

The Analysis and Research on Continuous Improvement of Grid Material Quality

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Abstract. The material quality level of the power grid seriously affects the safe and stable operation of the power grid in the later period. The variety of power grid materials is involved in a large number of suppliers, and the quality supervision of materials is an important task to ensure the reliable supply of materials. The article establishes the material quality supervision model and analyzes it from the perspectives of system mechanism and management strategy, and puts forward a series of measures to continuously improve the quality of power grid materials, which has certain significance for ensuring the quality of power grid materials.

1. Introduction

In recent years, with the large-scale construction of UHV projects and the continuous investment of a new round of rural power grids, China's power grid has developed rapidly. The high-quality power supply of the power grid is an effective guarantee for the safe construction of the power grid and the stable operation of the power grid at the later stage. However, at the same time, there are hundreds of thousands of types of equipment and materials, including various types of materials, materials, and so on. Levels and other unevenness have brought great problems to the quality management of materials.

Reviewing the material quality problems that have occurred in the past, in addition to the improper use in the production and use process, the problems involved in the product itself, the product design, parameter selection, process flow, manufacturing process and many other aspects. At present, the power grid company in the quality supervision of materials, the main quality control means for sampling inspection and supervision, the method is relatively single, while the sampling inspection or special sampling used in sampling inspection cannot cover all material batches; the number of supervision personnel is relatively insufficient. The professional level of the supervisory personnel is uneven, and the third-party supervisors have insufficient ability to control the site. The above situation has affected the further improvement of the quality supervision work of the grid materials.

Focusing on the problem of finding problems-analysing problems-solving problems, based on the analysis of key factors, it is the main reason for the quality supervision and improvement of power grid enterprises, and proposes solutions.

2. Establishment of material quality supervision model

Based on the current material work flow of the grid company, the actual impact on the quality supervision results is shown in Table 1.



Table1.The results of actual impact on the quality supervision

No.	Product Actual Quality	Quality Supervision Results	Treatment Measures	Monitoring Results
1	Qualified	Qualified	/	S1
2	Unqualified	Unqualified	Rejected	S2
3	Unqualified	Qualified	hidden dangers	S3

Material quality supervision effectiveness $S1>S2>S3$, combined with supplier performance evaluation, it is assumed that in case 2, the third-party quality supervision unit exercises the owner's rights to impose penalties on the supplier is W . In case 3, the penalty is X , and the penalty is $X>W$. Z_H indicates the probability that the supplier will provide the product qualified. When Z_Q indicates that the supplier provides the product with defects, the quality supervision will detect the probability of the product failing.

Assume that the cost of third-party quality supervision is $C_Q = f(Z_Q, t)$, and C'_Q is greater than 0, C''_Q greater than zero. t is the time required for material management work. Then the quality monitoring effectiveness function is:

$$S_{H1} = Z_H S_1 + (1-Z_H) Z_Q (S_2 + W) + (1-Z_H) (1-Z_Q) (S_3 + X) - C_Q \quad (1)$$

$$S_G = V - (1-Z_H) Z_Q W + (1-Z_H) (1-Z_Q) X - C_G \quad (2)$$

Where: $Z_Q \leq R$; R is the highest level of quality supervision; V is the product after-tax income; $C_G = f(P_G)$ is the quality cost, and $C'_G > 0, C''_G > 0$.

Although the sampling inspection work adopts the blind inspection situation, if the third-party inspection machine encourages the materials, the income situation:

$$S_{H3} = b S_G \quad (3)$$

The generalized effect of the third-party quality supervision unit is:

$$S_H = S_{H1} + S_{H2} + S_{H3} \quad (4)$$

According to the model analysis, if the owner unit cannot master the supplier's product quality assurance system, it will adversely affect the supplier and quality supervision work. At the same time, the quality supervision work should be moderate, not only to ensure the level of quality supervision, but also to avoid wasting manpower and material resources.

