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STUDIES ON THE USE OF ELECTROMECHANICAL EQUIPMENT IN MINING ENTERPRISES

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ABSTRACT

This article includes research on the use of electromechanical equipment in mines, such as the mechanization of communication signals in underground mines and open pit mining. The use of such electromechanical equipment in mining enterprises is carried out based on technical conditions. The reason is that mining machines are constantly in motion in mining enterprises. Electromechanical lines and power lines in mines pose a risk. In order to prevent dangerous processes in such mining enterprises, it is necessary to install communication signals in mines based on perfect schemes.

KEYWORDS

Mining enterprises, underground mining, electromechanical equipment in mines, communication signals.

Introduction

Communication signals in underground mining is a process of information exchange in mines based on activities related to the transmission of signals (analog and sound, signal data) for processes based on the extraction of ores under the program of mine mechanization in the mining industry. it is advisable to use electromechanical devices to ensure. In underground mines, communication signals are required from both of which have electromechanical voltage. The use of electromechanical equipment in mines should be based on a perfect scheme based on safety and efficiency. In mines, proper and reliable communication systems not only save the downtime of mining machines, but also help to transfer the message immediately. In mining operations, sound signals can be used to bring an underground working area closer to the surface for quick rescue operations. Therefore, a reliable and effective communication system is also an important prerequisite for the prospects of the mining industry. The communication system in mines helps to ensure safety in underground mines based on excellent technical conditions. All existing systems are based on the principle of linear communication of underground mines (wired); therefore, these cannot withstand disaster conditions, and also short signal outages occur in hard-to-reach areas. The use of an additional line connection on the road is a complex electromechanical process due to the symmetrical mine topology and complex circuit structure. Therefore, wireless communication is indispensable in mines, it is the most reliable, convenient system and it is necessary to deal with such disaster situations. Frequency modulated receivers with directional or active antennas, regularly spaced feeder cables and repeater amplifiers connected by leakage are reliable and usable. For underground mines, we can control the mine process

management system by using appropriate mine-wide communication systems. Portable Transceivers are used to carry it even in hard-to-reach places such as underground mines. Such communication systems are often used as a communication system to ensure safety in coal mines. It also helps to increase production and productivity in mines. This project report provides a critical review of various internal secure communications. Communication systems in mining enterprises, mine-wide communication systems and Internet-based information systems, electromechanical equipment in mines are used for underground communication. This project report uses the latest described technology, miner data and security system, system specific software and application software benchmarks. In addition, studies on the use of electromechanical equipment in mining enterprises will ensure the dissemination and operation of this project report. Communication systems in underground mines use reliable communication signals as an example of a safety system in coal mines. It also helps to increase productivity, speed control of processes and production efficiency in mines and increases productivity indicators in mines. Underground coal mining processes are dangerous processes. Miners work thousands of meters underground. In underground mines, miners dig under millions of tons of rock. They are surrounded by high-voltage power lines, darkness, dust and highly explosive methane gas flows from the coal. Mine disasters often leave survivors trapped underground. There would be rescuers on the ground, underground workers trying to reach the victims, their work is seriously hindered. The lack of information about the actual location and condition of the victims is the biggest problem. Effective and timely rescue efforts in mining enterprises, rescuers must have clear knowledge. The location of any survivors in the mines, and the nature and urgency of the danger of their condition, in the event that miners are quickly killed by toxic substances, the rescue campaign is different from one where the miners have adequate gas or fire traps, and the atmospheric environment, air, and combustion in mines due to feature increases. Some methods of locating survivors and working with them are very important. Therefore, in order for the mining industry to continue to improve, it is important to reduce operational costs and worker safety, which requires reliable, modern communication networks. These networks must have the ability to transmit voice, video and data across the mine. real-time access to mining (eg, seismic monitoring) and mine operation data is essential. Most of these tasks involve contact with a mobile worker, device or part thereof, and require the use of electromechanical equipment. At the same time, miners and their families are questioning why communication systems. But if the active antenna is located near the turns of the road, the signal can be amplified. Also, we can't get into the high wattage of the receivers due to their internal nature. The reason is that in a dangerous area (for example, a coal mine) the safety margin takes very high values. Considering all of the above, in order to create a large-scale communication system, it is necessary that we use flowing feeder cables as antennas and transmission lines. Acting effectively like a remote antenna, it steers radio waves around corners and bends. The communication system provides the ability to operate in a very high frequency modulated range. Using signals at the acceptable RF power required in underground mines is a complex process. The cable is characterized by an excellent frequency response in the spectrum required for the signal. According to the specifications of the mining industry, communication cables can be fireproof, waterproof, etc. In mines, line amplifiers are installed automatically after every 400 meters of cable. These amplifiers operate independently in forward and reverse directions. All equipment is powered by the cable itself. Intrinsically safe signal receivers can be used to communicate via a transmitting medium such as an antenna and a flowing

