Research on Equipment Defect Management System Based on QR Code

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Abstract. With the rapid development of information technology, bar code technology is widely used in information collection, logistics and warehousing, power management, and automatic identification technology, which brings huge economic benefits. The two-dimensional bar code has been widely used in various industries and departments because of its large information capacity, high security and high anti-counterfeiting, low cost and easy manufacture, high decoding reliability, and strong anti-loss and error correction capabilities. In the power equipment defect management system, the defect means that it will not cause trouble to the safe and stable operation of the power grid in a short period of time, but it may pose a safety hazard. Therefore, this paper mainly focuses on the research of equipment defect management system based on two-dimensional code. In order to improve the power system equipment, the operation and maintenance personnel can grasp the defect processing situation in time, and timely eliminate and repair the work, which can ensure that the equipment defect problem is tracked. Management without loss, continuous management of defects in poultry equipment, and promoted equipment in a safe, stable, economic operation.

1. Introduction
As a new information storage, transmission and recognition technology, QR code has received the attention of many countries since its birth [1]. Nowadays, as a kind of automatic identification technology with large information capacity, identifiable text website and low cost, the two-dimensional code integrates technologies in the fields of optoelectronics, communication and computer. It is an important method in the field of informationization. Large-scale application in many industries in China [2-3]. In recent years, with the development and popularization of smart phone technology, the application of mobile phone and other mobile intelligent devices to obtain relevant information and services for two-dimensional code has entered thousands of households. The two-dimensional code has gradually moved from closed system application to open system. Application transformation, the application of two-dimensional code has greatly improved the speed of data collection and information processing, improved people's work and living environment, and made important contributions to the scientific and modern management [4-7]. At the same time, with the continuous updating of power system equipment, the parameter principles and technical specifications of different equipments are also different. Therefore, higher requirements are placed on the operation and maintenance management of equipment. The operation and maintenance personnel need to know
the information and status of equipment in time. [8-10]. Equipment health is an important indicator that affects the normal and stable operation of the equipment. Once the equipment is abnormal or defective, it will threaten the safe operation of the power grid. By analyzing the defect of the equipment, the operation and maintenance personnel can fully grasp the health of the equipment. In time to find timely elimination, improve equipment operation and maintenance level.

2. Overview of QR code technology

2.1. Principle of QR code
Two-dimensional bar code is a popular encoding method on mobile devices in recent years. It can store more information than traditional Bar Code bar codes, and can also indicate more data types. Two-dimensional bar code uses a certain geometric pattern to record data symbol information in a black and white pattern distributed in a plane (two-dimensional direction) according to a certain rule; skillfully utilized in code compilation The concept of the "0" and "1" bitstreams of the internal logic of the computer uses several geometric shapes corresponding to the binary to represent the literal numerical information, and is automatically read by the image input device or the photoelectric scanning device to realize automatic information processing.. It has some commonalities of bar code technology: each code system has its own specific character set; each character occupies a certain width; it has a certain check function. At the same time, it also has automatic recognition function for different rows of information, and handles the rotation change point of the graphic. In the code compilation, the concept of "0" and "1" bit streams constituting the internal logic of the computer is skillfully utilized, and several geometric shapes corresponding to binary are used to represent the literal numerical information, which is automatically adopted by the image input device or the photoelectric scanning device. Read to achieve automatic processing of information. However, the security of QR codes is also being challenged, with malware and viruses becoming a stumbling block on the road to the popularity of QR codes. The development and prevention of the abuse of QR codes is becoming an urgent problem to be solved.

2.2. Application of QR code in equipment management
In the traditional equipment management, the equipment account is heavy, the amount of data is huge and cumbersome, and the operation and maintenance personnel check the equipment information and operation on the spot, and the workload is very large. The bar code identifies a small amount of information, the security of the security is low, and the cost of the electronic tag device is high. The two-dimensional code has the advantages of simple operation, high quality and low price; secondly, it can contain numbers, characters and images, and the information capacity is large; in addition, the technology has strong security and high security, and the technology is quite mature. Through the two-dimensional code software installed by the intelligent terminal, the intelligent terminal that is carried by the user can perform comparison check on various devices on the site to improve work efficiency. The two-dimensional code technology has the advantages of more versatility, convenient production, lower cost, and no electromagnetic interference caused by equipment.

