Research on Promoting Mine Soil Pollution Prevention and Greening Based on Big Data

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Abstract. Mineral resources are the important material basis of economic and social development, and the contribution and influence of mining industry to our country is great, but the exploitation of mineral resources in a long period, high intensity and large scale brings great pressure to the ecological environment. Mining will damage the land, produce a large amount of solid waste and occupy the land. At the same time, it will easily lead to collapse and debris flow disaster, but also cause soil and water pollution. Mine pit drainage will lead to the decline of groundwater level in many areas, spring discharge reduced or even dried up, seriously affecting the local ecological environment. Protecting ecological environment, dealing with climate change and maintaining energy and resource security are the common challenges facing the world. Writing ecological civilization into the Constitution, green mine construction has risen to national strategy [1]. Under the background of industrial civilization turning to ecological civilization, green mine construction is a general direction and an important way and inevitable requirement to realize the high quality development of mining industry. Is also our country realizes from the mining country to the mining power transformation only way! To promote the real green development of mine soil based on big data.

Keywords: Computer Technology, Soil Management, Green Production

1. The pollution control mode in the context of big data

Digital mine is a unified understanding and digital reproduction of the whole real mine and its related phenomena. A series of prototypes, system fields, material models, mechanical models, mathematical models, information models and computer models have been developed and integrated based on mine science and technology, information science, artificial intelligence and computational science, and supported by mine observation and network technology. They can be expressed in multidimensional by multimedia and simulation virtual technology. Intelligent mine production scheduling and control system is based on digitization, information, virtualization, intelligence and integration, taking into account all kinds of factors such as production, management, management, safety, benefit, environment and resources, and using computer, network, communication, virtual simulation, automatic control and monitoring technology to manage all kinds of mine information resources in an
all-round, efficient and orderly manner [2]. Intelligent production scheduling system is a typical multi-disciplinary new field, covering the whole process of production and management of mining enterprises. The system realizes the process of safety, high efficiency and low consumption production through the network, digitization, modeling, visualization, integration and scientific management of all links and factors of production, management and management of mines.

With more and more high-grade mines and easy-to-mine stones, there are more and more low-grade ores and ores with large burial depth, which are more and more difficult to collect and select. On the one hand, digital mines can redefine ore bodies and calculate reserves, on the other hand, they can provide effective ways to reduce mining costs. After the intelligent mine production scheduling and control system, the industrial index can be optimized [3]. According to the requirements of the manufacturers of different products for raw materials, through purposeful and planned mining, rich ore and middle and low grade ore can be mixed into commercial ore in a certain proportion, which also increases the utilization rate of middle and poor ore. Digital mine is beneficial to the rational development of resources, the full use of low-grade ore, the comprehensive utilization of multi-component mineral resources, and the optimization of grade index. At the same time, by establishing a mineral model, we can find out the quantitative distribution law of each mineral in three-dimensional space, maintain the favorable proportion of mineral content in the candidate ore through fixed-point mining and proportional ore blending, improve the recovery rate of ore dressing, and reduce the amount of mineral dressing agent. Reduce waste of resources and environmental pollution. This is shown in Figure 1.

Figure 1. New models of soil protection.

2. Big data computer control mode
Along with the construction of mine information transmission center, 5 G remote control application,
the whole process of shoveling, loading and transporting in open-pit mineral area is realized. One key start, light mouse, real-time observation of mining area production through screen; one key mining, sitting in the office can achieve remote control of mining area; one key solution, optimization analysis to provide the best production plan. Besides loading and unloading explosives, the application of 5G+ makes the remote operation of no man, such as crushing, digging, transporting and monitoring, realize the goal of "mechanized replacement, automatic reduction and intelligent efficiency improvement" digital management level. On the basis of analyzing the application status and function effect of each system of intelligent mine production dispatching and control system, the platform strengthens the sharing function of digital mine management resources by establishing central database and so on. And through the establishment of mine resource database, on the basis of ensuring data security, open the API interface for related enterprises, complete the construction of big data platform in mining industry, and design the software system suitable for mine use scenario.

Green intelligent digital reconstruction project of mine is to realize green, intelligent and digital production of mine by using open-air intelligent control system and driverless system, using pure electric unmanned transport vehicle and other equipment, combined with 5G network. Unmanned mining is safer and healthier, site construction is unmanned and remote controlled, greatly reducing the harm caused by dust, noise, vibration and other pollution to employees; unmanned mining is greener and environmentally friendly, all transport vehicles on site use pure electric vehicles, drilling rigs use electric air compressors, fully achieve zero emissions, reduce carbon dioxide emissions per year; unmanned mining is more economical and efficient, saving half of the labor from traditional mining mode. By replacing diesel drive with electric energy drive, the vehicle runs in the established route, effectively improves labor efficiency; unmanned mining is more intelligent and accurate, using the characteristics of super high rate and ultra low delay of 5G network, effectively improves the accuracy and stability of field operation of unmanned mining equipment [4].

2.1 Real-time monitoring and scheduling
The GPS/ Beidou positioning technology, 4G wireless communication network, Google Map and other cutting-edge technologies are applied to the dynamic real-time tracking of open-cast mine operation equipment, and the managers can grasp the working position of the vehicles and the distribution of the vehicles in the mining area in real time. The system carries on the early warning prompt to the vehicle operation area and the vehicle speed state in real time, greatly enhances the mining production management level.

