

Explore the Development and Application of Electrical Automation Control Systems

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Abstract: The development of electrical automation engineering control system is the foundation of modern industrial development in China, and also an important embodiment of the rapid development of modern technology. The application of electric automation technology can not only improve work efficiency, but also reduce enterprise cost. Based on this, the current situation and development trend of electrical automation engineering control system are studied for reference by relevant staff.

Keywords: Electric automation; control system; development; application

Introduction

Electric automation technology is a technology that combines automation software and hardware to control the whole production process, and utilizes computer technology, information technology and control theory. It is widely used in all walks of life, which greatly improves the working efficiency and product quality, making the production process more secure and reliable. As a result, the market of electric automatic control system has been expanding, which has laid a market foundation for its development^[1].

1. Summary

1.1 Concept of electrical automation control system

Electrical engineering and its automation is mainly involved in electrical and electronic technology, computer information technology, electronics technology, control technology, electromechanical integration technology, and many other areas, is a comprehensive strong discipline. The main characteristics of electric automation technology are the combination of software and hardware, the combination of electrotechnics and electronic technology, the combination of components and systems, and the combination of execution system and control system, etc. The electrical automation control system is mainly based on the control system of electric automation system^[2].

1.2 Characteristics of electrical automation control system

1.2.1 Wide range of applications

With the help of computer software and information technology, we constantly improve the electrical automation system, which is widely used in all aspects of society in the process of development and development. Especially in

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industry, service industry and transportation industry play an important role. Firstly, in terms of transportation, the effective application of electric automation system can realize automatic control of traffic monitoring equipment and signal indicator. To some extent, it has liberated the unnecessary labor force, improved the working efficiency of employees, and improved the traffic safety. In industry, the use of electrical automation can realize the automation process of the industrial production process, improve the overall level of industrial development, and reduce the output of manpower, material and financial resources, reduce the cost and increase the production efficiency for the enterprise^[3]. From the point of service industry, effective use the electrical automation technology, to provide consumers with automation services, convenient for people's work and life, improve people's quality of life.

1.2.2 Faster development

In recent years, the rapid development of electrical automation system has led to the development of other technology industries in the process of development. For example, computer technology and information technology can better promote the development of automation technology. The traditional artificial production mode cannot meet the needs of social production. At present, the wide application of electrical automation in all fields of society has greatly increased people's working efficiency and improved their quality of life. To a certain extent, it is also conducive to better and faster economic and social development^[4].

1.2.3 Large-scale batch operations

Compared with the traditional production mode, the electric automation system can carry out large-scale batch operation on a variety of data and work in a short time, and because of its automatic control system. Therefore, in the process of working, the computer is mainly used as the core element, and the equipment is conducted intelligently. Employees only need to give orders, and the electrical automation system can operate according to instructions. In the process of running once appear problem, can also be independent detection fault, remove by analyzing fault, make sure work can finish it on time, and from a security into consideration also plays a very important role^[5].

2. Application advantages of electrical automation control system

2.1 Make the operation more precise

The electrical automation system can help people to complete a lot of work and life. In the overall operation is also becoming more refined. Under the traditional technology background, the industrial production process is still semi-automatic, and many key links require human participation and control. For some newly-added employees, companies need to conduct pre-job training and improve their production and operation techniques, especially in terms of manual control, which requires employees to have high overall quality and professional skills.

2.2 More functional integration

The electrical automation system is operated in an integrated manner. In the process of carrying out operations, the entire production process can be monitored centrally, and information and data can be updated in a timely manner, information can be shared, real-time monitoring of the working environment and the operation of industrial production equipment. Especially in emergency, such as the natural or man-made accidents such as fire, can start the emergency alarm procedures, remind staff that provide people with more convenient, fast, comprehensive services, improve service quality and employee's work efficiency^[6]. This integration advantage of the electrical automation system can help people improve their quality in the process of work and service.

2.3 Remote operation

Traditional equipment often has some limitations in operation. For example, if you can't do remote operation, the employee can only work nearby, which may affect the overall operation efficiency. And some of the equipment in operation has certain danger, the operation personnel's life security also is threatened. The electrical automation system which combines the computer technology and the information technology can overcome this defect, can realize the remote control of the equipment, improve the working efficiency and the quality of service, and ensure the personal

safety of the staff^[7].

3. Application of electrical automation control system

3.1 Application of electrical automation control system

3.1.1 Industrial production applications

According to the current situation of China's industrial production, the electric automation control system has replaced the traditional mechanical equipment. In the process of industrial production, it not only saves labor, but also improves the efficiency of work, thus obtaining more economic benefits for enterprises and laying a good foundation for the stable development of enterprises^[8].

