Innovative Application of Electrical Automation Technology in Power Dispatching under the Environment of Energy Saving and Emission Reduction

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Abstract. Science and technology have developed rapidly recently, more and more automation technologies are applied to the production and life links, which provides a lot of help for social development and economic progress. In the power system, the power of the substation can be reasonably dispatched through the automatic control technology to reduce manual intervention and improve work efficiency. The use of power transfer automation technology can not only be more orderly and convenient to dispatch and manage, but also significantly improve the efficiency of power dispatching. It is an important technology for the development of the current power industry. This paper expounds the characteristics of power transmission automation technology, analyzes the innovative application of power transmission automation, and puts forward the trend of power dispatch automation, in order to better promote the development of China's electric power industry.

Keywords: Electrical Automation Technology; Power Dispatching; Energy Saving and Emission Reduction; Innovative Application.

1. Introduction
Nowadays, automation technology is widespread, it has given great help and improvement to people's life. In the power system, automation technology can realize intelligent management to make the power distribution and use time of the equipment more reasonable, which has a good promotion effect on the electrical equipment and thus accelerates the development of the power system[1]. It is an independent system that information is collected, analyzed and processed effectively, and it can transmit all kinds of information to the control center to ensure that each link can be completed in quality and quantity during the execution process. This system can realize the power equipment during the operation, the automatic control also shows obvious advantage in information processing and processing, which provides great convenience for the dispatching manager's work, ensures the scientific and effective scheduling.

Power dispatching is an effective management method used to ensure the safe and stable operation of the power grid, external and reliable power supply, and various types of power production work. The specific work content of power dispatching is based on the data information returned by various information collecting equipment, or the information provided by the monitoring personnel, combined
with the actual operating parameters of the power grid, such as voltage, current, frequency, load, etc., comprehensively considering the development of various production work[2]. Judging the safety and economic operation status of the power grid, issuing operational commands through the telephone or automatic system, and directing the on-site operators or automatic control systems to adjust, such as adjusting the generator output, adjusting the load distribution, switching capacitors, reactors, etc., ensure that the grid continues to operate safely and stably. Since the 20th century, modern monitoring and control methods have been continuously improved, and the technical support for power dispatching has become increasingly powerful[3].

Power dispatching automation system is mainly for the distribution network and power dispatching management personnel to collect all kinds of data, it can not only ensure the safe and stable operation of the system, but also ensure the quality of the power system and improve the benefits. With the development of economy, the power grid also advances gradually, and the people's demand for the operation and management of the power grid is constantly changing. In order to operate the power system safely and effectively, it needs the integration technology of power dispatching automation to adapt to the needs of the future power grid[4]. This paper mainly analyzes and explores some problems in the current situation of power dispatching automation and automation system in China, expounds the characteristics of power dispatching automation technology, analyzes the innovative application of power dispatching automation, and puts forward the trend of power dispatching automation on this basis, in order to better promote the development of power industry in China.

2. Characteristics of electrical automation technology

2.1. Speciality
With the continuous development of science and technology, the automation of power dispatching is an inevitable process. It is based on modern automation technology and has strong professionalism. The machines and working environment involved in the process of power dispatching automation are not set aimlessly, which need to be designed by special personnel[5]. The electric power dispatching machine needs special design, manufacture, debugging, maintenance and management. Every link has gathered human wisdom and experience, which can only be completed by specialized personnel. It seems that the work in this field is not too difficult, but to become an excellent power dispatching personnel, systematic and comprehensive professional training is essential.

2.2. Technicality
Power dispatching automation technology is an advanced technology, which has strong technicality. The actual power dispatching operation also has strong requirements for the operation ability of technical personnel. The power system involves many machines, and the machine operation also needs to follow a strict process. In the eyes of professionals, such a behemoth is a headache, but in the eyes of those professional technicians, these machines and equipment are really the most familiar partners.
2.3. Universality
The power environment varies from place to place across the country, but the power dispatch automation technology can be quickly adapted to any place and integrated with the local power environment to adapt to local conditions. This universality is the guarantee for the stability, reliability and safety of power system operation management.

3. Application advantages of electrical automation technology in power dispatching

3.1. The advantage of power supply service quality
The integrated automation control technology is applied to the substation power dispatching link and has certain advantages in improving the quality of its power supply service. The integrated automation control system is very comprehensive, especially the reactive power automatic control function, which is one of the most critical functions[6]. In a substation with a voltage regulating transformer and a reactive power compensation varactor, the voltage pass rate can be effectively improved, at the same time, the application of this technology can also maintain good maintenance of electricity and transmission equipment, prolong the service life of these equipment, effectively reduce the post-maintenance costs of substation equipment, and increase the economic benefits of enterprises.