feeder cable, and then a regularly repeating signal. Due to skin effect phenomena, radio waves are emitted in the larger environment by feeder cables, and the attenuated waves can be further amplified with the help of a repeater. Engineering and maintenance of such an electrical system is a demanding and difficult process and requires a specialist, who must have knowledge of mining and electrical engineering. On the contrary, effective mine management requires everyone responsible for production and safety to be involved. It is necessary to be aware of the mine's electrical system. Management must understand the advantages and disadvantages of one and the system over the other, because if the power system is designed incorrectly, not only the safety, but also the mine will be compromised. Often, an existing mine power system designed to operate a new mine type will require a comprehensive capacity study to determine individual system needs and review available alternatives. Problems arise when new mining equipment is installed in the power system adopted without considering the impact on the operation of existing mines; these problems plague the mine's power supply engineer who often has to deal with the system. The material presented here is structured in such a way that it cannot be done by a person who does not know electrical engineering in the first place. Sometimes even the best designed electrical systems experience faults and overloads, or breakdowns cause abnormally high currents. Such currents may be present in the ground system or observed in the phase conductors. Wherever it occurs, it poses a risk to electromechanical equipment or personnel in areas where the situation is likely to occur. In power systems, three are important for protective equipment and relays: adequate interrupting capability, current limiting capability, and selective system operation. The first two protect the system from disturbance, and the third is designed to locate the problem, then minimize its impact. It has been shown that ground currents can be limited by installing a resistor placed in series with the neutral conductor. However, not much has been presented about the performance of the selective system, other than its need. A protection circuit and a protection relay are the means behind the operation of a selective system. A power-related protection circuit system consists of transducers, relays, and switching devices. Its role in protecting personnel and equipment can be performed manually or automatically. One example is removing power from a part of the system for manual maintenance. An example of an automatic operation would be a situation in which the protection circuit first senses and then clears each dangerous current that occurs as a result of a fault. As expected, the cleaning process is to remove the affected circuit from the power source safely and as quickly as possible, with minimal interference to the system balance. In other words, the protection circuit must isolate the fault at a specific location with minimal damage to the circuit, and the equipment and minimum operating time must be checked. In mines, the function of protective circuits to detect and ensure failure of electromechanical equipment is called isolation selective relay. Some mining engineers have found that circuit breakers cannot cope with existing ones, and in certain low-voltage applications, short-circuit currents are equipped with face equipment such as outgoing DC circuits of trolley rectifiers and DC. A low-voltage circuit breaker provides an alternative in such cases. Circuit breakers for 1000 V applications have an open construction assembly with metal frame housing. They are designed to be stored under the field for scheduled periodic inspection and all parts are accessible for ease of maintenance, repair and replacement. The design provides high durability and higher performance. Mines use molded case devices with repetitive duty capabilities rather than electrical equipment. However, circuit breakers are designed for service only within structural enclosures, meaning no unauthorized access. Electromechanical units have long been available for