3.2 Application in agricultural production

In the process of agricultural production, the electric automatic control system has been widely used, speeding up the process of agricultural mechanization. In the field of grain harvest and irrigation, it has a certain positive effect, increasing food production and avoiding the phenomenon of wasting food.

3.1.3 Applications in services

In recent years, due to the gradual improvement of people's material living standards, the service industry has also proposed higher and more requirements. Only by paying attention to the technology of the electrical automation control system can we provide people with good services. In people's daily life, electronic products also receive more attention and application, the electric automation control system in it is particularly prominent, also facilitates people's life^[8].

3.1.4 Application in power grid system

At present, the electric automation control system is widely used in the power grid system, mainly through the system network and server of the computer, so as to realize the automatic control of power network dispatching. Through the automation technology of power grid, the data can be effectively collected, collated and analyzed in detail, which can improve the technical level to a certain extent and provide reliable network support.

3.1.5 Application in transportation

The application of the transportation tool greatly reduces the occurrence and harm of the fault problem, improves the safety of the transportation vehicle and brings many convenience to the passengers.

3.1.6 Application in construction engineering

Application to intelligent control on construction factors such as illumination, temperature, humidity, realize the rational allocation of power resources, reduce the spending of artificial management and the influence of man-made factors, to provide a more comfortable and convenient for the occupants and intelligent service.

3.1.7 Application in office activities

The application in office activities realizes the functions of monitoring and controlling the running status of various equipments in the system, and adjusts and switches the equipment according to the set time, at the same time, it is convenient for data storage and data review, and improves office efficiency.

3.2 Application status of electric automation control system

3.2.1 Distributed control of the system

Distributed control system refers to the use of advanced computer control system to control, on the basis of centralized control system, has a good real-time performance, reliability and extend sex etc, are widely used in the field of automatic control. But in the process of actual application, distribution control system also has some problems and deficiencies, for example, the system application of traditional instrument accuracy is not high, difficult to meet the needs of the current era, and difficult maintenance, etc.

3.2.2 Language specification standardization

At the present stage, the application of PC system make the current system language specification standardization, reduces the difficulty of maintenance work, fundamentally improve their work efficiency, to the

development and maintenance of the system to provide great convenience^[6].

3.2.3 Information integration

In the current era, electrical automation engineering gradually applies information integration technology, specifically, it mainly contains two aspects: On the one hand, in the process of enterprise management, for example, in the process of finance department accounting, computing and storage for related data use, etc., can use professional software, mastering the enterprise production of information. On the other hand, with the application of relevant information technology, the boundary between the device and the system interface is gradually eliminated, and the work efficiency is improved fundamentally^[9].

4. Development trend of electrical automation control system

4.1 Unified development

With the continuous development, the electrical automation engineering system gradually realized unification. To improve the efficiency of testing, design, debugging and maintenance of related products, reduce the cost of enterprises, shorten the relevant design cycle, and ensure the stable development of enterprises. At the same time, the unification of electrical automation engineering control system has a positive effect on the effective play of various functions of automation products. For example, the debugging of the product, the operation and maintenance of the product, and the running of the machine, etc., make the electric automation control development system gradually separate from the operating system, and fundamentally meet the needs of the current era. In contrast, unitization can realize the universalization of automation system and make use of relevant network structure to ensure the effective communication of engineering management data. Meanwhile, the overall communication between the relevant automation and control components is facilitated. The realization of the standardization of interface, realize the remote control operation, for example, the related planning scheme of remote control, etc., but need to based on the computer, connect them effectively, using standardized and unified data transformation smoothly^[10].

4.2 Innovative development

At the present stage, with the continuous development, our country has developed the perfect electrical engineering automation control system's development strategy and plan. Under the background of the current open market, the use of innovative technology, improving the capacity of the creation of the electrical automation engineering systems, integrated ability and ability to work, on the whole promote electrical automation engineering control level in our country. We continue to carry out innovative research on related technologies and products, broaden the development space of the control system, make clear the importance and status of the innovation of the electrical automation control system, and make use of the perfect mechanism to create a good innovation environment for the innovation of related technologies so as to ensure the smooth development of the innovation work. In the current era background, the applications and development of electrical automation engineering control must depend on advanced science and technology innovation, in order to meet the needs of the current market competition, improve enterprise competitive ability, improve the overall level of our country's industrialization^[11].