3. Enhance the quality management and control strategy of materials

1) Strengthen source prevention

Starting from the development of planned procurement, we will strengthen quality control for suppliers, procurement, logistics, warehousing, etc., and establish and improve various rules and regulations to reduce the occurrence of quality risks in the supply of materials from the source of control. Based on the consideration of the whole life cycle of the equipment, all employees are encouraged to participate in quality supervision throughout the entire production, installation and service. The procurement plan should be moderately advanced and accurate; the supplier management should be serious and practical; the procurement work should be professional and efficient; the logistics and storage should be scientific and standardized.

2) Strengthening process supervision

The process supervision is to supervise the process by means of routine sampling inspection, special sampling inspection, and on-site supervision. The owner unit entrusts a qualified third-party quality supervision agency to cooperate with professionals of various professional departments of the power grid to conduct product inspection, including the type test of the material products, the

sampling inspection of the arrival materials, and the commissioning of specialized supervision units. The equipment is on-site supervision and so on.

In addition, in the quality supervision of materials, combined with problems in actual work, through the improvement of the supervision system, the improvement of supervision standards, the establishment of a number of mechanisms, the multi-level assurance of reliable material quality.

a) Improve the supervision system

Based on the whole life cycle of the equipment, in accordance with the idea of "relying on the owner unit, joint professional department, guiding the manufacturer, and strengthening the quality control". An efficient and orderly quality supervision system contain the multi-level linkage, division of labor assistance and unified management of the materials from the headquarters to the second and third-level units should be established. Give full play to the professional advantages of the Institute of Electronics and other scientific research institutes; select the qualified and capable equipment to see the unit, implement the supervision and responsibilities, and strengthen the supervision, inspection and assessment of the supervision units.

b) Sound supervision standards

Establish "Implementation Rules for Supplier Product Quality Supervision and Management" to promote suppliers to improve the quality of products entering the network; prepare "Standards for Standardization of Key Equipment Residents and Supervision", unify supervision standards, responsibilities of supervisors, and important key points for equipment supervision Wait.

c) Sound supervision mechanism

➤ Establish a product quality traceability mechanism

Establish a product quality supervision and traceability system, carry out quality supervision of the whole process for product design, production, transportation, installation, commissioning and operation process, establish product quality files, and quality problems appear in any link, all can be found through quality files and responsible Investigate and combine the traceability mechanism of product quality with supplier evaluation.

➤ Establish an information communication mechanism

Relying on the multi-level supervision system, the bidding batch plan will be issued in a timely manner, and the headquarters will organize the preparation of the supervision and sampling plan and complete the issuance. Strengthen the information linkage between the owners, third-party quality supervision units, supervision units and suppliers to realize the smooth flow and sharing of supervision and inspection information.

➤ Establishing a quality inspection expert inspection mechanism

Relying on the power of scientific research institutes and professional talents of the Electric Power Research Institute, we will establish a quality inspection expert inspection system, and carry out inspections and "flying inspections" from time to time. First, we will supervise and witness the sampling inspection work to ensure the scientific and reasonable sampling inspection work. On the other hand, the flight inspection of the on-site work of the supervisory unit is carried out, and the work of the supervisory unit is urged to continue to improve.

➤ Establish a quality supervision mechanism for the whole process

Based on the life cycle of materials, materials involve multiple professions throughout their life, so it is necessary to establish a comprehensive supervision mechanism throughout the process. It is mainly divided into three-stage quality supervision of early quality control, medium-term quality management and post-quality service. In the early stage, we will prevent quality risks from the sources of design, raw materials and processes. In the medium term, we will implement supervision and sampling inspection plans, do a good job in supervision, key points witness, sampling inspection, etc., to prevent leakage; In the later stage, should communicate with the departments of infrastructure, transportation, inspection and marketing, and use information technology to grasp the equipment and materials, and urge the suppliers to timely deal with the problematic equipment.

4. Conclusion

The quality of materials is the key factor affecting the safe operation of power grids. The article combines the actual situation of quality control with the power grid enterprises from the analysis model, and analyzes and discusses the system mechanism, supervision strategy and guarantee. It has the ability to improve the quality control of suppliers.

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