actuation, but mechanical displacement panel types are commonly used for this function and provide similar overcurrent protection as well as bimetallic thermal shutdown in molded case breakers. Although the long-term characteristics cannot be adjusted with bimetallic strips, the instrument panel must have a long delay "turn-off" current and the operating time must be changed. This expands the circuit breaker's capabilities in a molded case, providing not only short-circuit but also overload adjustment, thus allowing for a wider range of applications. Low-voltage circuit breakers are available with or without direct-acting instantaneous units and with or without long-time delay units. In addition, most manufacturers offer three different adjustable long-delay operating bands, as well as three different short-delay operating bands. There are many opinions about the best location, but the most obvious place to improve power factors is at the points of use. This strategy is common in surface mines, particularly with mining machines. However, surface mining equipment has enough space to insert correction equipment, an advantage that is not widely used in underground mining machines. If there is an improvement, with the motors conveniently located immediately above the mine, the entire system, including the substation, can benefit from less apparent power, reduced line currents in the mines, and better voltage control. This location is based on the power centers that are usually located in the disposal equipment in the mine. As a result, some engineers prefer to correct the general condition without considering the power factor on the distribution side of the substation. So, if the power factors need correction, there are three general places to look: in the machine at the power centers or at the substation. Each individual mine needs to analyze the energy system to find a solution, and the final decision should take into account both electrical operations. One consideration should be the cost of the load center correction versus the penalty added to the electricity bill versus the correction at the substation. If a decision is made to make a correction, the general approach is to use a static bank also known. (Synchronous machines are logistically impractical in most cases.) Currently, the use of electric power in the mining industry dominates, with some segments of the mining process still better suited to the use of direct current motors. will come. A classic example is the use of DC series wound motors for traction. The speed-torque characteristics of these motors are very suitable for this application, especially for locomotives and transport cars. This is the reason why the use of direct current still plays an important role in the mining process. There are different ways to obtain direct voltage to power facial equipment. If the mine uses rail transport, the DC equipment in the working section can be powered directly from the trolley feeder line. However, if the operating section does not have direct access to the trolley feeder line, a rectifier must be used to convert the three-phase AC voltage to DC voltage. The rectifier can be a separate piece located in its own housing and the equipment supplied with power must be included in one housing with the means of the feeding cable from the AC power center or it can be an alternating current center, the common unit is ac-dc is called It is necessary to establish a combined power center in the mines. In mining, the size of the equipment based on the use of electricity and the replacement of the high cost of diesel will provide fuel and consequent savings.

• Investments in mine site electrical infrastructure are needed to ensure that electricity prices remain low compared to diesel fuel.

• Operational flexibility to be incorporated into long-term mining plans due to reduced electrical equipment installation requirements at mines. Electromechanics is a combination of mechanical and electrical systems that convert electrical energy and mechanical energy into one another.

Mining electromechanics, in other words, refers to the study of mechanical devices using electricity. Mining electromechanics will consist of the following important elements: Electromechanical motor (electromechanical advantage): This is the main part of the systems. These tools convert electrical energy into energy that works for guests. For example, electromechanical ventilators, pumps, generators. Controllers and sensors: These tools are used to control mechanical systems and ensure their successful operation. They are used, for example, in measuring temperature, speed, force, power and other parameters. Electronics and Circuit Regulators: These modules work in combination with other means to provide direct electrical energy to convert mechanical energy. For electromechanical tools to include intentions and application settings: Adjustment, technical basis, mechanical technique, available energy is necessary for energy exchange for support. Electricity supply is important in mining enterprises, and the above-mentioned electromechanical systems are of great importance in ensuring this supply. Power supply in mining enterprises has the following main points: Electromechanical devices In mining enterprises, devices such as electromechanical ventilators, pumps and generators are widely used. These tools are designed to generate electricity to work and turn it into the guests needed for similar devices inside the enterprise. Controllers and sensors are widely used in mining enterprises to control and monitor the power supply, to measure temperature, speed, force, power and other parameters. This is necessary to ensure the correct and efficient operation of electromechanical systems, these parameters are monitored and protect those required to operate automatically when the supply changes. Circuit Regulators and Electronics are important in power distribution and transmission, providing direct power for use in electromechanical devices. Flow regulators and electronics are components that work together with other things to provide a harmonious balance of mechanical and electrical energy within the enterprise.

