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ENVIRONMENTAL IMPACT OF ROCK BLASTING PROCESSES IN MINING ENTERPRISES

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Abstract. *Ensuring the safety of dust and explosion during underground mining in mining enterprises is one of the most important tasks of the enterprise. Departments of industrial safety and labor protection should be established in mining enterprises. For example, the main method of preventing the explosion of coal dust found during the processing of mines is to treat it with rock dust. Traditional methods of controlling the quality of stone dust removal include radioisotope, optical and chemical methods. To implement them, devices need replaceable tubes, expensive optical sensors, dryers and chemical reagents, which are equipped with environmentally harmful radioactive elements. Compressed air is widely used in many industries as a safe technological energy carrier in economically developed countries, energy costs for the production and distribution of compressed air reach 10-15%. An analysis of the industrial compressed air production and distribution systems sector shows that the efficiency of the systems is relatively low. It is about not paying enough attention to the systems, because the energy monitoring of compressed air systems has certain difficulties - the existence of complex and branched networks of air pipes with their own characteristics; low sensitivity of equipment that consumes compressed air; the complexity of checking pneumatic equipment that ensures the safety of continuous operation. The article analyzes the possibilities of reducing the costs of production and distribution of compressed air. The task is solved by hardware and software, which is to monitor and control the compressed air pressure at the main points of the network. The proposed method allows real-time detection of air currents occurring in the air duct network and sending commands to technical personnel. On the example of the Tebin Spring mine, we have considered the theories of analysis of the satisfactory approximation of the calculated air flow with the actual values. The practical significance of the obtained results is that the developed method of air flow control in the network of air ducts is simple, it requires uncomplicated work.*

Keywords: *Open pit mines, blasting, detonators, mine charge, mine explosion hazard, coal mines, rock dusting, thermogravimetry, thermogravimetric curve, compressed air, compressors, energy efficiency, air flow monitoring.*

ВЛИЯНИЕ НА ОКРУЖАЮЩУЮ СРЕДУ ПРОЦЕССОВ ВЗРЫВНЫХ РАБОТ НА ГОРНОДОБЫВАЮЩИХ ПРЕДПРИЯТИЯХ

Аннотация. *Обеспечение пылевзрывобезопасности при подземных горных работах на горнодобывающих предприятиях является одной из важнейших задач предприятия. На горнодобывающих предприятиях должны быть созданы отделы промышленной безопасности и охраны труда. Например, основным методом предотвращения взрыва угольной пыли, образующейся при переработке шахт, является обработка ее каменной пылью. Традиционные методы контроля качества удаления каменной пыли включают радиоизотопные, оптические и химические методы. Для их реализации устройствам*

необходимы сменные трубки, дорогостоящие оптические датчики, осушители и химические реагенты, которые оснащены экологически вредными радиоактивными элементами. Сжатый воздух широко используется во многих отраслях промышленности как безопасный технологический энергоноситель. В экономически развитых странах затраты энергии на производство и распределение сжатого воздуха достигают 10-15%. Анализ сектора промышленных систем производства и распределения сжатого воздуха показывает, что эффективность систем относительно низкая. Речь идет о недостаточном внимании к системам, поскольку энергетический мониторинг систем сжатого воздуха имеет определенные трудности – наличие сложных и разветвленных сетей воздуховодов со своими особенностями; низкая чувствительность оборудования, потребляющего сжатый воздух; сложность проверки пневмооборудования, обеспечивающего безопасность непрерывной работы. В статье анализируются возможности снижения затрат на производство и распространение сжатого воздуха. Задача решается аппаратно-программным путем, который заключается в контроле и контроле давления сжатого воздуха в основных точках сети.

Предложенный метод позволяет в режиме реального времени обнаруживать воздушные потоки, возникающие в сети воздуховодов, и отправлять команды техническому персоналу. На примере рудника Тебинский источник мы рассмотрели теории анализа удовлетворительного приближения расчетного расхода воздуха к фактическим значениям. Практическая значимость полученных результатов состоит в том, что разработанный способ регулирования расхода воздуха в сети воздуховодов прост, требует несложной работы.

Ключевые слова: *Карьеры, взрывные работы, детонаторы, шахтный заряд, шахтная взрывоопасность, угольные шахты, пылеобразование,* термогравиметрия, термогравиметрическая кривая, сжатый воздух, компрессоры, энергоэффективность, контроль расхода воздуха.

Introduction

The development of coal mines is accompanied by the intensive formation of dust particles and their release into the atmosphere. Airborne dust is transported long distances and accumulates both inside and outside excavations, causing not only disruption. in mines, dust exceeding the limit values also occurs under working conditions - the lower concentration limits of fire propagation should be taken into account. An additional factor is created in coal mines - it is necessary to identify limited areas that ensure the explosion and spread of coal dust. The conditional occurrence of a dust explosion is a dangerous process. Thus, if dust explosions are not reported during opencast mining, many coal-mining countries, including several mines, have experienced significant dust emissions with coal dust explosions. Underground dust control and a large amount of data and research are available to assess and reduce the risk of dust-methane-air explosions and associated worker injuries in open pit coal mining. This is a mandatory regulatory requirement to ensure the dust and explosion-proof condition of mining operations, which is achieved by neutralizing explosive properties during coal mining. In many coal-mining countries, the main methods of dust and blast protection are rock dusting processes based on rock protection or the

