Technical Analysis of Power Equipment Condition Maintenance

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Abstract

There are many state data of power equipment, and the maintenance work is complicated. It is necessary to use effective technology to analyze a large amount of state data and improve the efficiency of power maintenance work. This paper firstly analyzes the necessity of power equipment condition maintenance and its maintenance process, and provides information for the subsequent steps. It also studies various state analysis and overhaul technologies of power equipment and analyzes various conditions. The advantages and disadvantages of maintenance technology provide a reference for the maintenance of power equipment status.

Keywords

Power equipment; state analysis; maintenance process; maintenance technology.

1. INTRODUCTION

Power equipment status maintenance, providing equipment status based on condition monitoring and diagnostic techniques. At present, China's power equipment state maintenance is mainly in the state of development, and there is still a gap with foreign countries. It is urgent to improve the maintenance technology in China's power equipment maintenance and provide power for the development of China's power system. Power equipment condition maintenance can drive social and economic development, mainly as follows: Prepare corresponding work before equipment maintenance, can improve the efficiency of maintenance work, and use existing equipment status information to pay attention to equipment status in real time and develop a reasonable equipment maintenance strategy [1]; Analyze the use status of equipment to prevent related equipment failures, improve equipment quality, and improve equipment monitoring level; when the power system realizes RCM, users can get more reliable and stable power supply.

2. POWER EQUIPMENT CONDITION MAINTENANCE PROCESS

The power equipment maintenance process is divided into three processes, as shown in Figure 1.
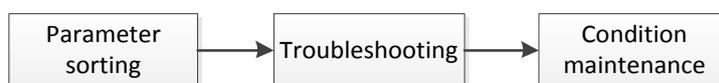
Figure 1. Power equipment maintenance process

(1) Equipment parameter sorting, because the equipment will set fixed parameter values in production, the parameters must be compared before the maintenance. If there is an error in the parameters, the equipment has problems, and the next step should be diagnosed. operating;

(2) Equipment fault diagnosis, for equipment failure, comprehensive measurement and comprehensive diagnosis of each parameter, so that the equipment state is in normal operation;

(3) Equipment status maintenance, according to the equipment parameter comparison data to determine whether the equipment needs to be repaired. If the data needs to be repaired when the data is abnormal, it is also necessary to control the maintenance cost. On this basis, the equipment is in normal operation.

3. ANALYSIS OF POWER EQUIPMENT STATE MAINTENANCE TECHNOLOGY

3.1. State-of-the-Art Maintenance of Power Equipment Based on High Dimensional Matrix

Power equipment state maintenance based on high-dimensional matrix state analysis of power equipment. Due to the large amount of state data of power equipment, its changes are closely related to the external environment. Traditional data analysis can not meet the timeliness and accuracy of power equipment state maintenance. Big data technology is needed to extract and analyze massive data. The high-dimensional matrix [2], as a big data analysis method, can integrate different types of data into high-dimensional matrices, and study the eigenvalues and data distribution of high-dimensional matrices from the statistical point of view. Therefore, the high-dimensional matrix can model and analyze the power equipment status data to deal with data diversity, difference, synchronization and other issues in the power system. Compared with the traditional data mining methods, the high-dimensional matrix processes massive data, which is less affected by noise points and has higher accuracy.

3.2. State-of-the-Art Maintenance of Power Equipment Based on BP Neural Network

Based on BP neural network for power equipment state maintenance, BP neural network includes three input layers, output layers and hidden layers [3]. First, the collected state data is analyzed to determine the number of nodes in the input layer. Then, the determination of the hidden layer nodes and the number of layers, taking into account the diversity of data and the speed of sample training, the use of two layers of hidden layers; the number of hidden layer nodes of BP neural network for prediction accuracy If there are fewer nodes, the network learning ability is poor and the training accuracy is poor. If there are many nodes, the network is easy to overfit, and the state data needs to be analyzed, and the number of reasonable hidden layer nodes is selected. Learn. The determination of the final output layer node is determined based on the state of the device that needs to be obtained.

3.3. State-of-the-Art Maintenance of Power Equipment Based on Historical Data

Based on the historical data [4] to repair the state of the power equipment, the first is the collection of equipment status data, the establishment of the data information library including the factory data, historical operational data and real-time dynamic data. Then analyze and predict the data, use real-time data combined with historical data to determine the state of the device, compare and match the state of the device with the historical state, arrange a reasonable time for device inspection, and achieve device state maintenance based on historical data. Finally, according to the historical data predicted power equipment failure, reasonable arrangement of human and financial resources, flexible implementation of equipment state maintenance based on historical data.

3.4. Condition-Based Maintenance of Power Equipment Based on Internet of Things Technology

In the state data acquisition of power equipment, the sensor technology [5] is often used to collect data, and the power equipment has many state data, and the signal types are different. It is complicated in calculation, so the signal conversion is realized under the action of the sensor.

The type of signal is converted to the same signal, making data processing simple and convenient. In the data collection, different types of data need to be separately sampled, and then follow-up operations to avoid information congestion. Fiber optic sensors are often used in condition monitoring. Compared with traditional sensors, optical sensors use optical measurements more accurately and reliably than traditional ones. Currently used fiber optic sensors use binocular probes, mobile probes, infrared probes, etc. to achieve state analysis and maintenance of different equipment.

According to the analysis, it can be seen that the four maintenance techniques have their own advantages and disadvantages. When analyzing the actual situation, various maintenance techniques should be used reasonably. Although the state maintenance of power equipment based on BP neural network is still in the development stage, the future prospect is higher than the rest. three methods. State analysis of power equipment based on high-dimensional matrices requires many types of data, and most power companies have fewer types of data, and errors may occur during use. The state of the power equipment based on historical data is mainly used to predict the use of historical data, and can not guarantee the accuracy of the prediction. The prediction is not simply predicting the state of the power equipment, but also analyzing the loss of the equipment and predicting the service life. Based on the IoT technology, the state of the power equipment is overhauled. At present, there are fewer optical fiber sensors, and infrared sensors are often used. There is error in data processing.

4. SUMMARY

With the introduction of smart grid, the development of China's power technology level and the development of detection technology, the state analysis of power equipment is more and more perfect in the power system, providing people with high quality power supply. And emerging technologies provide a new direction for power equipment condition maintenance to study the status of power equipment, and can also conduct joint analysis of related tests to provide more comprehensive status of power equipment. However, there are still problems in the maintenance of power equipment status in China, which requires a large amount of consumption. The human and financial resources, through the maintenance of power equipment status, can identify problems in a timely manner, timely handle maintenance, improve the health status of the power system, and provide basic guarantee for the development of power companies.

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