Discussion on Optimization and promotion of measurement standard management system in power industry

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Abstract—Measurement is the basis of development and service is the basis of measurement. The unity of measurement unit system and the accuracy and reliability of quantity value transmission are the important foundation of national economic development and the strong guarantee of serving social development. With the expansion of power industry business scale year by year, the number of measurement standards is increasing day by day. How to optimize the management mode of measurement standards and build an efficient, lean, interconnected measurement standard management system is the focus of this paper. This paper starts with the innovation of power industry measurement standard management ideas, discusses in detail the realization method of the optimization and promotion of the measurement standard management system, and proposes to establish a "Online + offline" measurement standard management system to realize linkage management mechanism, subvert the original passive cramming service mode, and truly realize customer-oriented, personalized customization and intelligent management mode of service.

1. Introduction
As an important part of the measurement specialty in the electric power industry, the core of measurement standard management is to ensure the unity of measurement unit system and the accuracy and reliability of measurement value. The traceability and transmission of measurement value is the main way and important technical means to realize the unity of measurement value. With the continuous expansion of business scale of electric power enterprises, the number of various measurement standard devices is increasing year by year, and the demand for traceability and transmission of value is also growing. How to accurately and efficiently complete the traceability and transmission of measurement device value is the key to ensure the accuracy and reliability of measurement verification results. At the same time, with the further deepening of the reform of development concept of "standardization, unification and informatization", it is imperative to continuously optimize the management system of measurement standard device.
2. Thoughts on optimizing the management system of measurement standards
Under the guidance of the ubiquitous power Internet of things construction outline, guided by the improvement of comprehensive management ability, and with the establishment and improvement of measurement standard management system, the measurement standard management system of the power industry can be standardized and supervised through the construction of efficient measurement standard management system, the establishment of information interconnection and sharing platform, and the promotion of intelligent and transparent measurement. In order to ensure the accuracy and reliability of measurement standard management system, the management and control of measurement standard equipment in the whole period can be realized through the full cycle management and management of metrological standard equipment. Achieving the strategic goal of the whole process cycle management of the measurement standard device, achieve the work expectations of unified management of data, timely supervision of work, and professional staff monitoring key issues, so as to provide technical support and services for improving the accuracy and reliability of the verification results and optimizing the business environment. [1]

3. Realization of optimization and promotion of measurement standard management system

3.1 Grid management, precise positioning, put forward the concept of intelligent management and control of measurement standards
Grid management is based on the grid cell as the carrier, differentiated characteristics as the guarantee, and information platform as the means to promote the integration of cell grid, linkage and collaboration between the upper and lower levels, and form a management structure that can effectively connect and support each other between different standard devices and across regions. [2] The grid management of measurement standards is carried out. Taking the actual work as the breakthrough point and relying on the unified management requirements of measurement standards, the measurement standard devices in the jurisdiction are divided into several grids, and each measurement standard device is taken as the basic unit grid. The measurement standard devices are divided into blocks and graded according to the differences of territorial characteristics, equipment types and operation conditions, and the grid is managed by layers and zones. In order to realize the management mode of vertical and horizontal linkage of measurement standard devices in the whole province, the management work of measurement standards is completed with high quality. The management and control contents include: standard establishment assessment and reexamination assessment of measurement standard device, measurement value traceability, operation and maintenance, fault treatment, management, maintenance, replacement, sealing and cancellation of all measurement standards and supporting equipment covered by the measurement standard device. [3] The management and control scope covers all the contents of measurement standard management, such as personnel, device, equipment, verification environment, authorized assessment, etc. The management concept emphasizes the integration and coordination of various management and control contents and control scope, and realizes the result control through process control, so as to ensure the legal and compliant use of measurement standard devices and the accuracy and reliability of verification results.

3.2 Overall planning and management optimization to build an efficient measurement standard management system
By establishing the database of measurement standard device, the information of the original scattered standard device is unified. Through the unified management, the problems of the original measurement standard device information management are not centralized, the management standard is not unified, the supervision and management is difficult, the scrapping / stopping application is not timely, and the horizontal comparison of data is difficult, and so on. The timely control of the basic information of the Ministry of metrology standard equipment, the validity period of the measurement standard assessment certificate, periodic verification and other information has standardized the management of the measurement standard device in the power industry, and eliminated the tedious and inefficient work
situation of repeatedly and repeatedly statistical data to the basic units, so as to better carry out the supervision on the timely rate of the periodic inspection of the measurement standard device. to ensure the accuracy and reliability of the verification results of all electric energy measuring instruments in the jurisdiction area. [4]