4.3 Security development

At present, with the improve of people's safety consciousness, electrical automation engineering control system gradually to develop in the direction of safety and reliability, in order to guarantee the safety of production and meet the needs of the current era. The modernization and automation of industrial production can effectively improve production efficiency and promote the rapid development of industrial economy. By improving the safety of electrical automation engineering products, users can use the least cost. Choose the most reasonable security solution to meet the needs of the current era. From a broad perspective, it is also an important direction and trend to improve the electrical automation engineering system in the future of our country, changing the traditional security level and improving the safety performance coefficient of the system. Promote the safety of the industry from the overall promotion, and finally realize

the safety of electrical engineering. At the same time, the electrical automation engineering control system is gradually specialized, for example, in the design process, installation process, and debugging process of the system, the relevant professionals are needed to meet the current needs of the times^[7].

4.4 Open development

In the research process of electric automation control system, the researchers paid more attention to the development of openness. With the continuous development and progress of science and technology, the researchers combine the automation system with the computer technology, which is beneficial to the continuous development of the electric automatic control system. At the same time, in the process of operation and management, some enterprises integrate the automation technology, and the ERP system integration management concept has been widely applied and concerned. The ERP system plays an extremely important role in the operation and management of enterprises. It only realized the effective combination of electrical control system and other control system, and realized the work of collecting system data, thus improving the management level. In addition, there are many characteristics that can improve the speed of transmission, so that each department can communicate with each other and improve the efficiency of work^[12].

4.5 Market development

As a profit-making organization in the market economy, the system designed and manufactured must meet the market demand and constantly improve the market competitiveness of the system and technology so as to expand the scale of production. To provide the foundation for the development of the system, and further develop and improve the key technology of the system according to the market demand, create a more advanced and professional automation control system, create higher economic and social benefits, and gradually form a virtuous cycle, and promote the development and progress of technology.

4.6 Intelligent development

In the field of electrical automation control, artificial intelligence is one of the major development directions in the future. Using the intelligent control system, it can effectively solve the problem that traditional control is difficult to solve, improve work efficiency and meet the demand of the current era. For example, the current intelligent technology has been gradually applied, and the related distributed integration and liquefaction integration belong to the intelligent system mode. Intelligentization has a strong sense of perception and analysis. It can make relevant decisions according to the actual situation, and control it with the similar thinking of human intelligence to meet the needs of the current era. With the development of the times, the integration of artificial intelligence theory and control technology has promoted the innovation in the field of electrical engineering control, prompting the system to make the most effective adjustment to different environment and actual conditions, more intelligent and humanized^[11].

Conclusion

To sum up, the continuous development of social economy puts forward higher requirements for electric automatic control system. At present, electric automatic control system has been widely used in all walks of life in China, which has effectively promoted the development and construction of our country's social economy. This paper mainly discusses the development and application of electric automatic control system, and looks forward to its future development trend.

References

- 1 Xin Sun. Application of electric automation control technology in power system [J]. *New Technology And New Products In China* 2018; (01).
- 2 Ting Chen. Research on application value and development trend of electric automation control [J]. *Wireless Internet Technology* 2017; (08).
- 3 Haitao Li. Research on the technology of electric automation control system [J]. *South Agricultural Machinery* 2017; (13).

- 4 Tian'tian Wang. New progress in intelligent electrical control system based on intelligent technology [J]. *Military and Civilian Dual-use Technology and Products* 2017; (14): 125.
- 5 Xizhu Wang. Reflections on the application of artificial intelligence technology in electrical automation control [J]. *Rural Economy and Technology* 2017; (10): 217, 219.
- 6 Chunyu Wang. Application and development trend of electric automation control systel [J]. *Shandong Industrial Technology* 2016; 29(20): 196.
- 7 Lizhi Wang. The current situation and development trend of electrical automation engineering control system [J]. *Electronic Test* 2016; (21): 155-156.
- 8 Yiyuan Yang. Discuss the current situation and development trend of electrical automation engineering control system [J]. *China's Investment in Science and Technology* 2016; (24): 101.
- 9 Fang Liu. Intelligent electric control system based on intelligent technology [J]. *Electronic Production* 2016; (1): 24+21.
- 10 Weikun Huo. The status quo and development trend of electrical automation engineering control system [J]. *Architectural Engineering Technology and Design* 2015; (16): 1570.
- 11 Xin Zhang. Current situation and development trend analysis of electrical automation engineering control system [J]. *Heilongjiang Science and Technology Information* 2015; (34): 25.
- 12 Liang Wang. Research on computer-based electronic engineering automation control application [J]. *Netizen World Cloud Education* 2014; (20): 28.