Fault prevention and application of electrical automation equipment based on maintenance methods

Pengfei Chen
School of Automation, Wuhan University of Technology, Wuhan, 430070, China
corresponding e-mail: victorcpf@whut.edu.cn

Abstract. Electrical automation equipment can perform unified processing, research and development control of relevant information with the support of computers, effectively improving the safety and stability of equipment operation. However, electrical machinery equipment systems are susceptible to interference from a variety of factors during operation, and are prone to failures, which will seriously affect normal production. Based on this, this article conducts in-depth research on electrical automation equipment faults, and puts forward the main strategies of electrical automation equipment fault prevention and the maintenance methods of common faults. Aiming at the problem that the number of correct detection fault parameters in the traditional electrical automation equipment detection method is small and the accuracy of the detection result is affected, research on the field fault detection method of electrical automation equipment is carried out. The on-site fault information collection of electrical automation equipment, fault information fusion combined with information link technology, and on-site fault diagnosis methods of electrical automation equipment ensure the accuracy requirements of industrial production enterprises for fault detection results.

1. Introduction
The rapid development of social economy has forced the continuous improvement of automation technology. However, in actual production and life, under long-term, high-load operation, frequent electrical automation equipment failures cause serious damage to the economic benefits of enterprises and cause serious interference to normal production and operation. Many companies have explored electrical automation equipment failures. Prevention and maintenance ensure the stable operation of electrical automation equipment, thus escorting the normal production and operation of the enterprise[1-2].

The so-called electrical automation equipment is a technology in which computers simulate human operations, which can ensure that the equipment achieves anthropomorphic electrical automation operations and can also perform tasks that humans cannot do. Electrical engineering and automation involves many fields such as power electronics technology, computer technology, electrical and electronic technology information and network control technology, mechatronics technology.[3-4]. It can also realize automatic diagnosis and maintenance of faulty equipment, and improve the safety and reliability of equipment. Electrical automation equipment can automatically adjust the control system to ensure more accurate system operation efficiency. At the same time, it can also realize the self-adjustment of the system, and quickly deal with its own parameters and various problems to complete the development of the control system[5]. Non-Model control mainly refers to the use of intelligent technology and computer programs to replace traditional model control methods to improve the accuracy and flexibility of problem processing. It can also make automatic logical judgments on the
operation of problems, effectively solve various complex problems, and ensure the overall operating quality of electrical engineering. Control processing can significantly enhance the quality of data processing, and the application level of computers can greatly improve data calculation and analysis capabilities. It has very strong advantages for data processing and can also improve the statistical effect of data.

The main advantage of the application of electrical automation equipment is that it can track electrical engineering systems in real time according to time, improve the performance of electrical engineering automation, and ensure the smooth operation of various systems. For electrical engineering automation applications, it can greatly reduce the work pressure of maintenance personnel, and it can also ensure that maintenance of electrical engineering is simpler and more efficient. It can automatically categorize all data information and make accurate judgments on all links. The controlled objects of electrical engineering are extremely variable and can easily cause adverse effects on the processor. Electrical automation equipment can effectively solve a variety of problems in mechanical equipment, and finally find a way to solve the problem to ensure a high degree of consistency in data processing. The use of electrical automation equipment can comprehensively monitor and control the engineering data and the operating status of electrical equipment to ensure the normal and stable operation of electrical engineering.

According to the information obtained from the on-site fault information collection and information fusion of electrical automation equipment, the alarm signal is output and automatically adjusted according to the corresponding threshold set in advance, or the equipment is shut down according to the severity of the fault. Basic flow chart of field fault diagnosis for electrical automation equipment. As shown in Figure 1.

![Flow Chart](image)

**Figure 1. Flow chart**

2. **On-site fault detection method of electrical automation equipment based on information link technology**

Collecting on-site fault information of electrical automation equipment must first classify fault types. According to the actual operation of electrical automation equipment in industrial production enterprises, taking the controllable rectifier circuit of electrical automation equipment as an example, there are 3 or more thyristors. At the same time, faults rarely occur, so short-circuit faults in electrical automation equipment will only occur in 1 or 2 thyristors. The fault problems of the controllable
rectifier circuit of electrical automation equipment are divided into 5 types, among which type 1 is the normal operation of electrical automation equipment; type 2 is the fault of 1 thyristor in the equipment; type 3 is that there are 2 thyristors in the equipment at the same time. There is a fault problem, and 2 thyristors belong to the same phase power supply at the same time; Type 4 means that there are 2 thyristors in the equipment fail at the same time, but the 2 thyristors are only in the same half bridge; Type 5 means there are two mutual The crossed thyristor has failed. Then, set the corresponding simulation parameters according to the above five types. First, set the trigger pulse parameters. Normally, the pulse duty cycle is roughly within the range of 24% to 28%, and the trigger angle is set to 0, 45, 90, 120, 150, 180°. Then set the specific parameters of the thyristor: the resistance is set to 0.10–0.225 Ω, the inductance is set to 0.9–1.2 μH, and the buffer voltage is set to 0.08–0.13 μH. Finally, the fault information collection cycle is set to 150 μs, and the collection time is controlled between 0 and 48 ms. Choose an appropriate collection point. Because the input voltage and output current of the electrical automation equipment during the operation process contain information that can effectively determine whether the equipment has a fault problem, this article selects the input voltage and output current of the electrical automation equipment as the collection point. The point information is the fault information of the electrical automation equipment.

