JUSTIFICATION OF THE DISTANCE BETWEEN SHORT TOPS ON THE WORKING HORIZONS OF THE MINE WHEN USING LOADING AND DELIVERY MACHINES

Khakimov Shadiboy Ikmatullayevich
Navoi State University of Mining and Technologies
Associate Professor of the Department of Mining

Qobilov Olimjon Sirojovich
Navoi State University of Mining and Technologies
Doctoral student of the Department of Mining
E-mail: olimjonkobilov@gmail.com

Abruyev Samandar Shodmon o'g'li
Navoi State University of Mining and Technologies
13a-21 KI (OKI) group student

Abstract: *To the article the worked out is driven on the basis ofresearches, methodology of choice of optimal distancebetween crossheadings in mine horizon at development ofhigh-dipping tendon deposits of different power with the useof self-propelled technique and offered graphic results forengineering calculations.*

Keywords: *mining-and-geological terms, development of ore withearthing up, transport and deliverable making, crossheading, distance deliveries and transporting, specific expenses.*

SHAXTA ISHCHI GORIZONTIDA YUKLAB-YETKAZUVCHI MASHINALARNI QO'LLAGANDA QISQA KVERSHLAGLAR ORASIDAGI MASOFANI ASOSLASH

Annotatsiya: *maqolada tik-qiya joylashgan, har xil qalinlikdagi tomirli konlarni yer osti usulida qazib olish ishlarida yuklab yetkazuvchi mashinalar qo'llanilganda, shaxta gorizontida ma'dan tanalariga yo'lak ochish uchun o'tiladigan kvershlaglar orasidagi samarador masofalarni aniqlash bo'yicha yaratilgan uslub va olingan hisob kitob natijalarini jadval holatiga keltirilgan va muxandislik ishlarida qo'llash uchun tavsiya etilgan.*

Kalit so'zlar: *kon geologik sharoit, shaxtagorizonti, qazilmani magazinlarda uyumlab qazish, qavatchalardan maydalab qazish, to'ldiruvchi materiiallar bilan bo'shagan maydonni to'ldirib qazish, transport ва eltuvchi lahimlar,kvershlag, tashish va eltish masofalari, solishtirma xarajatlar.*

The basis of the applied technology for excavation of steeply dipping veins is the mining system – with stacking and sublevel breaking of ore, as well as mining systems with goaf backfilling [1].

One of the main directions for improving the development of vein deposits is the use of self-propelled mining and transport equipment, which causes [2-4] to change the traditional technological schemes for opening and preparing horizons. Economic efficiency of mining work in this case depends on the parameters of technological schemes and requires a reasonable choice. So, in particular, reducing the distance between the so-called "short crosscuts" used to access the vein ore bodies (Fig. 1.) will lead to a decrease in the ore delivery distance, but at the same time, the volumes will also increase due to the cost of mining operations [5-14].

