

The Application of Electrical Engineering and Automation Technology in Intelligent Buildings

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Abstract: Due to the economic development of the country, the building materials industry is also quietly emerging, and electrical engineering and its automation science and technology are widely used. Due to the improvement of people's life, the demand for architectural design and electrical is getting higher and higher, therefore, the correct use of electrical engineering and its automation science and technology is crucial to meet people's demand for architectural design, which not only can effectively use national resources, but also can greatly improve the efficiency of using construction projects and make positive contributions to social development. In order to ensure safety, we have to further improve the degree of application of electrical and intelligent technology. This will make the intelligent architectural design truly possible and effectively realize the intelligent function of architectural design. Therefore, this chapter will mainly discuss the importance and use of electrical and intelligent technology in the intelligent architectural design.

Keywords: Electrical engineering, Automation technology, Intelligent building.

1. Introduction

As time marches on and the national economy grows rapidly, the construction industry is at its peak, but the continued increase in the number of customers also poses some challenges. In order to solve these problems, smart buildings were born, which have advanced information technology and advanced instruments to solve these problems effectively. Implementing smart buildings requires professional designers who need to combine modern building technologies with smart buildings and incorporate electrical and automation technologies to achieve the best results and create a more convenient and high-quality life for society. Only in this way can intelligent buildings truly perform their functions and create a more comfortable, safe and convenient life for people[1]. Electrical automation technology has an important role in intelligent buildings and can meet the needs of various users.

With the development of the times, human needs for living are no longer limited to the most basic needs, but pay more and more attention to comfort, safety factor, convenience and even infrastructure services. This need has brought great opportunities for the development of modern intelligent building design, making it possible to change traditional buildings[2, 3]. With the continuous development of science and technology and the improvement of electrical equipment system, the technical level of modern intelligent building design in China is also improving. In order to bring into play the significance of modern intelligent building design, we need to adopt modern and high-quality electrical engineering and its automation to achieve more efficient, comfortable and healthy scientific architectural design. The advantage of electrical engineering and its automation technology is that it can effectively control, lightning protection, drive power supply and other control systems that are closely related to modern intelligent building design, and can monitor the operation status of electrical equipment in real time, so as to ensure that it can operate efficiently. In order to bring the advantages and functions of modern intelligent building design into play, advanced electrical engineering technologies,

such as lightning protection equipment, shields, anti-interference devices, anti-static devices, or other modern automation means, must be used to reflect the utility of intelligent building design, thus reflecting its maximum value.

2. Intelligent Optimization Design

In the process of application and management of building electrical automation technology, the mastery of mechanical equipment electrical and magnetic and other knowledge is crucial, and the engineering design has complexity, so designers need to fully utilize their knowledge and skills to further improve the efficiency of mechanical equipment and achieve more efficient management. As the application of intelligent technology to building electrical design can combine professional theoretical knowledge with practical experience, and use computer software systems to complete engineering design, which in turn greatly shortens the engineering design phase, further optimizes the architectural design method and greatly improves the efficiency of machinery and equipment. One of the most advanced technologies in the application of automation technology is the automated control system (BIM), which not only can efficiently deal with the problems arising from engineering design, but also can greatly shorten the manufacturing time frame and improve efficiency[4]. In addition, the use of BIM technology in the process of equipment optimization also enables the drawing of relevant substation engineering diagrams and the modification of each main line of electricity consumption and high-voltage switches, etc., bringing great convenience to designers and greatly increasing efficiency. In many automatic control systems, this method is very applicable, it can not only greatly improve the accuracy of data control, but also effectively solve some relatively complicated practical problems, to ensure the smooth progress of product design work.

3. Intelligent Fault Diagnosis

By applying intelligent control technology to construction electrical engineering, it can effectively identify and check the

problems that occur in the installation, thus improving the efficiency and accuracy of fault handling, and can take a series of effective measures according to the fault situation in order to effectively solve the fault problem. In the past, electrical engineering mainly adopted manual testing methods to check accidents, which not only cost huge personnel and material resources, but more importantly, due to the lack of professional knowledge and experience of technical personnel, which makes the test data not reliable and real enough, and is subject to greater interference from personnel reasons, thus leading to the fault detection is not timely enough or the test data is not accurate enough, thus increasing the occurrence of safety accidents Chance. The application of intelligent control technology can greatly improve the safety problems in electrical engineering, because it can check whether there are deviations in electrical equipment by editing the program. This technology can help managers to detect problems in time and alert them to safety through an alarm system. The application of this technology can effectively protect people's lives and provide effective security for the safety of electrical equipment. By supervising, controlling and managing them effectively, we can solve the problems better. The application of intelligent control technology can greatly improve the safety and stability of electrical engineering. It can not only detect faults, but also transmit relevant data to the computer, so that the function of taking corresponding measures to prevent faults can be effectively implemented. In addition, intelligent control technology can also effectively analyze faults, so as to effectively prevent the occurrence of faults, thus ensuring the safe and stable operation of the building electrical engineering[5].

