
Analysis of Intelligent and Automation Technology for Electric Power Dispatching

Zhenfeng Wang, Hailun Wang *, Jubing Xu, Guanglong Gu

School of Electrical and Information Engineering, Quzhou University, 324000, China

*Corresponding Author: xiaohong1920@126.com

Abstract

In the face of ever-changing science and technology, the power grid has also been driven by the pace of reform, power system mechanization transition to automation direction. Electric power dispatching can be realized through modern computer network technology to build an intelligent and automatic dispatching system driven by science and technology in order to meet the new requirements of power in the new era. This paper discusses the intelligent and automatic technology of power dispatching.

Keywords

Dispatch; Automation; Power; Intelligence.

1. Introduction

Intelligent and automatic power dispatching system established in the new era is not only conducive to guaranteeing people's huge power consumption in the new era, but also provides a new power supply method to reduce the damage caused by power overload of power grid. Power dispatching focuses on the direction of development. Intelligence and automation of power dispatching are mainly embodied in collecting and analyzing information of power dispatching, forming fault prediction and diagnosis, which is conducive to maintaining the scientific nature of power dispatching and controlling power dispatching reasonably.

2. Power Dispatching

In 2009, the State Grid Corporation first announced the "smart grid" development plan, which will complete the transformation of the power grid by 2020. It is clear that 2009-2010 belongs to the pilot stage of planning, focusing on smart grid development planning, research on technology and management system, research and development of key technologies and equipment. 2011-2015 belongs to the stage of comprehensive construction, accelerating the construction of UHV power grid and urban and rural distribution network, initially forming a smart grid operation control and service system, key technologies and equipment have made significant breakthroughs and widely used. 2016-2020 is the leading stage of upgrading. The technology and equipment should be in the leading position in building smart grid in an all-round way. (as shown in Figure 1).

Electric power dispatching refers to the integrated process from supply to distribution of power. It is a common means of maintaining balanced power consumption in power system and plays an important role in power system. Electric power dispatching pays attention to the combination of technology and human resources to maximize the advantages of dual resources. The implementation of intelligent and automated technology in power dispatching not only solves the problem of time-consuming and laborious operation, but also effectively avoids manual error operation.

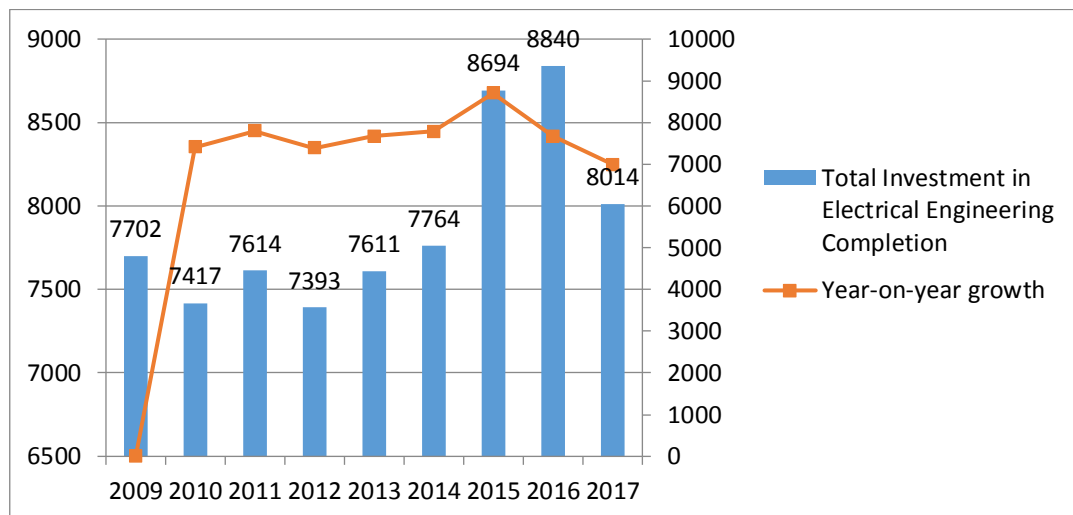


Figure 1 The trend of China's Electricity Investment in 2009-2017

3. Technical analysis

Intelligent and automatic power dispatching is a comprehensive application of computer network, remote communication and monitoring technology. It is implemented in the power dispatching system as a whole to achieve the scientific nature of power dispatching.