Based on the optimization scheduling of production vehicles in open pit mines, using mining system engineering, queuing theory and other related theories, the new generation of high and new technology such as Internet of things technology and open pit truck shovelscheduling are organically combined to plan the dynamic traffic flow of open pit vehicle transportation. Real-time scientific scheduling of open pit truck and excavator.

2.2 Automatic metrology statistics
By combining advanced remote RFID radio frequency identification technology with high precision positioning equipment and combining automatic identification with vehicle loading trajectory, an automatic metering algorithm is proposed, which realizes automatic, fast and accurate measurement of ore volume in open pit vehicle transportation without manual intervention.

2.3 Intelligent image recognition of loadings
By using image acquisition technology to collect vehicle loading situation in real time, using AI image intelligent recognition algorithm, dynamic analysis of vehicle ore or slag full load situation, real-time feedback of full load rate to dispatching managers, the intelligent analysis of vehicle full load rate is carried out regularly to provide decision basis for optimizing vehicle transportation and realize fine management of vehicle transportation. The width of the mining plate is divided into several blocks, the width of the block meets the requirements of the equipment workspace, the equipment is mined layer
by layer in the block section according to the method of horizontal stratification, and the next section is mined after the mining.

3. Green ecological mine

Green mine is characterized by resource saving and recycling and harmonious economic development mode with environment, which emphasizes organizing economic activities into a feedback process of resource-product-renewable resources [5]. It is characterized by low mining, high utilization and low emission. All materials and energy can be used reasonably and sustainably in this ongoing economic cycle to minimize the impact of economic activities on the natural environment.

3.1. 3D implant network

The three-dimensional vegetation network slope protection technology integrates the advantages of geotechnical network and plant slope protection, and plays the role of compound slope protection. When the vegetation coverage rate of the slope reaches more than 30%, it can withstand the scour of light rain, and when the coverage rate reaches more than 80%, it can withstand the scour of rainstorm. As the plants grow luxuriantly, the runoff velocity that can resist erosion reaches 6 m/s, more than twice that of the general turf. The existence of geotechnical network has a good effect on reducing water evaporation and increasing infiltration of slope soil. At the same time, because the geotextile material is black polyethylene, it has the function of heat absorption and heat preservation, which can promote seed germination and plant growth. When there is a contradiction between the construction period and the vegetation cultivation period, when the project has just been completed and enters the rainstorm season, it is necessary to take "reinforced grass skin" to protect the project quickly, so that after completion, the completely covered anti-scour vegetation can be obtained. "Reinforced grass skin" uses a three-dimensional vegetation network to pre-plant turf on the lawn plantation or open space near the site, which can be rolled up in whole or in blocks and then laid on the slope to be protected.

Sustainable development in the mining process to minimize the damage to the ecological environment, formulate and strictly implement the mine environmental protection and treatment plan. Make perfect mine closure plan and monitoring plan to achieve green sustainable development improve high utilization rate of mineral resources, high quality and excellent use, recycling waste resources actively promotes the use of new energy saving technology, new technology to achieve energy saving and consumption reduction.

3.2. Ultra-magnetic water separation purification technology

Supermagnetic water separation purification technology is a new mine water treatment technology developed in recent years. This method is suitable for all kinds of water quality, especially for the treatment of high suspended mine water. This is an important part of mine water treatment in the future. Trends in technology development. In Shanxi Datong Jinhua Palace mine sewage treatment station, the super magnetic separation water purification system is introduced to treat the underground mine water treatment part of the mine water treatment station for storage, the other part is used for underground operation. The whole process adopts automatic management, safety performance meets relevant standards.

The treatment of mine water is an important guarantee to ensure the quality and efficiency of coal mining. The improvement of mine water treatment technology not only reduces the pollution caused by mine water discharge. At the same time, the efficiency of coal mining is improved by rational utilization of mine water. In this paper, the author discusses and analyzes the common mine water treatment technology for different types of mine water in detail, and puts forward a reasonable prospect for the deficiency of the technology, so that the overall mine water treatment process can be optimized. This is shown in Figure 2.
4. Conclusion
The mine system can effectively help mining enterprises to realize the monitoring and scheduling management of mechanical vehicles and equipment through vehicle ad hoc network technology, various wireless communication technologies, satellite positioning technology, radar ranging technology, various sensing technologies, extended interface technology, man-machine interaction technology, image capture and recognition technology. Through PHP, C++, SQL, Apache, Nginx, data mining, algorithm optimization and other technologies, intelligent software can interact with intelligent hardware terminals in real time and stably; after the optimization of user experience designers, the data is converted into scientific and easy to read charts, and management suggestions are automatically given [6]. To sum up, after the intelligent mine production scheduling and control system products are completed according to the expected plan, the monitoring and scheduling management can be achieved anytime, anywhere and liberalized in the management of mechanical vehicles, and the fatigue tactics of traditional people staring at people can be abandoned. Moreover, with the help of many kinds of software, the real-time dynamic and real-time data (production data, fuel consumption, consumables, etc.) of the whole mine can be perfectly represented by charts, which can provide data support for managers’ decisions to a great extent. Efficient and intelligent management system can reduce production cost and improve production efficiency. After the completion of the mine intelligent system according to the expected goal, through the storage of full dimension data, multi-angle, multi-faceted comparative analysis, intelligent distribution of tasks, so that the mine green production to reduce pollution.

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