Research on the management and control information system and function design of overhead transmission line construction based on B/S architecture

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Research on Key Technologies of Unplanned Operation Perception in Power Transmission Lines Based on Multidimensional Stereo Network 5218F0230004

Abstract. As the basis of national industry and information industry, overhead transmission lines mainly provide rich power resources for urban and rural residents. According to the analysis of the development status of China's power industry in recent years, the construction of electric power overhead transmission lines should not only ensure the construction schedule, but also put forward strict requirements for the construction quality and project life, comprehensively maintain the overall construction quality of transmission lines, and ensure the safe and stable work of transmission lines. On the basis of understanding the current research status of information technology for management and control of overhead transmission line construction, this paper takes the tower construction stage as an example, mainly studies the construction operation, management and control information system and application functions of overhead transmission line construction based on B/S architecture, and then puts forward effective implementation countermeasures from the perspective of construction site.

Keywords: B/S architecture; Overhead transmission lines; Poles and towers; Construction phase; Information system.

1. Introduction

In the steady development of social economy, power resources always occupy an important influence position, so power enterprises should not only clarify the application value of power resources, but also vigorously build power projects according to the needs of users and development conditions in different regions, and always maintain the reliability and safety of electricity consumption to ensure the healthy operation of regional economy. Understanding the current construction situation of electric power projects, it can be seen that the control of transmission line construction operations is extremely critical. If quality problems occur during construction management, the quality of the entire project and the application effect will continue to decline. Therefore, electric power enterprises should strictly control the quality and safety of transmission line construction operations during construction to improve the overall construction level. Most of the power overhead transmission lines are located in the outdoor environment, the climate has great variability, the overall scheme design is not scientific, the construction of the technical disclosure before the lack of attention, the construction personnel's working ability is not strong, will affect the quality of power engineering construction.［1.2.3］

The basic function of the overhead transmission line is to transfer the force of the transmission line tower to the foundation soil or rock, so it has very significant industry characteristics in design, construction and detection: First of all, the distance of the transmission line is long, the region is

wide, the terrain and geological conditions along the route are complicated, the physical and mechanical properties of the foundation soil are different, and there are many boundary influencing factors to be considered comprehensively during the design and construction. Secondly, the load characteristics of the tower foundation are more complex, not only have tension/pressure alternating load, but also bear a large horizontal load, and the size, distribution and frequency of the load all affect the force characteristics of the foundation, the load distribution, the engineering characteristics of the foundation soil or rock, and the characteristics of the basic material determine the working characteristics of the foundation. Finally, under the influence of factors such as scientific research conditions and research funds, basic line research is relatively weak, scientific research achievements and technical reserves are relatively insufficient, and because the line foundation has a unique analysis method and design method, these contents are difficult to find in basic textbooks, and finally, there are fewer professionals related to the transmission line foundation in China. Fewer researchers are involved in the basic research of transmission line towers. Nowadays, the transmission line infrastructure needs to consider many factors, among which the most influential is the foundation problem. The foundation conditions directly determine the pole and tower positioning and tower structure, and the foundation characteristic parameters are the basis for the actual design, but they are related to the sampling process, experimental accuracy and randomness. Therefore, if there is no comprehensive understanding of the mechanical properties of the foundation soil or salt before the change law. It is not possible to simplify the basic circuit design method. For the construction and development of power enterprises, tower foundation as a basic component of transmission line construction, project cost, construction period and labor consumption occupy a large proportion in the entire line project, the current domestic and foreign transmission line infrastructure construction trend is shown in two aspects: On the one hand, scientific structural measures are selected to effectively improve the mechanical performance of the foundation and ensure that the foundation column mainly bears axial tensile pressure; On the other hand, make full use of the good mechanical properties of the original soil foundation with high bearing capacity and small deformation, and choose the original soil foundation form after following the principle of adapting to local conditions.［4.5.6］

Therefore, on the basis of understanding the B/S architecture design, this paper mainly discusses the implementation countermeasures of the tower construction operation according to the design and application function of the overhead transmission line construction operation management and control information system, in order to provide an effective basis for the construction management of electric power enterprises in the new era.

