Research on Fault Diagnosis Method of Building Electrical System

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Abstract: In the process of modern science and technology development, the fault diagnosis technology of building electrical systems has also been greatly improved. In the long-term operation of building electrical systems, various types of faults are easily generated. If the treatment is not timely, the stability and safety of the electrical system will be affected. This requires us to pay more attention to the fault diagnosis of building electrical systems. A variety of fault diagnosis methods are used to ensure that hidden faults are eliminated in time, and the building electrical system can be stably and reliably operated. This article will briefly describe the common types of faults in building electrical systems and introduce specific feasible diagnostic methods.

1. Introduction

In recent years, with the demand for safer and more convenient buildings, building electrical systems tend to be more complex and complex, and traditional manual testing can no longer meet the fault checking of building electrical systems. Because the failure of the building electrical system will bring unpredictable risks and threats to people's lives and property, and may also lead to a series of fires and other accidents, the diagnosis of building electrical system failure has become the most important concern of us. One of the problems. The fault diagnosis technology is also intelligent and efficient from the initial stage of manual detection and simple instrument measurement fault location to the diagnosis stage of the combination of computer and sensor technology, to the stage of intelligent detection and diagnosis that is popular today. There is also a huge leap. Although its diagnostic technology is still in the development stage, especially in China, the intelligent fault diagnosis technology of building electrical systems started late, but its stability and high efficiency have been verified and huge application prospects, and it has been developed in full swing. In this context, a series of intelligent building electrical system fault diagnosis methods have emerged with the development of science and technology. For example, algorithms such as artificial neural network algorithm, support vector machine algorithm and compressed sensing have been applied to fault diagnosis methods.

2. Common Electrical Faults in Building Electrical Systems

Open circuit faults are the most common in power system faults. The circuit system of the equipment is disconnected for some reason during operation. The disconnected circuit does not allow current to pass, which leads to the power system not running well. There are many reasons for the failure of the open circuit. The most common ones are: the electrical equipment is not repaired in time, causing the line to be disconnected, and the connection point between the wires is not good.

Short-circuit faults are more dangerous and difficult to handle than open-circuit faults. The cause of the short-circuit fault is generally that the insulation device between the electrical equipment lines is broken down, the potentials of different parts are incorrectly connected, and the like. If the short-circuit fault is not processed in time, the consequences are very serious. When the circuit is short-circuited, the surrounding resistance is wirelessly approaching zero, and the current can still pass. When the current passes through the short-circuit part. It may cause problems such as fire or even explosion on the line.

Large-scale electrical equipment often has a grounding wire. The function of this grounding wire is to protect the safe operation of electrical equipment. The cause of the fault is generally that the

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fault is not the grounding line as the grounding line or the grounding connection part. Looseness and the like. Such faults are faults that are better solved in power system faults. Generally speaking, as long as they are found in time, they can be processed accordingly.

The cause of such failures is generally the improper installation, aging, etc. of electrical equipment or electrical components. For example, if the current transformer fails, the position of the internal device is generally faulty or not sTable. However, it is relatively simple to detect whether such a fault occurs. When the circuit transformer fails, there is often abnormal sound, abnormal heat of the equipment, and In the case of smoke, etc., electrical equipment inspection and maintenance personnel use this to find out the fault location and solve it.

The cause of the harmonic fault is that there is a problem in the load of the power equipment. Under normal circumstances, there is a corresponding current to generate a pulse current. When the fault occurs, the grid voltage will change, and then the voltage of the transformer will replace the original voltage. Electrical equipment brings high power load problems. In addition to problems with power loads, the unreasonable configuration of capacitive and inductive loads of electrical equipment is also one of the causes of harmonic faults.

3. The Diagnosis Method of Building Electrical System Fault

This type of diagnosis is often used in the early stages of fault diagnosis because it is a rough judgment of electrical system failures, and then the construction company uses scientific and reasonable specific diagnostic methods based on the results of its judgment. The core of the signal diagnosis and processing method lies in the utilization of the measurable signals inside the electrical equipment, and the data generated by it is strictly supervised and analyzed, and then the causes and characteristics of the faults are obtained, which is convenient for the construction enterprises to use the targeted diagnosis and treatment of the faults. Method to achieve the purpose of detection. The shortcomings of this type of diagnostic method are also obvious. Because it is only a rough judgment in the early stage, the diagnosis of electrical system failure is not comprehensive. In order to solve this problem, technicians who require such diagnostic techniques must fully diagnose the power system.

The signal processing method obtains the characteristic values such as amplitude, frequency and variance in the time domain and frequency domain of the system through the use of the detection signal, and then finds the cause of the fault. Using this method to diagnose building electrical system faults is not only easy to operate, but also very flexible and widely used. Because the requirements in terms of technical application and environmental impact are high in use, it is necessary to consider the influence of external factors on system fault diagnosis and ensure the diagnosis of building electrical system is more accurate.

The knowledge diagnosis method is to diagnose the fault point of the building electrical system. In order to make the diagnosis result more accurate and scientific, it is necessary to conduct professional analysis and judgment, comprehensively grasp the system operation information, and judge the cause and location of the fault. The knowledge diagnosis method has the characteristics of intelligence, which can quickly and accurately determine the cause and location of the fault, and achieve the improvement of the diagnostic accuracy, and the application is also very extensive. For example, if a knowledge diagnosis method is used in the diagnosis of a motor fault, the sudden rotation speed is reduced during the operation of the system, and finally it is forced to stop working. It is found through inspection that the motor temperature is high, the surface is not found abnormal, and the motor can run by itself. Using the instrument to measure the insulation is 5 MΩ, after which the three-phase resistance balance is measured and found to be normal, indicating that the motor itself is not faulty. After the load is energized, the motor can not work normally, and there is a click sound. It is found that the phase C power supply phase is missing by the universal meter.

