: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-
5 ResearchBib IF: 8.848 / 2024

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-8

INCREASE THE SPEED OF DRILLING BY CHOOSING DRILLING MACHINES WITH HIGH EFFICIENCY IN THE CONDITIONS OF ANGRIND CUTTING

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Annotation: This scientific article will be devoted to the analysis of some methods and methods of increasing the drilling speed using high-performance drilling machines in Angren cross section and improving the drilling efficiency of mining drilling machines, which are practical and productive today.

The main scientific and practical results of the research are as follows:

reasonable technological modes of technical parameters of drilling machines were determined; depending on the speed of rotation of the drilling rig during drilling wells, laws of changes in production time and technical parameters were established.

Keywords: mining, drilling, machines.

INTRODUCTION

The basis of the resource base of the republic's coal industry is "Angren" lignite and two large - "Shargun" and "Boysun" coal mines.

It should be noted that 85% of the coal mined in Uzbekistan corresponds to the section of the "Angren" coal mine. The analysis of indicators describing the technical condition and performance of drilling equipment during its service life showed the need to systematize and clarify the formulas for improving the rock drilling process.

In this regard, the purpose of this research is to study the drilling machines used in the Angren coal mine section and to calculate the performance indicators and rational types of drilling machines for drilling wells to increase the cutting intensity. In this regard, study and justification of reasonable types of drilling machines and their parameters to increase drilling intensity.

Researches and studies will solve the actual scientific problem of optimizing drilling parameters during their working life, which will allow to determine the periods of rational use of drills, which are necessary for the development of the theory and practice of three-cornered drills.

The coal industry of Uzbekistan has a 72-year history.

Industrial coal mining has been carried out here since January 1948, when the cutting was completed. And the mine itself was discovered by geologists in the thirties of the 20th century - on the right bank of the Angren River, on the border between plains and mountains. That's why "Angren" is the name of the section.

This area is unique in its own way. The raw materials of local lignite cut and other cuts are not the same. Another important advantage of the cut is the raw material produced - kaolin. The kaolin mine is located in front of the coal mine.

Thus, in one year, specialists will mine 1 million tons of kaolin, in addition to coal, and this will cover the country's needs for this sedimentary mineral.

All the coal mined here is suitable only for the needs of Uzbekistan. For now, the company is on the way to meet the country's solid fuel needs. According to estimates, the republic needs 6 million tons of coal every year. In 2020, "Angren" delivered 3 million 700 thousand tons of coal. But the fact

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is that an increase in the volume of production always leads to an increase in the volume of opening work, and this is a huge amount of time and resources. Therefore, by 2021, the management of "Uzbekkomir" JSC planned to extract 4 million 500 thousand tons of coal. Year-on-year indicators increase and, according to the plan, the export of 6 million tons of coal shows that this indicator will take three years. [1,2].

The relevance of the work. One of the main links of the technological process in open-pit mining enterprises is the passage of explosive wells by mining machines, which makes up 30% of the total complexity of mining operations. It is not always possible to achieve optimal and technical operating modes of modern drilling machines. One of the reasons for this is the highly intensive longitudinal and transverse vibrations of the drill rig and the machine as a whole, which occur when drilling hard and fractured rocks.

Drilling of wells is carried out not only in the mining industry. Oil and gas and construction companies are conducting large-scale drilling operations. Currently, there are many constructive solutions for creating various drilling equipment. At the same time, in open and underground mines, the main program is carried out in rotary mine drilling machines.

LITERATURE ANALYSIS AND METHODOLOGY

The coal mine area is bordered by the Chotkal ridge from the north-west, and the Chetsuv, Aktash, Dukent and Karabog streams cross the mountainside.

The explosiveness of the coal mined in the Angren coal mine and the covering rocks belong to the second and third categories. In this case, the coating requires the use of crushing and blasting during mining. Hardness of sex prof. According to the M.M. Protodyakonov scale, the crushing of the rock is 69% of the total volume at 3-5, and at 5-7, it is 31%. Pre-softening is not required when the crushing is around 4% compared to the total volume. SBR-160 and 2SBSH-200 machines are used for blast drilling at the Angren coal mine.

Mining operations at the Angren coal mine are carried out in the "Yukori" and "Kalin" complexes. 61% of the mined coal belongs to the "Thick" complex, and 39% to the "High" complex. In mining, the costs for drilling a 1 m well were studied, taking into account the exact type and structure of the dolot, the size of the dolot, the geological location of the mine, the structure of the layer, the technical drilling capacity of the drilling machine [5]. When drilling a mine with drilling machines, it is planned and analyzed to select the most effective and efficient ones based on the conditions of the mine by drilling at different speeds [6].