Different electrical automation equipment has different performance, significant differences in internal structure, significant differences in design quality and design life, operating environment work intensity and other related factors are also significantly different, electrical automation equipment must be classified to achieve hierarchical maintenance and management, and minimize maintenance costs. The staff should also judge the performance and function of the equipment, clarify the specific environment in which the equipment is operated, and conduct level-by-level management. Most of the software failures of equipment are concentrated in software engineering. When formulating preventive measures, the equipment control program must be checked in an all-round way to determine whether there are loopholes. If the loophole will cause the device to fail to operate normally, the loophole must be repaired in time to ensure that there will be no malfunction. Equipment design should adopt advanced design ideas to make the performance of electrical automation equipment more stable, safe and stable. Use practical and expandable parts and components to reduce the risk of equipment failure.

To maintain the stability and scalability of each functional module, the normal operation of electrical automation equipment can only be guaranteed by realizing their respective functions. The operating environment of electrical automation equipment is relatively harsh. The most important thing is to strengthen the reasonable control of the temperature and humidity of the working environment, the power supply stability and the electromagnetic environment to provide long-term stable operation conditions for electrical automation equipment to avoid environmental factors that cause equipment failure. To ensure the stable operation of electrical equipment.

3. Reduce the factors affecting the operation of electrical automation equipment

Strengthening the normal operation of equipment To avoid hidden dangers of equipment failure caused by human or inaction, the most important thing is to strengthen system management, strictly implement equipment maintenance and system maintenance management systems, and improve the operating quality of electrical automation equipment. Regularly test software performance and hardware performance, remove dust for maintenance operations, and process the switching of monitoring software and operating system to ensure that the working platform and software system can perform normal functions. These mature and effective methods can be quickly and quickly eliminated. Failure to improve the efficiency of maintenance. Electrical engineering can improve people's living conditions, and at the same time promote the overall social and economic development, and provide sufficient power support for the society, but there are still many problems and deficiencies in the control and management of power engineering development. The use of electrical automation equipment to control the project can ensure the transformation and upgrading of electrical engineering, greatly save manpower and material resources, and promote the overall development of building electrical engineering. The important feature of modernization development is the realization of
automation, informatization and electrical automation. With the rapid development of modern economy, information technology and mechanical equipment technology are widely used in all walks of life. As the most important product of modern science and technology, electrical automation equipment has a relatively low level of application in electrical engineering, resulting in the development of electrical engineering. Constraints. In the research process, researchers should actively promote the effective application of electrical automation equipment in electrical engineering machinery and equipment, and find faults in time.

4. Concluding remarks
With the continuous improvement of the production quality of electrical automation equipment in my country, the technical requirements for equipment maintenance personnel are also increasing. Therefore, in order to effectively reduce the probability of electrical automation equipment failures, it is necessary to strengthen the prevention and maintenance of failures. Based on the structural principle of automation equipment, high-quality testing instruments are used to make judgments to ensure timely and effective solutions to equipment failures. This article analyzes the definition of electrical automation equipment, clarifies the important advantages of electrical automation equipment, and analyzes in detail the failure prevention strategies and troubleshooting methods of electrical automation equipment to improve the effectiveness of electrical automation equipment and promote the overall development of my country's power industry.

References
[1] Energy; Study Results from School of Electrical Engineering and Automation Broaden Understanding of Energy (State of Health Prediction for Lithium-ion Batteries With a Novel Online Sequential Extreme Learning Machine Method)[J].Energy Weekly News, 2020.
[2] L&T completes divestment of electrical, automation business to Schneider Electric[J].M2 Presswire, 2020.
[3] Geshun Tang, Xiaoxiao Mou, Yongzheng Liu. Building Material Conveying Equipment based on Electrical Automation[J]. International Core Journal of Engineering, 2020, 6(9).
[4] Sun Qingbin. Application and Research of Electrical Engineering and Automation in Electrical Engineering[J]. International Journal of Frontiers in Engineering Technology, 2020, 2(2).
[5] Huaihua University; "Plc-Based Electrical Automation Control Device" in Patent Application Approval Process (USPTO 20200225630)[J]. Politics & Government Week, 2020.