4. Application

4.1. In substations

The main purpose of substation automation technology is to monitor network conditions to ensure safe operation while increasing efficiency. When setting up transformers, full consideration should be given to using fully microcomputerized technology instead of electromagnetic equipment, and fiber optic cables should be used to transmit signals whenever possible. In addition, computer control systems should be used to instantly collect and grasp information and implement automated control.

Nowadays, the Internet has become an important medium for information transmission, and society has entered the Internet period. However, due to the industrialization, people have given higher standards for the reliability of communication means.

As technology evolves, traditional relay protection devices no longer meet the safety and reliability requirements of today's substations. Therefore, substations need to develop more advanced relay protection devices that not only have differential and longitudinal protection, but also can cut off problematic components, narrow the scope of faults, and complete the sharing of fault information data and status of maintenance units to ensure the safe operation of the power system.

In order to ensure safe and reliable operation of the system, maintenance units must have the ability to analyze data, manage data analysis and coordinate reclosures. To meet this standard, computer technology-based network connections must be used to enable relay protection systems to be

networked in order to accurately predict fault distances. Therefore, relay protection devices via the Internet can significantly improve their protection performance and safety reliability, thus ensuring the safe and reliable operation of intelligent substations.

In recent years, artificial intelligence technologies have developed rapidly and liaised increasingly closely with intelligent substations, such as evolutionary planning technology, neural network technology and genetic algorithms[6]. However, in practical applications, due to the complexity of the elements, traditional mathematical methods often have no way to give valid equations or to find accurate solutions. By using neural network technology, we can solve this thorny problem.

The transition resistance short-circuit phenomenon occurs when the transmission conductor is swung open at a certain potential angle at both ends, a phenomenon that not only does not conform to existing processes, but also does not allow precise measurement of the protection distance and the degree of failure, so that phenomena such as misoperation or rejection may occur under this condition. By using neural network technology, fault information data can be cultivated on a large scale and analyzed in depth so that the incident in question can be accurately identified. In intelligent substations and relay protection devices, the use of artificial intelligence techniques can deal with a range of problems that are still unsolved, thus greatly improving the safety and trustworthiness of transformer stations.

4.2. In power supply system

In order to improve the automation and intelligence of buildings, designers need to configure the automation system according to the work requirements to ensure the effective use of resources. In this way, the systems can work in coordination with each other, making the overall control system more integrated, thus ensuring the rationalization and science of the power supply system and safeguarding the normal life of residents.

4.3. In electrical safety systems

Due to the development of technology, many excellent home appliances are widely used in residents' lives, and smart buildings are aware of the increase in electricity requirements, as well as the importance of information security, which is also a focus of attention. The application of intelligent technology is conducive to all-weather security monitoring, to timely grasp the insulation performance of the network system, and to use electronic and information technology to clearly determine the security distance between each system and each other, so as to maintain the safety, reliability and comfort of the occupants. A well-designed security flow configuration is necessary to effectively maintain the data security and stability of the power network system of modern intelligent buildings, thus protecting its operation.

4.4. In communication systems

With the continuous innovation and progress of China's science and technology, computer science has also been developed tremendously, which not only brings opportunities for the development of electrical as well as automation technology, but also brings strong support for the development of communication system so that it can bring out its maximum value. The electronic computer is an indispensable part of the communication system, therefore, to

improve the efficiency of the electronic computer, it is necessary to strengthen the transmission and manipulation of information. To ensure the efficiency of intelligent buildings, a complete set of resource transmission and local area network needs to be built in the construction process, and equipped with the necessary electrical equipment for computer systems, so that intelligent buildings can play the greatest value and meet people's needs[7].

5. Conclusion

With the rapid development of technology, modern intelligent building design has become an important direction for human habitation. Electrical engineering and its automation technology play an important influence in intelligent construction, creating a soothing environment for customers, greatly improving efficiency, and more importantly, it can effectively reduce the occurrence of security incidents, thus enhancing the operational efficiency of enterprises. There is a clear distinction between electrical work and intelligence, of which weak electrical is the most important, and they play a vital role in the construction of security in buildings. With the advent of the new era, modern artificial intelligence management systems have become a major component of all industries. Although the development of domestic industrial intelligence applications has emerged late and is in its infancy, technology continues to improve, and the use of artificial intelligence systems in building electricians can efficiently detect and diagnose faults, thus ensuring the safety and quality of building electricians. As a relevant enterprise, it is important to strengthen the

application and promotion capabilities, innovation and effective integration of intelligent control technology with the building materials industry in order to promote the thriving of China's construction electrical engineering and achieve greater social and economic benefits.

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