3.3 data integration and simplification to build information interconnection and sharing platform
Establish online management and control system of measurement standards, extend the concept of highly automated and information-based measurement development to asset management. Through the "Online + offline" two pronged management mode of measurement standard devices, we can achieve common information, expert sharing, eco-friendly and efficient work expectations, and realize Cancel / seal the measurement standard device for online scrapping early warning. It is an efficient management mode to submit sealing application and report, send review and early warning for the standard device that is about to be expired, conduct online assessment for the standard device that has not been submitted for inspection, and realize the efficient management mode of issuing online and offline printing the verification report of standard device, reducing the cumbersome application process of multiple off-line signatures, and truly realizing the intelligent supervision of the whole process. [5] At the same time, it can also realize the real-time monitoring of the operation of the measurement standard device, organize the experts in the industry to conduct online collaborative analysis on the centralized problems of the measurement standard device, and horizontally compare and vertically solve the common problems found, so as to realize the ideal working state of rapid positioning and elimination of the problems, so as to achieve the goal that the information input of the measurement standard device can be purchased through bidding once. The working state of the whole process and life cycle management from the stage of retirement to retirement reduces the phenomenon of repeated information and multiple input to the greatest extent, provides strong support and technical support for the improvement of quality and efficiency of measurement standard management, and contributes to the creation of intelligent measurement management system.

Figure 1 Online and Offline Interaction

4. Implementation prospect of optimization and innovation of measurement standard management system
It is an inevitable trend for the future development to deeply cultivate the market, put service in front, and implement intelligent and transparent measurement management mode. Driven by the new situation and requirements of economic development and electric power reform, actively promoting the construction of all-round business hall, vigorously promoting the accuracy and efficiency of measurement and verification work, improving the professional ability of verification personnel, and promoting the transformation and upgrading of service mode are the powerful guarantee for enhancing the trust value of power customers to power enterprises.

It is a new mode of intelligent and transparent measurement management guided by information interconnection and sharing and customer-oriented. When customers doubt the accuracy and reliability
of electric energy measuring instruments, they can rely on the application of modern information technology in the all-round business hall to realize the operation mode of collaborative operation and joint promotion of various professional businesses, and realize the experience mode from "watching staff verification" in power supply company to "personally participating in verification" in all-round business hall. According to their own situation, customers can choose to be verified by professional staff or the verification robot that meets the qualification requirements of verification work, so as to transform the passive into the active, and truly realize the customer demand-oriented service mode in which customers participate in the whole process of verification. After the verification of electric energy measuring instruments is completed, customers can print the verification conclusion through the verification data publicity screen of the all-round business hall, query and download the verification results through 95598 website or SGCC online applications. If you still have doubts about the verification conclusion, you can apply for the reinspection of the provincial Metrology Center through online channels. Through online inquiry, you can find the information of the alternative measurement standard devices and the qualification of the verification staff. By using the "meal-ordering" selection mode, we can independently select the reinspection standard equipment, appointment verification personnel, simplify the process, speed up the audit speed, and reduce the re-inspection cost. To ensure the transparency and visualization of the whole process of reinspection, make the service more active, more accurate and more convenient, truly take the customer demand as the guidance, think what the customer wants and what the customer is urgent, and create an open and transparent market-oriented business environment for customers.

5. conclusion

Continuous optimization of the power industry measurement standard management system is an inevitable choice to meet the needs of power development in the new era. How to deeply integrate the traditional mode and modern concept and promote the continuous improvement of measurement standard management ability is an urgent issue to be considered. In this paper, through the construction of efficient measurement device management system, the establishment of information interconnection and sharing platform, the implementation of intelligent and transparent measurement management mode and other ways, subverted the traditional measurement standard device management problems such as unequal information, scattered data management, unstable traceability time, inadequate supervision, not timely review within the cycle, and inadequate feedback. The new electric power service mode with flexible operation and economic operation, through the "Online + offline" two pronged management mode of measurement standard device, spanning the influence of objective factors such as time, space, region, etc., to truly create a smart management system, realize the transformation and upgrading from traditional management to sharing and intelligent measurement standard management based on the construction outline of ubiquitous power Internet of things. In the process of power marketing, a service experience mode of open sharing between the supply and the user is created, which contributes a little to the optimization of business environment.

Reference

[1] JJF1033 Standards of measurement and assessment, National Technical Committee of Measurement by Legal System Administration
[2] JJF1069 Standards for the assessment of legal metrological verification institutions, Metrology Department of general Administration of Quality Supervision, Inspection and Quarantine
[3] Analysis of relevant measures for applying for metrological standard assessment by legal metrological technical institutions at the grassroots level, Bin Guan
[4] A brief discussion on the application, acceptance and evaluation procedure of measurement standard assessment, Shan Ling
[5] Interpretation of 8 preparatory works for the assessment of new metrological standards for application, Limin Sun