Talking About the Application of Intelligent Technology in Power System Automation

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ABSTRACT

In recent years, the power system uses intelligent technology in the process of continuous reform and innovation. Application methods gradually shift to efficient use. The comprehensive utilization of intelligent technology and control have been into a relatively complete stage, and the use of efficiency has also been significantly improved. In the power system, the realization of intelligent control is to protect the system efficient control, monitoring, processing and prevention of the premise. The use of intelligent technology can also play a role in reducing the loss of power in the process of transport.

INTRODUCTION

As a kind of easy to control, electric power is easy to transport, fast conversion, environmental pollution and many other advantages of energy. In the eighties of last century successfully replaced steam power, it has become the basis of social and economic development of energy. At the same time, in order to meet the rhythm of modern production, with the energy production, transmission and management to achieve automatic control, automatic scheduling and automated management of power automation technology came into being. The power system is a comprehensive system with wide geographical distribution and complex network structure. It is mainly composed of substation, power plant, transmission and distribution system network and end user group, which is unified dispatch and operation. The emergence of power automation technology is very good. To solve the energy in the transport process of the various problems, it has greatly promoted the development of power engineering.

AUTOMATIC TECHNOLOGY IN POWER SYSTEM

The power automation system has been widely used in the field since the 1950s. The power automation system has been limited to individual automatic devices, and widely used telecontrol devices to install analogue frequency modulation devices and economic power distribution devices. And then to the computer as the main body of the real-time monitoring system, the emergence of power automation system is gradually into the track of modern development. Power automation technology mainly includes power grid dispatching automation, automation of thermal power plant, automatic automation of hydroelectric power station, automatic transmission system of power system information, automatic system of power system anti-accident automatic device, automation of power supply system, automation of power industry management system and so on. I will have a brief introduction to the main aspects.

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Substation automation

At present, China’s substation automation development has achieved some success. Making the substation operating costs have been greatly reduced, and it has enhanced the power grid scheduling and transmission and distribution of the possibility. As the substation automation has a stable running status, high degree of automation and other aspects of the characteristics of substations at all levels have been widely used. The use of automation technology can call manual and manual monitoring to replace so that the safe operation level and work efficiency greatly improved.

Grid dispatching automation

Power grid dispatching automation mainly includes core computer control system, software system for real-time analysis and calculation. The power grid dispatching automation technology can carry on the automatic dispatch to the electricity market to meet the actual operation demand of the electric power market when the power production is carried out by using the analysis and the monitoring and the monitoring of the safety and the running state of the power grid system. In the power plant and substation information collection part of the far-end, the scheduling side is mainly used for remote control of the information collected to schedule.

Integrated automation automation

Substation integrated automation through the modern electronic technology, information processing technology and the use of computer technology, substation equipment, equipment, optimize the design and functional combination, to achieve the main substation substation and related equipment measurement, automatic control and monitoring and other comprehensive management. The substation automation technology combines all the functions of the secondary circuit of the substation, and implements the comprehensive and systematic operation and monitoring of the substation. The technology has the characteristics of maintenance debugging and easy operation, which makes the performance of substation protection greatly enhanced, and fundamentally realized the remote monitoring and management of substation.

Distribution network automation

Distribution network automation technology through the distribution lines and distribution substation combination, common synthesis of distribution network, with scattered, more points, wide and other aspects of the characteristics. In the power system, the distribution network automation mainly includes user management automation, feeder automation and integrated automation and other aspects of the content. This technology can monitor and optimize the operation mode of the distribution network, so as to improve and optimize the operation mode of the distribution network. When the distribution network fails and the abnormal operation occurs, the distribution network automation technology can find the fault in time, And to be effective measures. In addition, the distribution network automation technology can also be through the voltage level and voltage reactive load control and analysis, so that the power quality has been effectively improved.
APPLICATION OF INTELLIGENT TECHNOLOGY IN POWER SYSTEM AUTOMATION

Power automation technology uses modern communication technology, network technology, electronic technology, etc. to grid data, online offline data, power grid structure and other information integration, the formation of a complete set of automated control system to achieve the normal operation of the relevant equipment under the monitoring and maintenance And management.

Neural network control technology

In 1943, people developed a man-made neural network, its development so far, has six or seven decades of history, both in the algorithm or model structure, its social have a certain significance. The neural network has been widely concerned because of its strong robustness, non-linearity, autonomous organizational learning ability and essence of parallel processing ability. The neural network consists mainly of a particular way in which many simple small neurons are connected in an orderly manner. It has the effect of imposing a large amount of information on the weight of its connection and then acting on a particular algorithm Down the weight of the m-dimensional space to the n-dimensional space of the complex nonlinear mapping can be effectively implemented under the action of the neural network. So far, the main directions of neural network theory research are: neural network learning algorithm research, structure research, hardware implementation problem and its model. Figure 1 below shows one of the neural network control model diagram.

