Informationization Design of Field Standardized Operation Management System for Medium and Low Voltage Distribution Network

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Abstract. The medium and low voltage distribution network system can provide information design according to the needs and usage habits of users, realize a series of service applications based on the management location data provided by the medium and low voltage system, and finally realize the information of distribution network resources. This paper mainly introduces the background and significance of the subject research and the work content and objectives of the subject. Demand analysis mainly introduces the overview of the system and describes the functional requirements; The system design describes the process of system establishment and the function realized finally. The summary part summarizes the development of medium and low voltage technology and the trend of its application in distribution network.

Keywords: Standard Activity Based Management, Distribution Network, Medium and Low Voltage Technology

1. Introduction
With the continuous development of power grid construction, distribution network management information system has become an important part of power information. It realizes the spatial database system with topological structure and analysis function, and provides a powerful means to deal with graphical and non-graphical information.

At the same time, users have higher and higher requirements for power supply reliability. This requires the management of power enterprises, especially the distribution network, to be more refined. The establishment of distribution network management information system is helpful to improve the management level of distribution network dispatching, planning, production, operation and marketing.

At present, some distribution network information systems based on medium and low voltage have appeared, which can complete basic query and analysis functions. However, they are slightly inadequate in providing realistic visual scenes, perfect human-computer interaction and enhanced analysis [1].
In this paper, the medium and low voltage system is introduced as the analysis, display and interaction layer of distribution network information system to solve or alleviate the above problems. From different perspectives, there are three definitions of SOM.

2. Definition based on toolbox

2.1. Design objectives of job management system

2.1.1. Design principles of job management system. (1) Openness: object-oriented supporting platform and operation and development platform are adopted to improve the reliability, inheritability, maintainability and extensibility of software; Adopt open-source development tools, support third party secondary development.

(2) Security: the system provides strict security measures, security management means, reliable data storage and system operation mechanism.

(3) Functionality: Functionality is the primary principle for the design of power distribution integrated management drawing system, and system functionality is the basic standard to measure the success of the construction of management information system. As a prototype verification system, the functional design basically meets the requirements of the construction of distribution network system.

2.1.2. Design objectives of job management system. The main objective of the system is to innovate the production management of the distribution network, get rid of the traditional operation mode, enhance the visual degree of the system, and improve the working efficiency and management efficiency.

The main design objectives of this system are:

(1) Realistically and intuitively reproduce the three-dimensional landscape of distribution lines, distribution equipment, ground information and buildings.
(2) All kinds of information, attributes, and part of the grid users are stored in the standard operating management database, to make the information communication and data exchange, directly from the standard operating management system database information you need to extract various information with other departments for information flow, process shown in figure 2 as follows:

![Figure 2. System design for standardized job management](image)

2.2. **Job management system function analysis**

(1) in the management of map intuitively reflected power grid equipment, the distribution of load and the user, and simulating the actual running situation of power grid, directly query and statistic data, such as equipment and user needs, image and intuitively show the results, generate the corresponding map (equipment load diagram, customer statistical figure (2 d), regional analysis diagram, etc.), for management, analysis and decision-making [4,5].

(2) Provide power grid operation management analysis and optimization tools to ensure the safe and economic operation of the power grid, strengthen professional management such as operation and maintenance and business service, speed up the response speed of application for installation, repair and emergency repair, improve customer satisfaction, and provide technical support for effectively improving work efficiency and service quality.

(3) It is planned to build a data exchange and information sharing platform, which can effectively seamlessly integrate with the existing isolated application systems (MIS, customer service, electricity, etc.), so as to provide more effective and comprehensive support for information decision-making.

3. **The overall design of the job management system is taken as the B/S network architecture**

Due to database maintenance and power grid planning involves a large amount of data processing and analysis, especially in the processing of spatial data, large amount of information, processing way is complex, so using arcde, through the model can make managers to easily change for normal operation of power grid graph, line cutting, power analysis, attribute information updates, graphics, reports print functions such as browsing inquiry, statistics, generate reports, etc, so the b/s mode.

3.1. **Operation Management System Model**

Traditional Distribution Network Topology Model According to the characteristics of distribution network, many scholars have proposed many different distribution network topology models, such as the dissipative network model, which simplifies the distribution network into points and arcs, including outgoing switches of substations and switching stations [6].

The segment switch and contact switch on the feeder are regarded as the vertex, and the segment of the feeder is regarded as the arc, whose direction is the direction of the power flow on the line.
power supply load of a section of the line can be regarded as the arc load, and the load flowing through the switch can be regarded as the load of the vertex. Another distribution network topology oriented to the original model of distribution system. Based on the transmission network database structure, a network database structure and network hierarchy model suitable for distribution system are proposed. The model respectively describes the distribution feeder, feeder segment (branch line) and power supply (transmission part), as shown in Fig. 3 below:

**Figure 3.** Traditional distribution network topology model

Although these models fully consider the characteristics of distribution network and basically meet the requirements of distribution network construction, based on the application of SOP in distribution network, how to make these models directly applied or integrated on the SOP management platform becomes a problem [7,8].

3.2. The topology model of this system only contains two elements of points

Topology is managed as a single layer on the standard job management platform, with point and line elements having all the methods and attributes of the objects. Although the topology has been formed, but facing standard operating management platform of topology analysis, after all, not for power system, therefore must also be in the standard operating management, on the basis of topology, suitable for power system analysis model is set up, such not only can make full use of the powerful spatial analysis ability standard operating management, at the same time also can meet the requirements of power system, more can well complete standard operating management and integration of dpas [9]. Considering the characteristics of distribution network, a model which plays a key role in network topology should be established. The key nodes in a network are those nodes that have important influence on the network topology. The points which do not affect topology are designed as points on complex edges, and the points which affect topology are designed as endpoints of complex edges, etc., to establish the most suitable distribution network model [10].

4. Conclusion
This paper summarizes the distribution network management information system construction, points out the current distribution network management information system some of the deficiencies and improvement, among them, the introduction of low pressure in basic solution to the problem of the existing system of presentation, the use of standard operation management and web also greatly reduced the difficulty of system operators to fit. The content demonstrated in this paper can play a certain guiding or reference role to the application of standard activity-based management in power supply enterprise management. Of course, there are still some shortcomings in the design of this system. I believe that with the continuous development of computer technology and standard operating management technology, these problems will be solved continuously, and the three-dimensional distribution network standard operating management system will certainly have a broader development prospect.

Acknowledgments
Science and technology project : The third task for key technologies research and application of non-service interruption working in distribution network—Study on equipment optimization and task information with benefit evaluation model of non-service interruption working (GZHKJXM20190107).

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