Compared with analytical model diagnosis and signal processing diagnosis, knowledge diagnosis has certain intelligence. It is manifested in the flexible control of the relevant information by the technician before using the method. Secondly, it is necessary to use the method flexibly, and clearly know how to use the method to deal with specific problems encountered in the process. The method

of knowledge diagnosis is also scientific, because the use of the method is related to professional knowledge, and the fault diagnosed by the method of knowledge diagnosis is the highest accuracy rate, and the technician can diagnose the result through the method to perform the most accurate treatment. Because the method of knowledge diagnosis is very demanding, if the construction industry wants to make this method better serve its own enterprise, it is necessary to train and manage the internal technical personnel at all times to ensure that it can play a role.

Analytical model diagnosis is one of the common methods for diagnosing whether a building electrical system is faulty. The technical personnel required to implement the analytical model diagnostic method must have a certain degree in mathematical theory. The diagnostic method utilizes the principle of mathematical modeling to transform the operating process of the power system into a model that is convenient for analysis, and then analyzes this mode to find out the location and cause of the fault, and then processes the fault according to the fault repair technology that has been mastered. . The analytical method of analytical model is one of the effective methods to find and solve the fault of electrical system. However, before the construction enterprise uses it, it must be checked whether the relevant technicians have the corresponding technology, and the technicians should be trained regularly to ensure the technicians. The technology can keep up with the pace of the times, in order to be able to analyze the model diagnostics to maximize the role.

The analytical model diagnosis method applies the mathematical theory knowledge of building electrical system, and establishes a scientific and reasonable electrical system analytical model according to the actual operation of the system, comprehensively analyzes the analytical model, judges and summarizes the fault diagnosis result of the building electrical system, and according to the diagnosis result. The use of corresponding solutions to improve the safety, reliability and stability of the building electrical system. However, when using the analytical model diagnosis method, the conditions of the building electrical system model construction should be analyzed, the electrical system model should be constructed in a targeted manner, and various modern scientific techniques and methods should be used to comprehensively detect the hidden troubles of the building electrical system and improve the unknown. The sensitivity of fault diagnosis and detection, combined with the analytical model, is derived from the fault diagnosis results of the building electrical system. For the application of analytical model diagnosis method, some building electrical systems are difficult to construct suiTable mathematical models. Therefore, it is necessary to analyze the operation status of the building electrical system during the diagnosis process, simplify the model construction conditions, and make the final fault diagnosis more scientific and reasonable.

For the support vector machine theory fault diagnosis method, we also call it SVM. According to the difference of usage methods, it mainly includes the following types, which are one-to-one, one-to-many, decision-oriented acyclic graph and K-class. SVM method. The support vector machine theory fault diagnosis method mainly adopts statistical learning theory, and establishes a machine learning method based on VC dimension theory and structural risk minimum principle. It can divide the preprocessed sample data into the following parts, namely training set and test set. And set the relevant model parameters, use the training set to train the SVM, can get the model data information, and use its model information to judge the test set, and finally get the diagnosis result. This method of fault diagnosis is more practical and can solve the classification problem under small sample conditions. The recognition rate is 1000Ic. It is applied in small samples and the recognition degree is also high. For example, in the fault diagnosis of transformers, the support vector machine theory fault diagnosis method is applied. According to the European clustering principle, a European distance calculator is written in C# language, and the transformer is low-energy discharge, high-energy discharge, medium-low temperature overheating, high temperature overheating and normal. The category status sample is input into the database. After the program processes the transformer status raw data, the data information is adjusted, and the normal state and the strong fault state are set to +1 and -1, respectively. Next, we need to calculate the running training set and test set. As long as the support vector machine training data shows -11:0.992:0.99... it indicates that the transformer is faulty.

4. The Development Trend of Building Electrical System Fault Diagnosis

The implementation of fault diagnosis technology has a great connection with the establishment of fault simulation platform. The establishment of fault simulation platform is related to the level of fault diagnosis technology in the construction enterprise. If the relevant technicians can construct the most scientific and accurate fault simulation platform, they can find out the faults in the power system with the fastest efficiency and find out the relevant processing methods as soon as possible, so the construction company wants to improve itself. The fault diagnosis technology is one of the effective ways to strengthen the internal technical personnel to build the fault simulation platform.

With the rapid development of science and technology, traditional fault diagnosis methods are no longer applicable. In order to keep pace with the times, construction companies will certainly improve their own fault diagnosis technology, and the result will be the accuracy of fault diagnosis. Higher than traditional fault diagnosis methods, in addition to bringing more accurate data to construction companies, it is also the key to improving the competitiveness of construction companies themselves in the industry. In order to effectively improve the accuracy of the diagnosis results, construction companies can reasonably rely on the most advanced testing equipment.

5. Conclusion

In short, during the daily operation of the building electrical system, in order to effectively improve the efficiency and level of electrical system operation, and always maintain high stability and safety, we need to master the common types of faults in building electrical systems, and rationally use a variety of The treatment method eliminates the adverse effects of faults on the operation of the electrical system. After the failure of the building electrical system, we must also analyze its causes and use corresponding solutions, such as signal processing methods, knowledge diagnosis methods, analytical model diagnosis methods and support vector machine theory fault diagnosis methods to improve the fault treatment effect. It lays a good foundation for a more sTable operation of the building electrical system.

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