Fuzzy control technology

For the control system, the establishment of the model is a more advanced method. Compared with the establishment of the conventional model, the fuzzy model is relatively simple. From this point of view, the fuzzy model has certain advantages. Therefore, in the power system (such as electric furnace, electric fans, etc.), often through the fuzzy control theory to effectively control the system. The blurring method makes control very easy and easy to master, so it also shows superiority in household appliances. It is very difficult to establish a model to realize the control, which is a modern and advanced method. However, it is very difficult to establish a conventional mathematical model. The establishment of the fuzzy relation model is very simple and the practice proves that it has great superiority. The application of fuzzy control theory is very extensive. For example, we used the daily electric furnace, electric fans and other electrical appliances.
Fieldbus technology

Fieldbus technology refers to the integration of automation devices and instrument control equipment in power engineering, the formation of multi-station multi-station information network, and digital communications, intelligent control and computer equipment integration and integration of integrated technology. At present the typical field bus CAN, LONWORKS, HART, and PROFIBUS and so on. This technology through the relevant equipment and sensors, the current, resistance and other information parameters passed to the host, the staff according to the mathematical model of the data analysis and finishing, and eventually the instructions sent to the control device. In recent years, through a series of 35KV substation and a series of automated transformation shows that fieldbus technology to save the number of hardware and investment, installation, maintenance and other aspects of outstanding performance, while giving users a high degree of system integration initiative, allowing users to choose equipment brand, Market potential is huge.

Power automation compensation technology

The traditional low-voltage reactive power compensation technology to collect a single signal and three-phase capacitor, three-phase complement. The use of this compensation for the main power consumption for the single-phase load of the user, there will be three-phase load imbalance, resulting in a certain degree of overcompensation or underwriting, and the compensation technology does not take into account the balance of the voltage, And generally do not have the function of power distribution detection.

Intelligent reactive power compensation technology through the combination of fixed compensation and dynamic compensation, three-phase co-complement and phase compensation combined with steady-state compensation and rapid compensation combined with the way to make up for the traditional technology simple fixed compensation defects, can be better Adapt to load changes. And the use of advanced switching switch, the scientific voltage limit conditions and other technical models to achieve the intelligent switching capacitor control to improve the accuracy of compensation, while the lack of protection function.
Active object database technology

The emergence of active object database technology, software engineering has brought great changes on the software development, packaging, design direction also had a profound impact. In modern power engineering, active object database technology is widely used in power system automation monitoring, compared with the traditional technology, the technology in the object technology and active function support to occupy an absolute advantage. As the introduction of object technology and trigger mechanism, database automatic monitoring can be achieved, while the high accuracy of the data after processing, the use of high value, can provide reliable data for the relevant reference. With the development of database technology and the further research on the function of triggering sub-objects and objects in the monitoring system, it is expected to realize the more complicated functions of automatic monitoring and control of power system. Through the international reference to advanced technology and domestic experts R & D improved, active object database technology to continue to develop and improve, greatly to meet the needs of industrial production and life.

DEVELOPMENT TREND OF ELECTRIC POWER AUTOMATION TECHNOLOGY

With the improvement of people's living standard, the reliability and stability of the power supply system is getting higher and higher. Because the functions of various departments of the power enterprises are not unified, there is no information sharing between the systems, which is inevitable in the process of power supply. The emergence of flaws. Therefore, in the future development of power automation, we must integrate the resources of various departments of the power system, and gradually improve the status quo. The system of data acquisition and distribution system, monitoring system, management system, geographic system, advanced application software package, communication system integration and feeder automation are integrated into a system which integrates the power system with single function into a system of information sharing. Perfect, platform open, information sharing, efficient and convenient information system.

In recent years, in the social development and modern science and technology, it has been driven by power automation technology has been rapid development. With the development of power engineering, the degree of automation of power will be higher and higher, a new generation of power automation technology, that is, intelligent power automation technology came into being. It is in the second phase of the distribution automation system based on the increase in intelligent power distribution function, more scientific management of complex circuit network. Intelligent power distribution system can not only play a role in the failure, but also in the normal operation of the distribution network, but also for the power supply enterprises to improve economic and social benefits.
CONCLUSION

From the current development trend of power engineering can be seen, the development of power automation will promote the development of power engineering, industrial production and life through a wide range of power automation technology applications, the future of power automation technology will be to improve the utilization of power supply equipment, Improve the stability and safety of power supply, reduce operating costs and improve the quality of the direction of continuous efforts to promote the technology to promote the development of power is of great significance.

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