The coal layer is divided into "High" and "Thick" complexes according to the thickness and structure. The average total thickness of the "Yukorigi" complex is 21.6 m, and pure coal layers are found mixed with mine rocks.

Currently, there are many constructive solutions for creating various drilling equipment.

The following types of drilling machines are used in Razrez:

- SBSH (spindle drilling machine),

- SBR (drilling machine with cutting bits),

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THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-4, ISSUE-8

- SBU (percussion-rotary drilling machine),

There are frequently changing rocks with a strength coefficient f = 1-12, in such conditions, replacing the drilling bits with high-speed bits, replacing bits of M, MZ, T and TM types is not very effective. In the mine, T-type drill bits are used. We can see the various failures of the augers used in the mining process. Figure 1.

Figure 1. View of broken teeth.

Broken teeth of shroshok dolotas.

Reasons:

1. very high rotation speed;
2. broken, destroyed rocks during drilling or drilling of wells;
3. Incorrect selection of sharoshka dolotas;
4. intercalation of rocks with the introduction of very strong rocks [7].

The main parameter for the selection of drilling equipment is the rock drilling index determined by the empirical formula of V.V. Rzhevsky

$$P_b = 0{,}07\ (\sigma_{sh} + \sigma_{sd}) + 0{,}7\ g,$$

here σ_{sh} -34-450 MPa, σsd– 0,01-75 mn/m 2- limits of rock strength for compression and shear; g-stone density, t / m^3.

Rocks with mechanical drilling methods are divided into five classes according to the value of the P_b indicator, each of which includes five categories:

I class-light (P_b = 1÷5); Class II-medium drilling (P_b = 5,1÷10); Class III-difficult (P_b = 10,1÷15); Class IV - very difficult (P_b = 15,1÷20); Class V - very difficult (P_b = 20,1÷25);

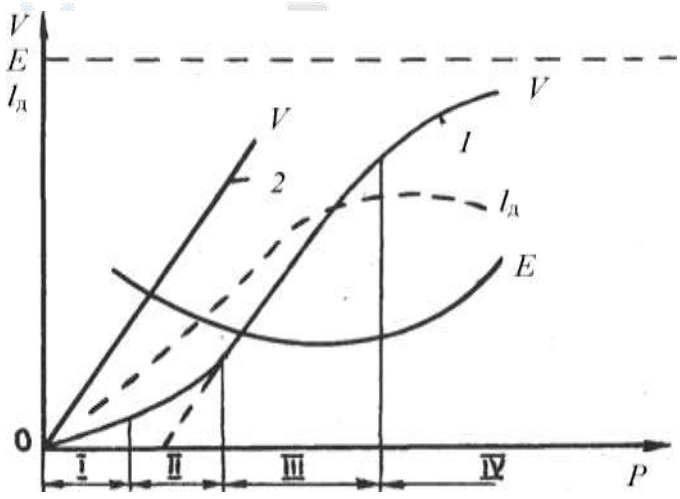

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Figure 2. Changing the drilling speed v- depends on the specific energy density of fragmentation and the durability of the dolot ld p; 1- for dolots with a significant impact area of teeth (knives) with hard rock; 2. For a perfectly sharp chisel in soft rock.

For sharp bits, the change in drilling speed with increasing impact force is represented by a s-shaped curve with 4 characteristic stages (zones) of the development process and tends to stabilize (saturation) with an infinite increase in load. . Zones I and III are conventionally linear.

V(P) where the curve is determined by the ratio between the ore property = P/F specific impact pressure of the dolot and the impact strength of the ore rock.

The conditions of rock crushing in selected areas are mathematically written as follows:

$$\text{I. } \frac{P}{F_К} \ll P_k \qquad \text{II.} \frac{P}{F_К} \leq P_k \qquad \text{III.} \frac{P}{F_К} \gg P_k \qquad \text{IV} \frac{P}{F_К} \geq P_k$$

here: $F_К$- impact area with the working part of the dolot; P_k- impact power of stone; $P/F_К$– specific impact pressure of the dowel on the transmission rod, $P / F_К$= ore.

In the i-zone, which is called the surface fracture area, the p-longitudinal force is not enough for the tooth to penetrate or crush the stone, so the surface layer is crushed as a result of the impact of the awl surface on the stone, and the displaced stone grains are separated. The decay rate increases approximately linearly.