Intelligent and automatic power dispatching system includes three kinds: application system, minicomputer system and cluster system. In power dispatching system, dual-computer system is usually used. When power dispatching problems occur, intelligent switching between mainframe and standby machine can be implemented to ensure the normal operation of power dispatching system. For the design of the system, the maintenance system and the normal operation as seen should be designed, and the software should be updated in time based on the collected data and monitoring system, and the database of archived information should be established. (as shown in Figure 2).

Dongbei power grid	Provincial Power Network in the Region 1200
Huabei power grid	Provincial Power Network in the Region 2429
Huazhong power grid	Provincial Power Network in the Region 885
Huazhong power grid	Provincial Power Network in the Region 1552
Xibei power grid	Provincial Power Network in the Region 200
Nanfang power grid	Provincial Power Network in the Region 2452

Figure 2 Current situation analysis of power network in China

Therefore, the future automation, intelligent system and power market operation system need to be closely integrated. In traditional EMS and WAMS applications, more market factors are integrated,

including the study of power grid security risk analysis theory and the traditional EMS analysis function in the market environment. For example, the security checking function, probabilistic power flow and security and stability of generation plan promotion in power market are calculated and analyzed, and on-line available transmission capacity (ATC) is analyzed and calculated.

The goal of power dispatching automation system is to improve the safe operation level of power grid, improve the ability of fault recovery and reduce losses. The dispatching automation system should have the functions of data acquisition, monitoring and control (SCADA), but in the specific implementation process, the overall functions should be properly determined according to the scope of dispatching responsibilities, the status quo of dispatching automation and the automation conditions of basic equipment, and according to the principle of from low to high and from easy to difficult.

The system realizes an open and full-configuration integrated dispatching automation system, which not only makes the picture and background language configurable, but also makes the data acquisition design configurable. The fundamental reason for realizing the above capabilities is that the system abstracts the level of equipment channels and communication protocols. The system realizes the construction of a satisfactory man-machine interface based on the user's requirements. The commonly used artistic tools for the construction of man-machine interface have animation attributes, including "color, size, location, text, angle, flicker, hiding" attributes, which can be simply linked with the expression of monitoring variables or memory variables as parameters. Next, the system provides an efficient screen refresh mechanism to ensure that the attributes of graphic elements change with the changes of variable expression attributes; the system provides independent function controls for displaying alarm information, curves and bars of the system, and these controls can also be connected with the variables or expressions of monitoring points and their historical databases by some units. Complete the query and display functions. The basic graphic elements and controls of the system can also form a satisfactory man-machine interface, which can control RTU, intelligent instrument, board and program flow, and achieve the effect and satisfaction of programming in general language.

4. Technical problems

In the process of power system operation, power dispatching automation system exists all the time and controls the whole system. If there is a problem in the automation of power dispatching system in a certain link, it will affect the security and stability of the whole power grid system, and even lead to the paralysis of the whole power grid system. At present, the speed of power system construction is gradually accelerating, and the technical nature of automation system is also gradually improving.

In the power dispatching automation system, to fundamentally solve the technical problems, we need to strive to achieve technological innovation, analyze and summarize the problems of the current power grid in the system, and strive to achieve technological innovation. For example, in automation system, we can set up monitoring points in different stages, collect real-time information in different stages, and feed it back to the staff. The staff can summarize the information of each link, so as to issue scientific instructions. Through the construction of monitoring system, we can find out the faults in time and promote them. Improvement of power supply efficiency.