2.3. The necessity of establishing equipment defect management system
As one of the important links in equipment management, equipment defect management should be closely combined with technical supervision, daily inspection and hidden danger investigation to discover equipment problems in time. Once there is a tendency to deteriorate, various effective measures must be taken to reduce the number of defects and prevent hidden dangers. Further deterioration. For some power stations, the traditional defect management method is still adopted, and the daily tracking management of the defects and the production site are not effectively combined. As a result, the operation and maintenance personnel cannot grasp the defects in time, and cannot perform the shortage and maintenance work in time. The inability to effectively track management has slowed down the information development and economic benefits of enterprises. Establishing an advanced...
and reliable closed-loop management system for defects can not neglect the promotion of enterprise competitiveness and its own development. It can effectively improve the defect management level and management efficiency of Guanyinyan Hydropower Station and ensure the sustainability and permanence of defect tracking.

3. Two-dimensional code device defect management system

3.1. Two-dimensional code equipment defect management system master plan

The equipment defect management system should be simple and practical, make full use of advanced computer technology and communication technology, and be composed of servers, mobile terminals, application software and equipment QR codes. The server is responsible for communication between the various components of the system, providing background support and information storage. The QR code of the device is pasted on the body of the patrolling device. The internal information includes the name, model number, serial number, nameplate information, and running time of the device. The mobile terminal should have the functions of recording motion track, scanning code, information entry, and receiving alarm information. The application software can be installed on a computer or mobile phone. The design should be simple and intuitive. It includes a device management interface and a defect management interface. Both interfaces are designed in Excel form. The items of the device management interface include the device information in the device QR code and the current status of the device. The defect management interface is generated when a defect is created after the device defect occurs. The project contains the basic information of the device and the defect plan, and leaves room for the deletion progress. Managers, dispatchers, operators, and maintenance personnel are required to install application software to receive defect alarm information at any time.

3.2. Application process of defect management system

For example, the two-dimensional code is applied in the running tour check and defect processing, as shown in Fig. 1. The patrol inspection process of the operation personnel shall be inspected according to the set route, and the defects in the operation of the equipment shall be found at any time for recording and processing. Using the smart mobile terminal (mobile phone or patrol point detector, taking the mobile phone as an example), the running personnel can open the patrol inspection application, and according to the set route, use the mobile phone to scan the two-dimensional code at the checkpoint, and record the patrol at this time. At the time of check, you can simply enter the results of the patrol check, so that a complete patrol check record with the patrol checker, time, route, and conclusion is generated (it can also be designed to collect data offline, online import form). At this time, if the device defect is found midway, you can directly scan the device's QR code to obtain the device code, fill in the brief defect description online, or take the image evidence and submit it directly to the device owner. A defect list is generated. The person in charge of the equipment receives the defect list and checks the equipment defect on the spot. You can scan the QR code of the device to confirm whether it is the target object. Then, you can view the accounting and historical defect processing of all the devices. If you suspect the related device problem, you can also scan the QR code of the nearby device to find the historical defect record, comprehensive analysis and processing, and after the defect processing is completed. Take the process or result directly with your mobile phone, upload it as an attachment, and then submit it for acceptance. This preserves the complete record and image material processed for this device and provides a reliable basis for subsequent deficiencies.
4. The function of the power equipment defect system

