting a large number of EMC tests during the whole process of product EMC design and development, can we find the existing problems as early as possible and take necessary measures to ensure the electromagnetic compatibility of the system\cite{1}.

At present, the EMC Laboratory of Beijing Satellite Environmental Engineering Research Institute (511) has undertaken a large number of model product testing tasks\cite{2}. With the increasingly heavy testing tasks undertaken by laboratories in recent years, the traditional operating mode has hindered the development pace of laboratories, and it is the only way for development to complete the core competitiveness of the overall unit through informationization. In the information construction work, 511 institutes have successfully implemented systems similar to AVIDM, MES, etc., and have achieved excellent results and extensive demonstration effects. However, the speciality and complexity of the EMC laboratory make it impossible for the higher-level system functions to cover EMC’s daily testing technology business and management.

According to the laboratory's business carding, the current problems in the EMC laboratory are as follows: large amount of testing tasks, many types of testing, insufficient task monitoring and process judgment methods, backward data collection and management methods, low data processing efficiency after the test, difficult query statistics and poor information integration.
2. Research on EMC Management Laboratory Management Platform

2.1. Overall structure design
The entire system structure will adopt a mature integrated management platform plus an overall structure built by laboratory functional applications. The platform needs to provide comprehensive support capabilities for laboratory information management systems, which are mainly reflected in the following five aspects[3].

a) Provide design, development, deployment, operation and maintenance support during the life cycle of the laboratory information management system software, and provide a basic design and operating environment.

b) Provide the integration of laboratory information management system with other internal and external and upper and lower systems.

c) Provide a standard process design, development and operation platform for the laboratory.

d) Provide a platform for data interaction and sharing.

e) Provide various underlying services and tools needed for the construction of upper-level application systems.

Based on the needs of the above five aspects, we adopt the following overall structural solution as shown in Figure 1 below[4-5].

![EMC laboratory system architecture diagram](image-url)

Figure 1. EMC laboratory system architecture diagram.

2.2. System functional architecture design
Based on the actual situation of the EMC laboratory, the laboratory management system needs to be analyzed. Based on the powerful, easy-to-use, customizable permissions, and security mechanisms of the information system platform, the EMC management system is designed[6]. It consists of four system modules, namely resource management, process management, business process management, and management perspective platform, as shown in Figure 2 below.
2.3. System functional structure overview

The functional overview of the EMC laboratory system is shown in Figure 3 below. It mainly includes: console, system settings, stand-alone testing process, star detection task, form design, personnel management, equipment management, file management, material management, environmental management and laboratory display[7].

![Figure 2. EMC laboratory system functional architecture diagram.](image)

![Figure 3. System function illustration.](image)
3. Implementation summary
The integrated management platform has been successfully applied to the electromagnetic compatibility laboratories of a number of large-scale military scientific research institutes such as aerospace, aviation, and weapons. Not only fully grasp the professional knowledge of the industry, but also deeply understand its professional needs, and provide users with truly professional, applicable and easy-to-use information software. The successful implementation of the system will achieve the following effects, as shown below.
   a) Comprehensive integration of experimental resources.
   b) Strong support during the test.
   c) Efficient management of trial business.
   d) Effective inheritance of experimental knowledge.
   e) Overall interaction of test data.
   f) Rapid expansion of test platform.
   g) Accurate manifestation of test specifications.

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