

Low Voltage Power Supply System in the Reliability Analysis and Countermeasures of Coal

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Abstract. The coal mine production, received the influence of many factors, the power supply system has been an important topic in the application. The underground operation have many defects, which leads to the efficient operation of the. Power supply system, is one of the most any job must have system. However, people with high requirements on production, safety and feasibility of more attention. Therefore, low voltage power supply system reliability problem in coal mine, has received some attention. Its reliability in underground coal mine of this paper, and to analyze the downhole operation strategies.

Introduction

Along with our country economic level increasing, for coal and other energy demand is also increasing. In order to ensure the stability of coal production, coal and other energy production began to be paid attention to, especially the frequent coal mine safety accidents in recent years, coal mine workers in the underground working environment is also known as by accident in recent years. Coal mine safety accident statistics found that, most are due to gas explosion in coal mine caused by explosion, and the cause is usually EDM power supply system instability generated, and power supply equipment under the mine must adopt flameproof type, but through the survey found, at present mine production in our country, the power supply device flameproof inadequate safety standards, many power supply equipment are unfit, and some large underground coal mine power supply equipment while the safety standard, but there are some problems in the process of using, easily lead to the occurrence of safety accidents.

Status of low-voltage power supply system for use in a coal mine

Compared to some developed countries, between China and the west, the level of science and technology and living standards have a certain gap, for low voltage power supply system in coal mine, and both in the safe and stable, there is a big gap. The current low voltage power supply system of our country, the basic use of non grounded way, this way not only can reduce the current ground, also can improve the safety and low voltage power supply equipment, and in low voltage power supply options, are basically the same and the western developed country, with a central transformer. Although the low voltage power supply mode and the western developed countries is similar, but for safety low voltage power supply system, will be much worse than the developed western countries, and lead to this phenomenon is mainly because of the security level of power supply equipment of low, in the work process, but also prone to failure, affect the mine production, serious when low voltage power supply system can produce a spark, led directly to the gas explosion in coal mine underground, a threat to the personal safety of coal mine workers. Through the survey found, the number of accidents in recent years coal mine, there is a rising trend year by year. Under this background, to study the reliability of low voltage power supply system in coal mine, there is the great significance of reality.

Low voltage power supply system is the coal mine machinery lighting and guarantee the normal operation of its stability and safety, can be directly on the efficiency of coal production of the impact. If the system is not stable, so the mining machine and other mechanical operation can not be guaranteed, at the same time in the EDM process to produce power, lead to security incidents the

occurrence of low voltage power supply system. Because of the importance of security, its reliability has become a focus in the research of the relevant experts and scholars. The low voltage power supply system in our country using the appliance, security measures are the traditional explosion-proof enclosure device. Practice shows that, these security measures can improve the safety of low voltage power supply system and stability effectively, but in actual use process, by technical limitations, electrical design usually has some problems, and a lot of security and protection measures have certain limitations, which have resulted in low voltage power supply system reliability problems in coal mine.

Reliability factors analysis effecting low voltage power supply system in coal mine underground

Low voltage power supply system is overloaded

With the development of our national economy, the demand for more and more coal, coal prices are also gradually improve. In this context, many coal mine management personnel in order to obtain greater economic benefits, excessive pursuit of coal production, led that a lot of coal mine production has overload. Coal mine production equipment load operation, and even some coal mine has also increased the mining machine and other production equipment. These factors have brought pressure to low voltage power supply system, especially the main transformer in low voltage power supply system prone to problems. Once the damage will affect the coal mine production of transformers, transformer replacement can also cause some economic loss. If the transformer fire occurred due to the load, losses will be greater. Low voltage power supply system used in coal mine, the main consideration is safety. High voltage line prone to danger, and the impact on the surrounding environment of production.

Performance issues of low-voltage electrical power supply system

Considering the safety of low voltage power supply system in coal mine, it needs to use of riot appliances, but through the survey found, riot appliances used in China at present, its structure is very simple, and the technical level is backward. The explosion-proof electrical appliances in use process, if the connection or repair, you need to open the cover that can be carried out. But China's "coal mine safety regulations" clearly pointed out that "underground shall be charged maintenance, relocation of electrical equipment", in this regulation, the riot appliances currently used for maintenance and wiring without method. In the actual underground production process, many skilled workers have ignored this rule, free to be explosion-proof electrical openings, so that the operation does not meet the requirements which can easily lead to security incidents. Practice shows that coal mine accidents occurred in the past, but also because there are a lot of skilled workers caused by illegal operations.