5. Specific Applications

5.1 Promoting Integration Development

Intelligent power dispatching is the process of further promoting power supply and distribution, thus establishing an integrated power management system. Through the new platform of computer network, the scientific and standardized Power Dispatcher relies on information technology to improve the efficiency of power dispatching. Intelligent power dispatching can also provide hardware facilities for scientific power dispatching by means of new electronic devices such as smart power stations and smart watches to support its development and integrated power dispatching system, which can not only organically combine the relevant factors of power dispatching, but also give full

play to the advantages of all aspects. Comprehensive application can achieve the unity of optimum cooperation and organic combination.

It is worth noting that power dispatching is a system engineering, which requires all departments of power dispatching to complete the unified dispatching of time-limited power. The realization of automation and intellectualization of power dispatching can bring into play the contact and cooperation of various departments through network platform, and contribute to the efficient operation of power system.

5.2 Effective Information Processing

The data collection process of electric power dispatching system is a process of reprocessing the collected information to make it an effective data of electric power dispatching system. Acquisition of information through remote communication and monitoring technology for real-time detection and analysis of power system operation process, relying on the data detected and analyzed to judge the power system. Accordingly, the corresponding power dispatch is made, including the analysis and judgment of the operation state of the power system. This scientific and effective means of processing information can not only analyze the state of power operation, but also improve the analysis basis for the analysis of the optimal state of power system, and provide a reference for the management of power enterprises.

For example, by collecting the data of short-circuit state of power system and comparing with the data of previous operation, the causes of short-circuit are analyzed and judged, so as to improve the scientific basis for solving circuit failure and restoring power consumption. At the same time, we should pay attention to the update of data acquisition and acquisition technology to provide rich and reliable information for the database of power system, so as to ensure the correctness of power dispatch from a scientific point of view.

5.3 Rationalization of Fault Handling

Faults will also occur in power dispatching. For the faults of power dispatching, we should first adhere to the policy of "giving priority to prevention, specific problems, rapid response and reasonable solution". Preventive measures are to strengthen the fault prediction and self-diagnosis of power dispatching through the application platform of power system software, so as to ensure the normal operation of power dispatching. The characteristics of power system software application platform are obvious: fast operation speed and high accuracy.

The application platform of power system software can improve detailed database information for power dispatching. In terms of power dispatching faults, it can timely feedback data information for technicians to quickly find out the causes of faults. To deal with power dispatching faults, specific problems should be analyzed with the help of relevant data, and the causes of faults and appropriate solutions should be found as soon as possible. The development of power system depends on network technology. First of all, it is necessary to ensure the safe operation of network environment and avoid the influence of network problems on the normal operation of power system.

6. Concluding remarks

Today, with the rapid development of information technology, the traditional power grid dispatching can't meet the needs of the times. Only by establishing intelligent and automated power dispatching system, can we keep pace with the times, meet the needs of the times and achieve new development of power enterprises. As an electric power enterprise, we should make full use of information technology to further improve the intelligent and automated power dispatching system. In view of the development trend, we should formulate a reasonable development strategy to achieve the success of the reform of electric power enterprises and promote the successful transformation of power grid dispatching.

Acknowledgments

This work was partially supported by National Science and Technology Innovation Project for College Students(No.201711488004).

References

- [1] Zhang Xiaofeng, Zheng Hanjie, Wu Haocheng, et al. Intelligence and automation of power grid dispatching [J]. Enterprise technology development .
- [2] Wang Jintang. Analysis of Integration Technology in Electric Power Dispatching Automation [J]. Information Security and Technology, 2014
- [3] Jiang Xuemei. Talking about Intelligence and Automation of Electric Power Dispatching [J]. China's New Technologies and New Products 2015, (10)
- [4] Yao Jianguo, Yang Shengchun, Gao Zonghe, etc. The development trend of power grid automation system is prospected.