Conclusion

For electricity supply in mining enterprises, energy efficiency is of great importance. It is important for the enterprise to optimize the amount of energy consumed and provide it, especially for changing the components of technical equipment and improving their quality. Also, the power supply is the main structure for ensuring the operation of the enterprise, which includes these systems and tools, as well as their monitoring and control technology systems. Electromechanical structures represent the integration of electrical and mechanical components into each other and are used to convert one of them into another form. This type can be related to techniques such as facilities, automation, impact devices, electromechanical control systems, etc. Electromechanical installations can have the following points: Automation and control are used in mines for electromechanical installations, automation equipment and other safety systems. It is used for change in automatic supplies, enterprise management and technical process studies.

References

1. Yeshmuratova, A., et al. "MINE BLASTING PROCESSES OPTIMIZATION STAGES OF DIGITAL TECHNOLOGY OF DETONATORS." Scienceweb academic papers collection.–2023 (2023).
2. Jumabayeva, G., B. Allanazarov, and A. Joldasbayeva. "STAGES OF OPEN PIT MINING. MINING METHODS AND THEIR PROCESSES." Science and innovation 2.A1 (2023): 236-240.

3. Jumabayeva, Guljahon. "CONTROL OF UNDERGROUND WATER IN THE MINE, DETECTION AND PREVENTION OF RISKS." Академические исследования в современной науке 2.5 (2023): 159-166.
4. Abdiramanova, Z., et al. "ACTIVITY OF TEBINBULAK IRON ORE MINING ENTERPRISES IN THE REPUBLIC OF KARAKALPAKSTAN." Scienceweb academic papers collection.–2023 (2023).
5. Djaksimuratov, K., et al. "GROUNDWATER CONTROL IN MINES." Scienceweb academic papers collection.–2023 (2023).
6. Mustapaevich, Djaksimuratov Karamatdin, et al. "Underground mine mining systems and technological parameters of mine development." INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 8.036 11.10 (2022): 110-117.
7. Alisher o‘g, O‘telbayev Azizbek, and Azizov Azatbek Jumabek o‘g‘li. "AUTOMATION AND ROBOTIZATION OF UNDERGROUND MINES." Open Access Repository 9.10 (2022): 20-28.
8. Abatbayevich, Dauletov Kalniyaz. "Research on methods of automatic control of constant pressure compressors." Texas Journal of Engineering and Technology 20 (2023): 17-22.
9. Dauletov, Kalniyaz, and Aliya Kulmuratova. "Research Studies on the Creation of an Automated System for Saving Electricity." International Journal on Integrated Education (2023).
10. Dauletov, K., and A. Kulmuratova. "Research on the Use of Renewable Energy in the Automation of Electric Generators." (2023).
11. Матжанов, Аман Жарылкапович. "Транспортные проблемы Каракалпакстана в 1920-1930 годы." Бюллетень науки и практики 7.6 (2021): 509-517.
12. Aman, Matjanov. "Traditional Transport among the Peoples of the Aral Region (1800-1873)." Res Militaris 13.1 (2023): 2985-2988.
13. Matjanov, Aman. "SCIENTIFIC RESEARCH OF THE LIFESTYLE OF THE PEOPLE EVACUATED IN KARAKALPAKSTAN." Modern Science and Research 2.10 (2023): 771-775.
14. Заиров, Шерзод Шарипович, and Муборак Жабборовна Норматова. "Разработка конструкции и параметров скважинных зарядов взрывчатых веществ при контурном взрывании для получения устойчивых откосов уступов." Ãîðíûé æóðíàë (2017): 102868.
15. Заиров, Ш. Ш., et al. "Исследование влияния забойки скважинного заряда на эффективность разрушения и пылеподавления." ТОШКЕНТ-2021 (2016): 59.
16. Заиров, Ш. Ш., et al. "КАРЬЕРЛАРДА ПОРТЛАТИШ ИШЛАРИНИ ОЛИБ БОРИШДА ЧАНГ-ГАЗ АЖРАЛИБ ЧИҚИШИНИ ПАСАЙТИРИШ УСУЛИНИ ИШЛАБ ЧИҚИШ." Journal of Advances in Engineering Technology 2 (2022): 22-25.