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Research on the Reliability of Electrical Automation Control Equipment

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ABSTRACT. *Nowadays, the market demand for electrical automation control equipment in society has become greater and greater. The electrical field pays more attention to the reliability of electrical automation control equipment. However, there are some shortcomings in electrical automation control equipment, how to improve the reliability of electrical automation control equipment has become a problem that needs to be discussed in depth.*

KEYWORDS: *Electrical automation; Control equipment; Reliability*

1. Introduction

With the continuous development of science and technology, electrical automation control equipment plays an important role in industrial production due to its advantages of high accuracy and reliability. With the help of electrical automation control equipment, production and processing personnel can monitor the entire production process in the office. This can not only improve the quality and efficiency of industrial production, but also better protect the life safety of operators. In the increasingly fierce market competition, only to ensure the quality and reliability of electrical automation control equipment can fully guarantee the economic benefits of mechanical equipment. Therefore, the following will analyze the main factors affecting the reliability of electrical automation control equipment, and propose the main strategies to improve the reliability of electrical automation control equipment.

2. The Role of Improving the Reliability of Electrical Automation Control Equipment

Electrical automation control equipment is the core of the enterprise's overall control system. Improving the reliability of electrical automation control equipment can promote the stable and good operation of the overall system. In the past industrial production process, once there is a problem in the control equipment, it will affect the operation of other mechanical equipment and directly slow down the production progress. If the electric automation control equipment can be used scientifically and reasonably, once the system fails, the operator can immediately send out error correction instructions to quickly isolate the failed equipment, so as to effectively protect other mechanical equipment. In addition, if the enterprises want to develop, they must adhere to the principle of low investment and high output to ensure the quality and efficiency of production, and the reliability of electrical automation control equipment is the basis to achieve this goal. Moreover, once the failure rate of electrical automation control equipment is too high, it will definitely reduce the qualification rate of industrial production and increase the cost of equipment maintenance on the basis of increasing the production cost. Therefore, it can be understood that improving the reliability of electrical automation control equipment has a very important role.

3. Main Factors Affecting the Reliability of Electrical Automation Control Equipment

3.1 Quality Factors

As the market demand for electrical automation control equipment continues to increase, many manufacturers have begun to produce and manufacture electrical automation control equipment. However, in order to obtain higher benefits, some manufacturers cause the quality of the components used to be different.

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After the electrical automation control equipment is put into production, it will definitely cause a series of failures, which will greatly threaten the reliability of the electrical automation control equipment.

3.2 Environmental Factors

The environmental factors that affect the reliability of electrical automation control equipment can be categorized into the following categories: electromagnetic interference during work, weather and mechanical forces. If the temperature and humidity cannot meet the requirements of the equipment, the structure of the equipment will be seriously damaged; and the equipment is very sensitive to electromagnetic during work. If the equipment is subjected to a relatively large electromagnetic shock during operation, the reliability of the equipment will be greatly reduced. In addition, the impact of mechanical forces on the reliability of the equipment should be different according to the actual situation, such as vibration can cause the equipment to malfunction.

3.3 Human Factors

Although the manual operation of some electrical automation control equipment has been eliminated, most of the operations that require manual coordination are relatively difficult operations, which directly put higher requirements on the comprehensive skills of the operators. If the operator lacks skilled skills, it is very easy for improper operation to occur, which directly affects the reliability of the equipment, causing the equipment to fail to operate normally and even causing the equipment to malfunction.

3.4 Maintenance Factors

Because the working environment of electrical automation control equipment is relatively complicated, the field maintenance work of automation equipment is difficult, which requires relevant maintenance personnel to be able to provide maintenance inspection work for automation control equipment in a timely manner. If the maintenance staff is unable to do this work in time, it will likely cause the equipment to malfunction during operation and cannot be used normally, which will affect the reliability of the electrical automation control equipment.