4.1. Power defect equipment registration management

The defect registration function module collects the information of each device defect through the function component designed in advance in the system, and registers in the device defect management. The specific operation is first automatically submitted by the system, or after the user submits the device defect request. It is submitted to the system's logical process for review and judgment, and stored in the database, and in the defect graphic information, it can also supplement the corresponding device failure information. The processing flow of the defect registration management function module is shown in Fig. 2. Defect information is added. The main function of the defect information adding function module is to newly add a device defect information, and the defect information of the device specifically includes the specific event describing the occurrence of the defect and the running state of the related device; the defect information is received. The defect information receiving sub-function module receives information about the discovered defects and stores them in a database of the device defect management system; defect information processing. The main task of defect information processing is to deal with defects. The whole process is in the logic processing layer of the equipment defect management system. It is judged whether the defect belongs to the first occurrence through analysis. If it is the first time, it will be submitted to the competent department for detailed investigation; if knowledge The defect information is stored in the library, and the corresponding processing method is sent to the device defect processing personnel for processing; the defect type maintenance. In the equipment defect management system, all types of equipment defect faults in the system can be maintained through the defect type maintenance function module.
4.2. Power defect device notification management
The defect notification management function module can report the operation personnel to the inspection point in time after discovering the defect of the equipment, and arrange the operation personnel to perform the processing in time, and summarize the processing process and the processing result. In the equipment defect management system, the defect management function module is the most important function module of the system. This function module completes the record from the detection of defects to the record of defects, approval, distribution and maintenance to the final acceptance, all in this key function. Completed in the module, this functional module. Ensure high efficiency and business process flow to reduce the damage caused by equipment defects. First, after the system detects a defect in the defect management function module, the system automatically creates a defect in the rights management function module in the device defect management, and details the device defect information collected in the event. Record and further analyze and locate the device defect problem, then the system automatically searches the device defect knowledge base in the background, matches the cause of the device defect and the type of the fault and the solution method, and also searches the system once The fault handling method of the similar equipment recorded is checked by the operator to check the equipment defects. When it is found that there may be other problems in the work of eliminating the work, then the hidden dangers should be further analyzed until the defect is solved.

4.3. PC computer equipment defect management
The system server is installed in the power room, the system server builds the database, and configures various interfaces for subsequent expansion. The database mainly records and saves a large amount of information such as basic information, real-time sensing information, and historical records of the device, and accepts data from the PC. Management. PC computer installation equipment defect dynamic management system, can realize system interface maintenance, data backup and restoration, personnel authority, defect analysis management, defect maintenance management, defect information statistics, QR code development, server management, etc. System interface maintenance is the system Modification of the graphical interface and modification of functions. Defect analysis management establishes equipment defect management standards, and also configures infrared temperature measurement judgment tools to facilitate device defect determination. Defect maintenance
management establishes equipment differentiated operation and maintenance management standards to achieve dynamic tracking of equipment defects. The defect information statistics are the contents, causes and times of equipment defects in a period of time, which provide the basis for equipment selection. QR code development generates QR code tags based on the device's category, model, and code. Server management remotely logs in to the server and queries, modifies, and maintains server data.

4.4. Intelligent terminal equipment defect management

The database built by the system server also accepts the management of data by the intelligent terminal. The intelligent terminal installation device defect dynamic management system APP can obtain various information of the device by scanning and pasting the two-dimensional code function of the power device, and directly save the system server, support voice, and query, record, modify, and update the device information. The exchange of pictures and positioning information is equipped with a defect abnormality information transmission function. The intelligent terminal submits the device information, the sensing information and the manual recording information to the server, compares with the defect standard data set by the system server, instantly determines the defect nature of the device and proposes the processing suggestions, and further determines the defect quality and the device based on the differentiated operation and maintenance. Standards, generate equipment operation and maintenance strategies during the defect period, and guide the operation and maintenance personnel to carry out Teve in time.

5. Conclusion

The research of defect management system based on two-dimensional code further improves the management level of equipment, improves the work efficiency of equipment management of operation and maintenance personnel, and avoids damage to the power grid caused by equipment failure. At the same time, the system can be easily managed, improve work efficiency, simple and generous interface, convenient use and maintenance. The system can make the direction of the management information system more diversified. Devices, management systems, and users become a whole. Only by cooperating and sharing advantages can we play a more powerful role in device management.

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