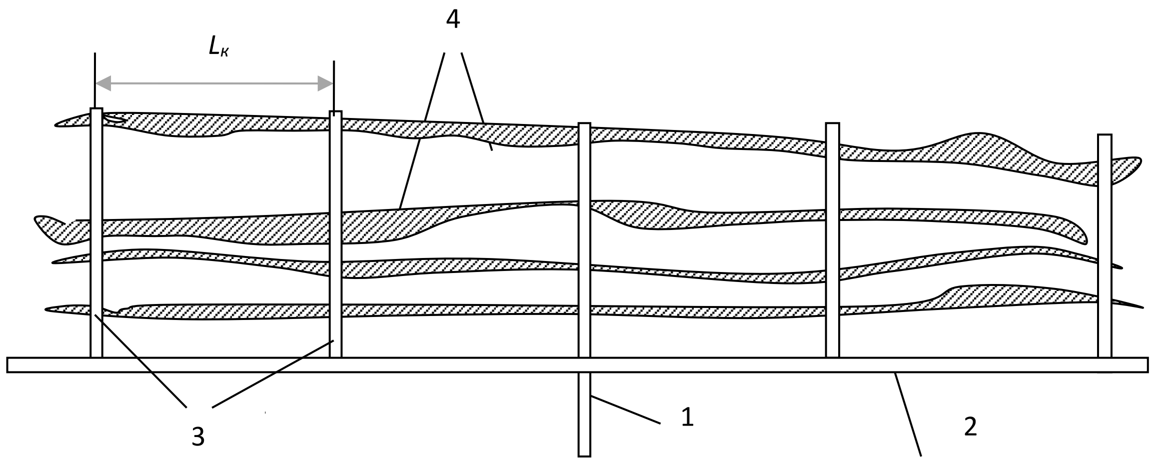

Fig. 1. Scheme of the working horizon for choosing the distance between short crosscuts and delivery of ore: L_{to} – the distance between the crosscuts, m; 1 – "capital crosscut"; 2 – transport and delivery drift; 5 – short crosscuts; 6 – ore bodies.

The rational distance between the crosscuts must be determined by searching for the minimum sum of the reduced unit costs for the sinking of the crosscut and the delivery of ore according to the expression:

$$\sum Z_{uc} = Z_{uc.cr} + Z_{uc.d} \rightarrow \min \qquad (1)$$

where Z_{uccr} – unit costs for driving a short crosscut, sum/m

$$Z_{uc.cr} = \frac{S_c * I_{cr} * C_s}{m * h_f * L_{cr} * \gamma} \qquad (2)$$

where S_c – cross sections, m^2;

I_{cr} – crosscut length, m;

C_s – the cost of sinking $1m^3$ crosscut, sum/m^3;

m – is the thickness of the ore, m;

h_f – floor height, m;

L_{cr} – distances between crosscuts, m;

γ – ore density, t/m^3;

$$\mathbf{Z_{uc.d} = Z_{d.r} + Z_{rsm} + Z_{z.p} + Z_{a.s}} \quad (3)$$

Where, $Z_{d.r}$ – the cost of depreciation and restoration of load-dump machines, is determined by the formula, sum/ton;

$$\mathbf{Z_{d.r}} = \frac{S_{lm} * n_a + S_{lm} * p_{v.r}}{P_{lm}} \quad (4)$$

Where S_{lm} – Cost of loading and hauling machines, sums;

n_a – annual rate of depreciation deductions, more units;

$p_{v.r}$ – the annual norm for repair and restoration, more than a unit;

P_{lm} – annual productivity of load-and-delivery machines, tons/year;

$$\mathbf{P_{lm}} = \frac{60 * q_{lm} * T_{dsh} * K_u * N_{nm}}{T_{ft}} \quad (5)$$

Where q_{lm} – load capacity of LHM, tn;

T_{dsh} – is the duration of the shift, hour;

k_u – coefficient of use of time in a shift;

N_{nm} – the number of working shifts LHM, shift;

T_{ft} – flight time LHM, min;

$$\mathbf{T_{ft} = t_{ma} + t_{sd} + t_u + t_{eo} + t_{aw}} \quad (6)$$

Where t_{ma}, t_{sd}, t_u, t_{eo}, t_{aw} – respectively, the time of ore mass accumulation, the time of movement in cargo and strike directions, the time of unloading and the time for exchange operations when moving along workings, min;

C_{fl} – the cost of fuel and lubricants is determined, sum/ton;

$$\mathbf{C_{fl}} = \frac{q_{mh} * T_{dsh} * C_f + 0{,}03(q_{mh} * T_{см} * C_т)}{П_{пдм}} \quad ; \quad (7)$$

Where is the fuel q_{mh} – consumption per 1 moto hour work, kg;

C_f – is the cost of fuel, amounts/kg;

C_{wd} – wage costs are determined by:

$$\mathbf{C_{wd}} = \frac{A_{so} * N_{nm}}{P_{lm}} \; ; \quad (8)$$

A_{so} – the average shift salary of the operator of the LHM; sum/shift;

C_{td} – the cost of tires is determined, sum/ton;

$$\mathbf{C_{td}} = (q_{qt} * c_{qt}); \quad (9)$$

where q_{qt} – is the consumption of tires, set;

$$\mathbf{q_{qt}} = \frac{P_{lm} * L_{кв.}}{q_{lm} * 1000 * p_{st}} \quad (10)$$

where p_{st} – mileage set of tires;

c_{qt} – cost of tires, sum/set;

Thus, a methodology has been developed based on a technical and economic analysis of the change in the specific reduced costs per tons of ore transported through the crosscut, depending on the change in the distance between the crosscuts, in conjunction with other parameters of the development system used.