Wire selection problems

In the low voltage power supply system in coal mine, wire selection is most likely to be ignored, but also the system most prone to problems. Because of the special nature of the coal mine production, equipment and workers are moving with the production, and this movement is rarely rectilinear, bent with the coal mining, and this power supply lines is moving with the production equipment and workers. If the process moves do not pay attention, it is easy to cause a short circuit and other problems, even when serious sparks due to overheating. For this situation, China has made it clear that the mining of coal mine work, etc., must be used in wire-powered flame retardant. But in the actual production process, a lot of mine managers economic considerations, are still using non-flame retardant for coal mine safety production supply, brought a lot of problems.

Measures to improve the reliability of low-voltage power supply system in coal mine

Strictly control of coal production in coal mine

Low voltage power supply system load problem mainly because of excessive pursuit of coal mine production of coal, lead mining machines and other production equipment overload operation. Therefore, to the low voltage power supply system of transformer load control in a safe range, the

best way is to control the coal mine production. Since each coal mine in the design will follow a certain amount of coal production design, and low voltage power supply systems and other production facilities are based on the amount of coal production to design. If the production of coal beyond the standard design, the low voltage power supply systems and other related facilities will load operation, coal mine production to a great deal of insecurity. Thus, only the strict control coal mine coal production, in order to truly make low-voltage power supply systems up and running.

The government forced underground coal mine power supply device update

For the coal mine low voltage power supply system of explosion-proof electrical equipment and wiring problem, relevant government departments should play its due role, regular on the area of the underground coal mine low voltage power supply system detection. If it is found that the use of low voltage power supply system of explosion-proof electric apparatus and wire unqualified, shall promptly inform the coal mine management personnel, and the replacement of the unqualified products. If it is found that the coal mine management personnel did not replace the safety equipment in the next examination, can undertake capital punishment to its corresponding. If the potential safety hazard is very serious, should let mine stop production. Only such mandatory supervision and severe punishment, in order to truly make coal mine management personnel the importance of low voltage power supply system in coal mine, so as to enhance the reliability of low voltage power supply system. Improve the reliability, is to play the advantage to a certain extent, to ensure the maximum benefit of the equipment.

Increase the function of real-time monitoring of low voltage power supply system

With the development of science and technology, coal mine low voltage power supply system in western developed countries have real-time monitoring function. A lot of local power network in our country, there are also some real-time monitoring function. Through the real-time monitoring of the power supply system, can discover the problems existing in the system, and then quickly ruled out. In the low voltage power supply system underground coal mine in China, there is no real time monitoring function, but the real-time monitoring of power system technology and experience, have been very mature. Through some state sensor, real-time monitoring system can quickly form a low voltage power supply system on the coal mine overload, over-current, leakage and so. Through the real-time monitoring of the low voltage power supply system, it can eliminate the security risks in the production process, greatly improve the reliability of low-voltage power supply system in coal mine underground. Real time monitoring functions, for coal mines, especially in underground production, is significant. The real implementation of the program, to ensure the normal operation of the whole system, and complete the coordination for downhole operation. Monitoring function to a certain extent, realize the high efficiency of downhole operation, and solve some problems in a certain extent. Power supply system of low pressure, not only to provide the normal power supply, but also enrich the underground working environment to a great extent, ensure the feasibility of the operation.

Conclusion

With the development of science and technology and the progress of industrial level, and electrical equipment of low voltage power supply system in coal mine is advanced, and the power supply system is prone to problems in the work experience accumulated during the process of more and more. All of these can improve the reliability of low-voltage power supply system in coal mine underground in a certain extent. But in the actual production process, or there will be some unexpected factors, affect the stability of low voltage power supply system in coal mine. In the formation of coal mine underground low voltage power supply system in practice, only choose some explosion-proof electrical equipment, advanced flame retardant wire and so on, in order to secure problem occurs to a minimum. Then through the real-time monitoring function of low-voltage power supply system, there found the first time problems, and timely elimination, improves the reliability and only in this way can the greatest degree of low voltage power supply system in coal mine underground.

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