2. Method

2.1 B/S Architecture

As a three-layer or multi-layer distributed system, B/S mode is mainly composed of a browser and a server, in which the server includes a Web server, database, application server, etc. The specific architecture is shown in Figure 1 below:

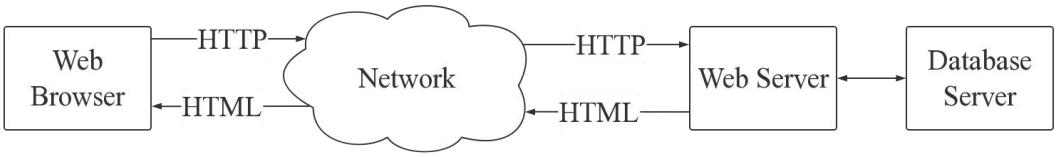

Figure 1 Structure diagram of B/S mode

From the perspective of practical application, the B/S mode will guide the user to use the browser to send a request to the server, the Web server will make a query request to the database server, and finally the queried data will be passed to the browser in the form of hypertext. In the overall operation process, the B/S mode will use the standard AP, HTTP protocol, effectively combined with the existing network of the enterprise, with strong scalability, can directly connect to the Internet, compared with the C/S mode has a high degree of sharing, more information, convenient maintenance and other unique advantages. In the overhead transmission line construction operation management and control information system design period, only need to develop the Server application, not only to meet the needs of existing users, but also to increase the number of users, to ensure that the function continues to run.［7.8.9］

2.2 System Architecture

In the design of overhead transmission line construction operation management and control information system based on B/S architecture, the safety of system operation should be emphasized. In the traditional three-layer B/S structure information system, there is no special system and mechanism between the browser and the Web server, or between the Web server and the database server to ensure the security of the system. Therefore, this paper chooses the four-layer general security architecture, expands the design based on the traditional B/S architecture, and introduces the encryption and decryption module and the security authentication module. To ensure the overall safety of system operation, the specific design is shown in Figure 2 below:

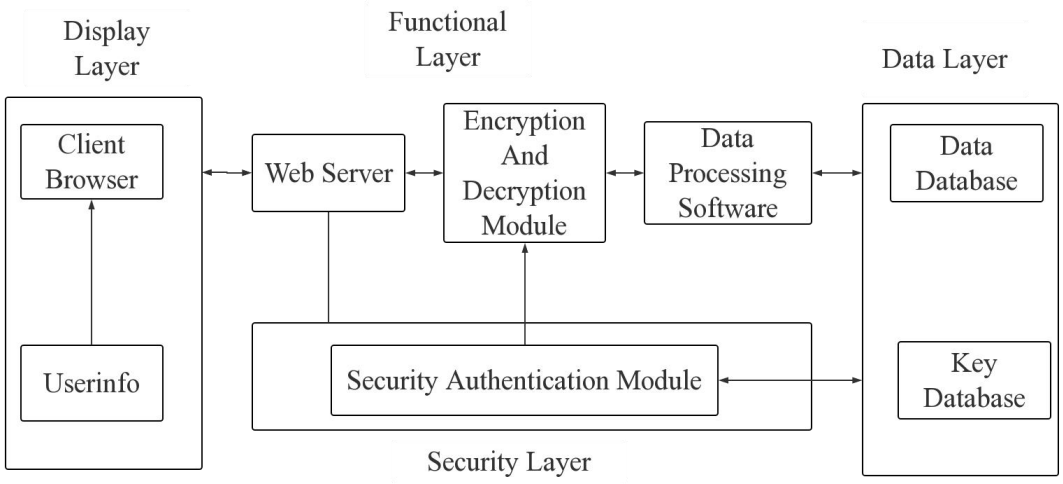

Figure 2 System architecture diagram

According to the above analysis, the overall design is divided into four parts: First, the presentation layer. This level is mainly responsible for the presentation of client information, to ensure the security of information transmission between the client and the server; Second, the functional layer. This level is similar to the system design of traditional B/S structure, mainly used to deal with the basic business of system operation; Third, the data layer. This level is based on the