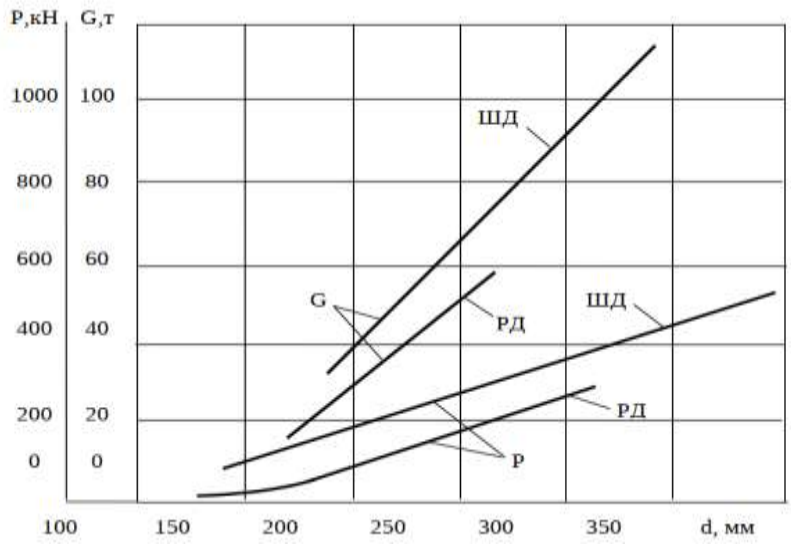

Fig. 3. The mass of the drilling machines and the variation of the forces in the direction of the intended maximum axis.

Experimentally, the possibility of continuous integral evaluation of the durability of the drilled rocks in industrial conditions directly on the drilling machine is related to the impact strength, power coefficient and other properties of the rocks in accordance with the technical parameters of the process. liq. Derived an equation for a specific drilling rig [3,4,8,9,10].

$$P_{us} = [P_M + f \cdot (V - V_0) \cdot \mu \cdot f_К]$$

here: Pus - the force in the direction of the axis being set; f- strength coefficient of rocks; PM, μ, fK, V -constants characterizing the machine structure and the "drilling device-mount array" system.

The choice of drilling method is primarily determined by the hardness and abrasiveness of the rock and ultimately the cost of drilling. At the same time, the rate of breaking rocks (drilling speed or

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the depth of rock crushing in one rotation of the bit) depends on the impact force in the bit. [11,12,13,14].

RESULTS. As a result of the research, the following principles of control of drilling modes of technological wells by drilling machines were formed:

1. The control system should provide for the regulation of three main parameters that determine the mode of the drilling process: drilling speed; power to deliver the drilling rig to the bottom of the well; the consumption of compressed air necessary for the extraction of crushed rocks.

2. The control system should be flexible: depending on the changes in the physical and mechanical properties of the rock, the speed of rotation and the power of the drilling rig, as well as the compressed air flow to the well, will be transferred in time and without problems.

3. Rotational speed, impact force and compressed air flow are the main parameters that affect the performance of the well drilling process and the durability of the drilling tool. Regulation of these parameters in the control system of well drilling operating modes should be consistent and interrelated and should be carried out taking into account the changing physical and mechanical properties of rocks.

4. The effective operation of the system management of the drilling machine should be done by creating special drilling tools of the cutting-rotation type, which can be used with less effort.

5. Ensuring the maximum productivity of the well drilling process is achieved by controlling the flow of compressed air supplied to the well, taking into account the speed and drilling equipment, as well as the geological conditions.

6. The flexibility of the well drilling process control system can be provided by completely new technical and technological solutions for creating a mechanism for delivering the drilling device to the bottom of the well, based on the electromagnetic principle of rotation and movement of working bodies.

Currently, there are about 100 dolot and chisel drilling machines working in quarries and cuttings, 80% of them are domestic (UMMC-Rudgormash, Izkhora plant, etc.), 20% are foreign companies (Atlas Kopko, Sandvik, Tamrok, etc.). . Rotary drilling machines are a small number. In recent years, there has been a constant increase in the number of foreign drilling equipment.

Foreign diesel drilling rigs, compared to electric ones, have the following main advantages: they do not depend on the quarry's electrical network, they have increased mobility and productivity, and their hydraulic drive allows for the mechanization of a number of basic drilling processes. Based on this, the number of orders for diesel engine drilling rigs by domestic consumers is increasing significantly.

DISCUSSION. Taking into account the advantages of imported drilling equipment listed above, as well as the working conditions of the operator and the ease of maintenance and repair (much better than domestic analogues), it should be noted that their operating costs are much higher than domestic ones. should be noted.

Figures 3 and 4 show the structure of drilling costs by domestic and foreign drilling rigs, which is consistent with the data of this work..