3.2. The advantage of management efficiency
Electrical automation technology has certain advantages in improving the efficiency of substation management. In the application of electrical automation technology, it mainly relies on advanced computing technology and the internet to automatically perform all tasks of power dispatching. The staff can fully understand the data parameters of all aspects of power transmission and power transmission by observing the screen, and through the internet. Realizing the fast transmission of information greatly improves management efficiency[7], while observing the data, the dispatcher can also combine his own professional technology, timely discover the problems arising from the data changes, and make adjustment and control work to ensure the stability and security of the system operation.
3.3. The advantage of security
Automation technology has played a great advantage in fault detection and diagnosis. Because it mainly uses computational technology to control the system, the reaction speed is fast, it can detect the faults in the system in time, and take corresponding measures to cut off the power. protection. Some devices in the integrated automation control system can even monitor the report object at any time[8]. Once it is found that there is a surge in value during the operation, it will immediately issue a warning signal to remind the staff to handle it as soon as possible and strictly control it. The occurrence and development of accidents have effectively improved the stability of the operation of primary equipment and secondary equipment.

3.4. The advantage of cost saving
With the support of information technology, the integrated automation control system can realize the sharing of resources and effectively improve the information utilization rate. In addition to the application of large-scale integrated circuits in intelligent substations, the cost of substation is greatly reduced. In addition, in the construction of intelligent substation and the application of integrated automation technology, the cost of renovation and material will only continue to decline, the cost performance will continue to increase, and the total cost will eventually be at a lower level. Electrical automation technology has great advantages in terms of cost savings.

3.5. Advantages of labour saving
In the past power dispatching work, the staff need to monitor and analyze the data for a long time, and the workload is large. However, the application of information technology in the integrated automation control system has realized the reuse of information resources. The staff only need to implement the wheel flow duty monitoring for the key hub equipment, so that they can fully control the system data. At the same time, the integrated automatic control system can realize the remote control according to the computer setup program, which provides great convenience for the staff, effectively reduces the output of labor force, and realizes the saving of human resources.

4. Innovative application of power dispatching automation technology
4.1. Centralized structure application
The centralized structure is the most commonly used automatic power dispatching structure in power dispatching (Figure 3). It mainly uses the powerful function computer in the substation to expand its I/O interface to obtain accurate information. For example, in the instant analog quantity acquisition of a substation, the system can automatically analyze and analyze the data after it is collected, and implement
automatic protection and control functions for the microcomputer from the perspective of data statistics[9]. The centralized structure is not responsible for all monitoring and protection work in power dispatching by a computer. Instead, it requires a separate computer to pay more attention to the processing of its own field when it is responsible for the corresponding tasks, such as the computer responsible for monitoring, more attention needs to be paid to monitoring data and transaction processing, such as current circuit breaker emergency handling.

**Figure 3.** Block diagram of centralized power dispatching automation system

### 4.2. Distributed architecture application

The composition of the distributed structure is different from the centralized one. The original functions of substation in this structure must be expanded, and not only one or a group of computers will be used for work, but all functions will behave according to certain rules. It mainly uses the CPU system working idea to perform parallel operation, orderly processing many data generated in the same time period, realizes effective processing of multiple tasks or emergencies, and fully solves the data jam problem, which is one of them. If there is a problem with a single module, it will not have an excessive impact on other modules, so that the substation function can continue to operate normally[3]. This structure is mainly applicable to substations with certain maintenance difficulties.

### 4.3. Distributed decentralized structure application

The automatic control technology of this mode is mainly applied to the two-layer substation system which is divided into two layers of substation layer and interval layer. Through this structure mode, certain innovation can be realized. In particular, in the design of the interval between circuit breakers, systematic, comprehensive acquisition of circuit breaker interval data. On this basis, the protection function, control function and so on are summarized on the small-scale control unit, which effectively saves the use of cable lines, reduces electromagnetic interference, and greatly improves the accuracy of information transmission. Failure between the two will not affect the overall operation. At the same time, the setting of the distributed and dispersed structure is very simple, and the manufacturer can assemble in advance, which reduces the construction difficulty in the construction of the intelligent substation and plays an important role in improving the construction efficiency[7]. The automation technology that chooses which structural mode to use should not be selected on the basis of the actual situation of the substation, because if it is not properly selected, it will both increase the cost of use and reduce the efficiency of management and increase the failure rate[10-11]. Therefore, relevant technologies are needed. The personnel do a good job in pre-existing research and select the most suitable automation control technology on the basis of sufficient research.
5. Conclusion
On the whole, the development of social economy and the continuous improvement of people's living standards make the demand for electric power growing, and the requirements for electric energy are higher. In order to make sure of the service quality of electric power systems, as a power company, Relevant researchers should improve the application of electrical automation technology in electric power system independently. In the production process of power companies, it is necessary to strictly control the production process so that all work items can be completed in an orderly manner. As a power system, it is necessary to cite a new type of management system, and the power system dispatching automation technology has a positive impact on improving the operating capacity of the power system. The advantages of cost saving and capital saving of the electrical automation technology also drive the power companies in China, also promote the rapid development of China's enterprises in the same industry in the direction of energy saving, low consumption and safety.

Acknowledgments
Core Teaching Team Construction Project supported for QingGong College, North China University of Science and Technology.

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