use of non-combustible rock dust. Technical specifications" limestone (dolomite) - based on substances with the main chemical formula CaCO3. In coal mines, a type of stone dust with hydrophobic additives - stone hydrophobic is used. In mines engaged in intensive coal mining, There are several stages of stone powder application. After tunneling the main 10-20 m deposits, rock placement is carried out on the surface, and then "secondary" and "fine reactive" rocks are dusted during the mining process. Dusting of especially fine reactive rocks was one of the first in Australian coal mines. Stone dust cleaning is carried out using various pneumatic and mechanical devices. Practical experience shows that the use of stone dust does not have significant negative effects, and there are several theories related to occupational health. The main components of stone dust (CaCO3 and hydrophobic additives of natural origin) are environmentally safe processes.Existing technologies allow monitoring the parameters of various industrial system objects and displaying them in a mnemonic diagram displayed on the operator's screen. More and more mining enterprises are starting to introduce modern telecommunication solutions and technologies that significantly reduce the probability of production errors and optimize production processes. However, there are no existing approaches for real-time monitoring of the energy efficiency of compressed air production and distribution systems. In most cases, the only indication of technical or operational problems that characterize compressed air systems is an increase in the power consumption of the compressor station. An increase in energy consumption not only increases the efficiency of compressor devices and causes technical problems, this process also occurs with uncontrolled air flows. Therefore, it is necessary to use a system that includes real-time mode and implement key technical parameters, waste compressed air detection procedures and rapid monitoring, which will be effective in implementing a warning system to manage the elimination of the causes of air emissions. in mining enterprises. It is necessary to consider the technical aspect of improving the energy efficiency of compressed air production and the introduction of distribution systems in mining enterprises. It is customary to divide compressed air systems into two parts: production and compressed air distribution processes. The first part includes the compressor units themselves, air filters, air and collectors, dryers, etc. The second part includes control valves, distribution air ducts and compressed air equipment and process equipment. The second part usually represents the external network of the compressor unit. . The one on the outside is called an external overturn. If the mine or part of it is mined by one quarry called the career field. Planned quarry area and the geometric form describing the dimensions of the density is its volume It is considered retired covers the stones. industrial site and other production border where devices are located. i.e. the pit of the quarry enters. At the moment, steps are being taken inside the quarry the assembly is called the working area of the car. Work area upper and lower steps of the quarry where the work is being carried out lower horizontal fields (by time) characters. Along the entire length of the front, the quarry is defined by mining operations steps taken from the sum of the length of the mine front Just transport it to start a new level ensure arrival and work front suitable for the workplace should be created. There is one step in the book above the first step a transport link that carries out mass transportation. A new step should be opened for deployment. that is, from the surface of the earth or especially from the upper rung to the lower rung It is necessary to transfer (open) mines. In most cases, these are the same connects points located at different heights (if one step is opened, the height difference will be one step

equal to the height). so is the target slope (i). Opening seams are trapezoidal or triangular in cross section will have a look and according to capital moat and half called a trench. To create an initial work queue in the opened step (cutting stage) trapezoid (triangle) of soldering iron. Length and cross-sectional dimensions are very different making horizontal mining slabs - trench cutting (half trench) or part with a single measurement system of length and width you have to go through the abyss. The last depth is the digging of piles, which are inclined and vertical production capacity of the quarry, its area dimensions. the total volume of mined mine mass is determined. The final depth for horizontal and vertical piles is natural conditions determined by and during the entire mining period of the quarry little changes. The ultimate depth is during career planning installed. Elongation and transverse direction of the pile on the surface of the earth according to the indicators of the quarry, the dimensions of the heap, i.e the dimensions of the bottom of the pit, its depth and the slope angle of its side determined by. They can be set as a graphical representation or analytically. The shape of the quarry in the plan is often oval. The branching of the network of air ducts in mining enterprises and the large number of consumers of compressed air require strict consideration of the losses that occur during transportation. The available technical means allow control of the main parameters and are considered as energy carriers at all stages of its movement. However, their widespread use is limited by their high cost and the need for additional technical costs. In some cases, the use of special software is required as part of the necessary functional tasks. In our opinion, in such conditions, methods based on real-time monitoring of the main parameters of the energy carrier, allowing monitoring of air flows in mines and taking into account the factors will appear. This process is more suitable for mining companies. Timely detection of air leaks significantly reduces harmful substances and prevents losses and unnecessary costs in compressed air systems. The design of compressor stations and the calculation of air duct networks for stationary compressed design operating modes of compressed air consumers do not cause great difficulties. The main function of the compressor unit is to supply air and the end user with the appropriate process parameters, including pressure, flow and air. Important parameters of the external network of the compressor unit are the length, diameters of the pipes and the presence of local resistance. The selection of these parameters in the appropriate calculations and subsequent processes allows to minimize losses and use the least compressor machines and increase energy efficiency and energy efficiency.

Conclusion

Mines must have a fully developed ventilation system. One of the methods of technical implementation of effective management of compressed air flow networks is software-hardware monitoring of air flows, which consists of real-time monitoring based on the network. A mathematical model is formed that takes into account the characteristics and availability of air networks. The presence of pressure value indicators at the control points of the network makes it possible to determine the air flows in the network, and networks are formed according to the calculation method. In the example of the Tebin spring mine, the calculated parameters of the experimental research conducted on the network of air pipes deviated from the actual values of the air flow by no more than 9 percent. The implementation of this system allows to reduce the electric energy consumption of drivers in developed countries, where the precise management of energy service, compressor units of mines equal to 4000 kWh per year. The software of this method allows

real-time monitoring of the air duct network. Various processes such as mining and loading and transportation of rocks are carried out in mining enterprises.

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