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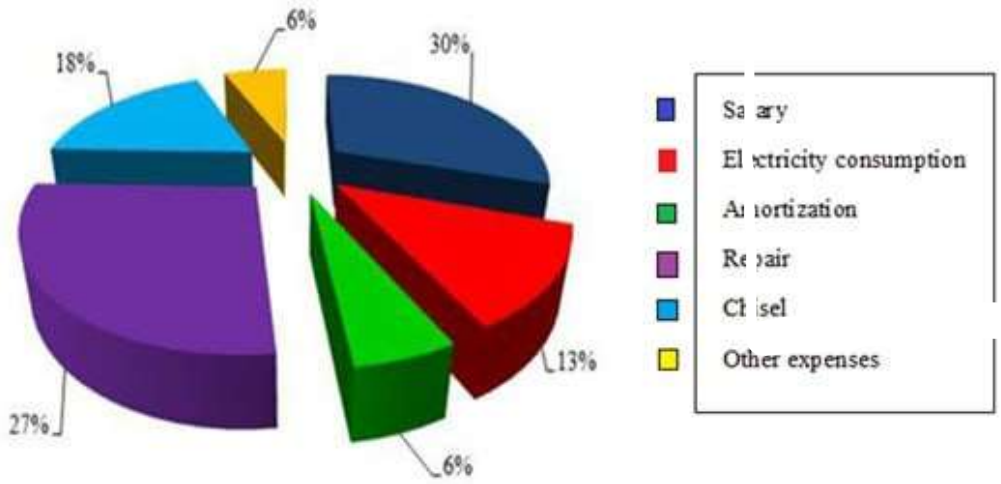

Figure 4 - Structure of drilling costs for SBSH type machines.

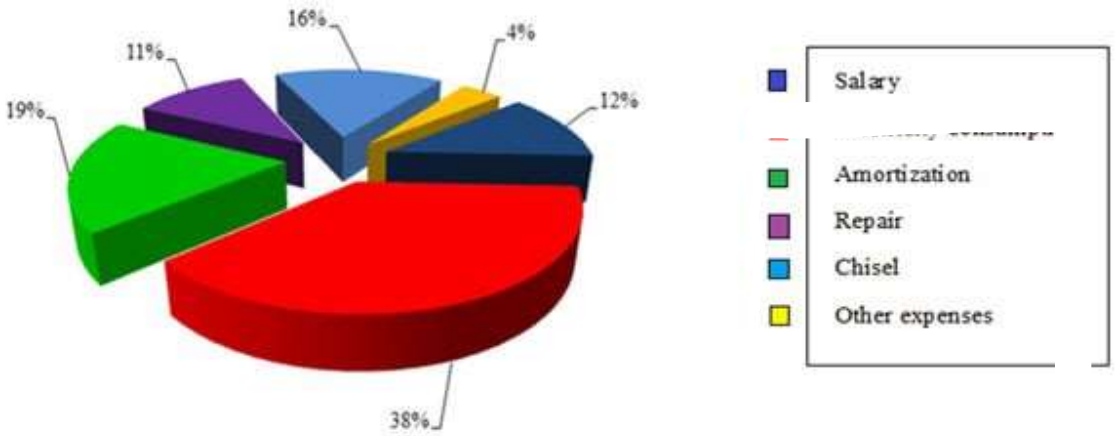

Figure 5 - structure of drilling costs for foreign diesel machines.

Analysis of the data presented in the table. Figures 3 and 4 show that the energy costs of imported drilling equipment are 3 or more times higher than those of domestic equipment. The cost of repairing domestic cars is high, because the car fleet is significantly worn out (wear and tear 60-80% and more), while the cars of Western companies are relatively new and their repair costs are not yet high. [19,17,18,16,15].

CONCLUSION

In summary, it includes the following.

1. Compared to SBSH-250MNA-32 and 5SBSH-200 machines, the use of imported diesel drilling rigs for technological drilling of blast wells can significantly increase the productivity of equipment and personnel.

2. The greatest effect of using mobile equipment with a high speed of auxiliary operations is achieved in the conditions of drilling weak rocks with small explosive blocks or significant distances between working areas.

3. It is advisable to use diesel drilling equipment in enterprises far from short-term electricity systems due to the minimization of personnel infrastructure and maintenance.

4. Mobile diesel equipment opens up great opportunities for solving the problem of intensification of technological processes, especially in narrow mining conditions.

5. The economic performance of imported equipment is comparable to that of domestic drilling rigs in terms of unit costs, while providing a high level of productivity.

6. In the economic conditions of the country in general, and in particular, imported hydraulic drilling rigs with an electric drive can be very competitive.