traditional event structure model evolved, with the excellent performance of the client server database management system and development tools, the basic functions of the traditional data layer, can be used to store a large number of data information. In the system designed in this paper, the data layer mainly includes two databases: data and key; Finally, the security layer. This level will provide three aspects of security services, including authentication of user information to ensure the legal qualification of users, providing user data to ensure data security, providing signature verification function to ensure the integrity and non-repudiation of data storage. ［10.11.12］

2.3 Function Modules

After considering all aspects of power communication engineering construction and management requirements, the overall system is divided into six modules as shown in Figure 3 below:

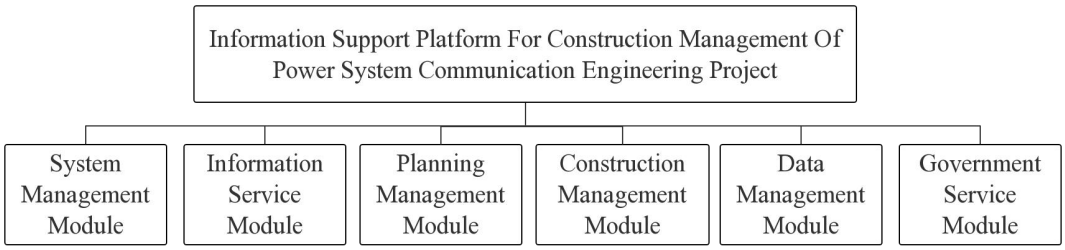

Figure 3 Functional modules of the system

According to the above analysis, the specific module content is divided into the following points: First, system management. This module is the basic basis for designing and managing user information, including user data, user role, role data, role authority, etc. Second, information services. This module is mainly used to publish data information, which includes information release, information management, resource services, government affairs disclosure, engineering construction and other contents. For example, electric power enterprises can fully accept the supervision and management of the public when they release important construction progress and construction news to the public. Third, planning management. This module mainly predicts the future goals to be achieved in project planning and problems that may be encountered, and proposes effective solutions, measures and means to solve problems, including project planning management, investment planning management, survey and design management, etc. Fourth, construction management. This module is proposed based on planning and design, which requires planning, coordination, supervision and control of preparation work, survey and design, construction links, completion acceptance and other links of project construction. Effective methods such as contract management and target control are used to ensure that the progress, cost and target of project construction achieve the best results. Fifth, data management. This module refers to the management of various documents generated during the construction of the project, including compilation management, contract management, archive management and other functions, among which the most critical is to summarize and store the communication line data formed after the completion of the project construction; Sixth, government services. This module belongs to the information communication platform of the supervisory unit of the power system communication network and the subordinate communication network management unit, which mainly includes file management, human resources management, administrative management and office automation and

other functions, and will take integrated business processing as the basic content, focusing on improving the work efficiency and quality of internal employees.[13.14.15]

2.4 Tower construction

Tucker construction accounts for 30% to 40% of overhead transmission line construction operations, which directly affects the overall construction quality and efficiency. Nowadays, most construction units mainly rely on traditional experience construction management during construction management, although it can solve construction problems to a certain extent, but under the conditions of high construction time and quality requirements, the lack of experience often leads to excessive waste of construction manpower and material resources. In this paper, after mastering the management and control information system of overhead transmission line construction, a tower construction design and simulation system block diagram as shown in Figure 4 below is constructed by computer. During the design and construction period, 3D dynamic diagram simulation demonstration is carried out by various methods. The specific simulation program is shown in Figure 5 below:

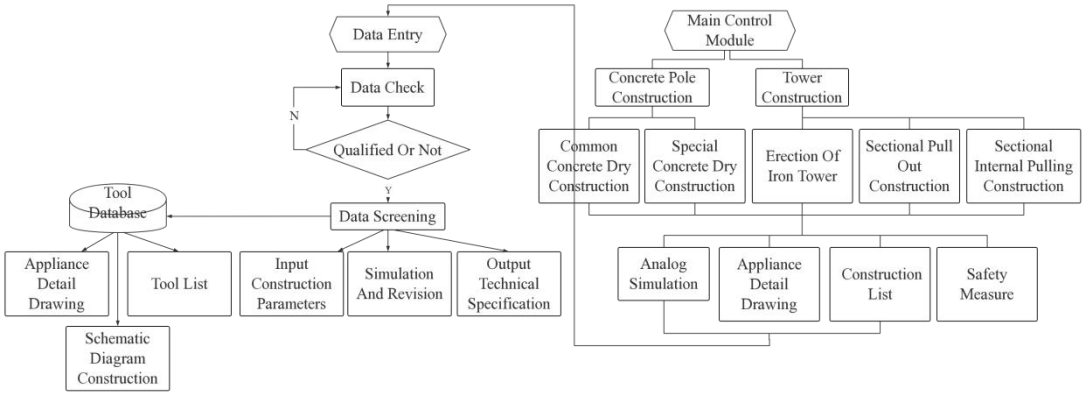

Figure 4 Frame diagram of tower erection construction design and simulation system

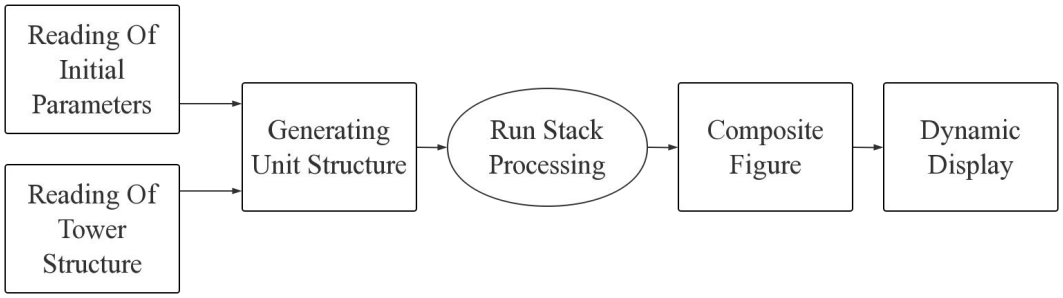

Figure 5 Dynamic simulation program diagram of tower group

3. Result analysis

For the construction of the tower, the effective control of the construction quality must do the following work: First, the construction preparation stage. In this process, the construction unit should regard the construction drawings as the important and difficult point of the review. If there is a problem with the drawings, it will affect the construction schedule, construction cost and construction quality, resulting in the normal operation of the pre-set construction scheme. Therefore, the construction unit should carefully check the construction materials and machinery and equipment, determine whether they meet the site construction standards, and avoid the use of illegal products and equipment; Secondly, the construction process. Investigate and study the environment or soil condition around the tower to determine whether there is deviation between it and the design scheme, and correct it immediately if there is; Finally, the construction is completed. During the completion period of the transmission line, the relevant departments should arrange professional personnel to check and verify the transmission line, quickly discover the hidden security risks of the line, ensure the best quality of the transmission line, effectively prevent the occurrence of all kinds of safety accidents, and ensure that the transmission line can operate safely under normal conditions.

Conclusion

To sum up, transmission line construction quality control is a complex and tedious task. After receiving great attention from relevant departments, the construction operation management and control information system of overhead transmission lines by using information technology can not only clarify the main factors affecting quality and safety, but also propose effective countermeasures according to accumulated experience in practice. Finally, the overhead transmission line construction project can be delivered on time and in quantity.

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