4. The Main Strategy to Improve the Reliability of Electrical Automation Control Equipment

4.1 Scientific Selection of Electronic Components

For electrical automation control equipment, the quality of internal electronic components will directly affect the reliability of electrical automation control equipment. Therefore, as a designer, it is necessary to strengthen the analysis of the reliability of electrical automation control equipment, and also to consider the operation and performance of the automation control equipment, so as to scientifically select internal electronic components and ensure electrical automation control equipment. It can obtain more ideal results under specific working conditions, thereby improving the stability and reliability of the work and reducing the incidence of failures. In addition, as a user, it is also necessary to maintain the relevant equipment in place, to ensure the reasonable degree of automatic control equipment, to lay a good foundation for the successful implementation of automatic control work, not only to effectively extend the service life, but also to better improve the quality and efficiency of work. Moreover, in the process of selecting electrical automation control equipment, it is also necessary to select targeted electrical automation control equipment in strict accordance with the specific work conditions, pay attention to the quality and performance of the electronic components used for inspection, and ensure that the parameters of electronic components can meet the actual work requirements.

4.2 Effectively Control Environmental Factors

For the influence of temperature and humidity in the air on the electrical automatic control equipment, resulting in problems in the operation of the equipment. For example, the air humidity in the operation of the equipment exceeds the range that the equipment bears. In this case, with the passage of time, the internal parts of the equipment will be corroded, resulting in the failure of the work. The heat dissipation of electrical equipment is also a key problem. If it can not be handled properly at ordinary times, there will be a large problem. The

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electrical equipment will generate a large amount of heat under the passage of time. The generation of heat will not only shorten the service life of the equipment, but also make the equipment generate more idle work. Moreover, if the temperature in the working environment is too high, it will directly affect the divergence of the thermal energy of the equipment, resulting in the temperature rise of the equipment. Therefore, it is necessary to strictly control the temperature and humidity of equipment operation, and formulate a reasonable heat dissipation scheme, such as increasing mechanical ventilation fan and other methods. Additionally, enterprises also need to adopt effective measures to reduce electromagnetic impact force, avoid excessive vibration of equipment, create a good working environment, and improve the reliability of equipment operation.

4.3 Improve the Quality of Operators

For some operators, they should have professional knowledge when operating and controlling electrical automation control equipment. As enterprise managers, we must use effective means to improve the professional skills of operators, so that they can truly master the operation skills of electrical automation control equipment, so as to effectively reduce the failure caused by improper operation, reduce the influence of human factors in electrical automation control equipment, and improve the reliability of equipment operation.

4.4 Carrying out Equipment Reliability Inspection

It is very important to inspect the reliability of electrical automation control equipment. After the reliability inspection work is carried out in time, the deficiencies in the operation of the equipment can be found in time, and the existing problems of the equipment can be maintained in advance to ensure the normal production. The reliability test method of electrical automation control equipment can adopt laboratory test method, guarantee test method and field test method. Laboratory test method should meet certain experimental conditions to ensure the stability of the operation environment of electrical automation control equipment. This method can obtain the most detailed data, but it needs to control the experimental environment accurately, which is suitable for the working environment of automatic control line with constant temperature and humidity or air pressure. The guarantee test method is specifically to detect whether the electrical automation control equipment has faults before leaving the factory. This method is suitable for using in the electrical automation control equipment with precise and complex internal structure. It can carry out random detection on whether the equipment has faults and find the fault source. Compared with the two testing methods, the field testing method is to obtain the operation data of the electrical automation control equipment, and analyze in time to judge the reliability of the equipment in the environment. The test precision of this method is not high. Special test instruments should be used, which will affect the connection effect of the equipment. If this test method is selected, field investigation must be done in place.

5. Conclusion

In short, the reliability of electrical automation control equipment is very important. It is necessary to find the influencing factors on the reliability of electrical automation control equipment in time to prevent unnecessary failures. At the same time, it takes a long process to improve and perfect the electrical automation control equipment and improve the reliability of the electrical automation control equipment. It is necessary to steadily perform every step and do every work link to open up a broad space for the development of electrical automation control equipment.

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