7. An autonomous shock-transmitting system can be implemented in hydraulic drilling rigs with a main electric drive, which has a significant economic impact in most operating conditions. This direction is promising for domestic and foreign manufacturers of drilling equipment.

The flexibility of the well drilling process control system can be provided by completely new technical and technological solutions to create a mechanism for delivering the drilling device to the bottom of the well, based on the electromagnetic principle of rotation and movement of working bodies.

REFERENCES:

1. Decree of the President of the Republic of Uzbekistan. Presidential Decree No. PF-3454 "On Macroeconomic Indicators and State Budget Parameters of the Republic of Uzbekistan for 2018". Tashkent, December 29, 2017. Appendix 3. (Legal documents of the Republic of Uzbekistan collection, 2017, No. 6, Article 70)
2. 24.06.2021 of the President of the Republic of Uzbekistan. Decision No. PQ-5159 on "Additional measures for the development of mining and metallurgical industry and related industries".
3. Воронов, Ю. Е. Совершенствование бурового оборудования разрезов / Ю. Е. Воронов. – Кемерово: Кузбасс. гос. ун-т, 1998. – 192 с.
4. Справочник. Открытые горные работы / К. Н. Трубецкой [и др.]. – М.: Горное бюро, 1994. – 590 с.
5. Рахимов,А.А., Эшонкулов, К.Э., & Жураев, Ш.Н. (2022). Обоснование повышение скорости бурения эффективности от применения безопорных долот. *Вестник науки и образования*, (5-2 (125)), 5-7.
6. Рахимов, А., эшонкулов, К., & Жураев, Ш. Вестник науки и образования. *Вестник науки и образования Учредители: Олимп*, 17-20.
7. Маткасимова, Ш.Ш.К., Эшонкулов, К.Э.., Тогаев, А.С.У., & Пардаев, А. Б. (2022). Технологические аспекты процесса бурения скважин трехшарошечными долотами в условиях разреза «АНГРЕНСКИЙ». *Вестник науки и образования*, (10-1 (130)), 38-45.
8. Рузманов,Ф. И., & Ашуров, Б. Н. (2019). Увеличение механической скорости при бурении скважин. *Редакционная коллегия*, 73.

9. Pardayev,A.B. (2022). Improving the productivity of well drilling machines. *Confrencea*, *6*(6), 136-139.

10. Bekmurodovich,P.A., & Akbarkhodjiyevich,R.A. (2022). Improving drilling speed while using high-efficiency drilling machines in quarry conditions. *Confrencea*, *1*(1).

11. Техника, технология и опыт бурения скважин на карьерах / под ред. В. А. Перетолчина. – М.: Недра, 1993. – 286 с.

12. Подэрни, Р. Ю. Основные концепции создания бурового станка нового технического уровня / Р. Ю. Пдэрни, М. Р. Хромой // Горный журнал. – 1994. – № 3. – С. 35-39.

13. Иванов, К. И. Техника бурения при разработке месторождений полезных ископаемых / К. И. Иванов, В. А. Латышев, В. Д. Андреев. – 3-е изд., перераб. и доп. – М.: Недра, 1987. – 272 с.

14. Гилев А. В. Научно-технические основы созданияспециализированных буровых инструментов и технологий их применения накарьерах: Дис. … д-ра техн. наук/ А. В. Гилёв. – Красноярск, 2005. – 385 с.

15. Шигин А. О. Методология проектирования адаптивныхвращательно-подающих органов буровых станков и технологий ихприменения в сложноструктурных породных массивах [Текст]:Дис. ... д-ра

техн. наук/ А. О. Шигин– Красноярск., 2015. – 355 с.

16. Решетняк С. П. Основные направления развития техники для бурения взрывных скважин на открытых горных работах / С. П. Решетняк, Н. И. Паладеева // Горная техника. – 2012 – № 1. С. 2 – 8.

17. Гилёв А. В. Повышение эффективности эксплуатации буровой техники на горных предприятиях/ А. В. Гилёв, А. О. Шигин и [др.]. - Красноярск. Сиб. Федер. ун-т, 2013. - 372 с.

18. Катанов Б.А. Карьерные буровые станки / Б.А. Катанов // Вестник КузГТУ. - 2007. - №5. - С. 5-8.

19. Pardayev A.B. & Rakhimov A.A.. Improving drilling speed while using high-efficiency drilling machines in quarry conditions. International Conference on Advance Research in Humanities,Sciences and Education, 2022; Vol.1 №1 -10.05.2022. [Электронный ресурс]. Режим доступа: (дата обращения: 18.11.2022).https://confrencea.org/index.php/confrenceas/article/view/18/15