In accordance with this methodology using the Microsoft program Excel calculations were made and graphs were built (Fig. 2).

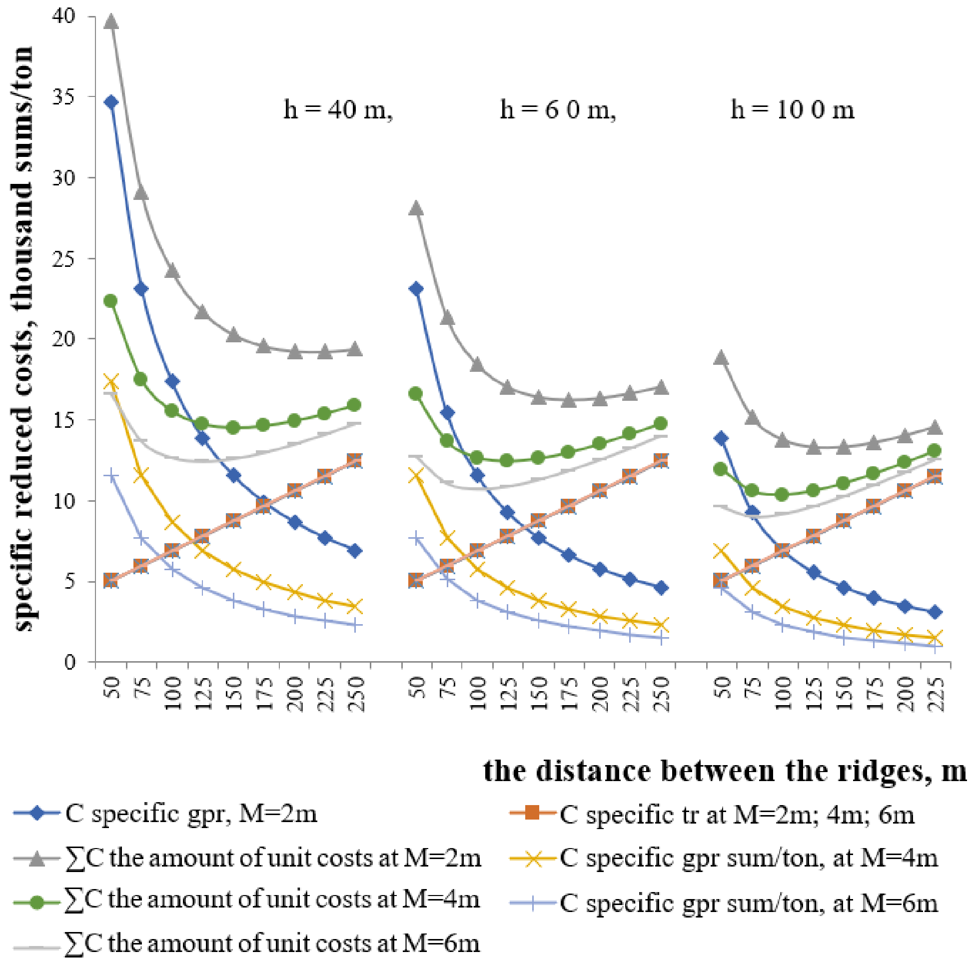

Fig.2. Graph of the change in the specific reduced costs for crosscutting and delivery of ore mass depending on the change in the distance between the crosscuts, the total thickness of the ore bodies and the height of the floor.

From the graphs presented in Fig.2. It can be seen that the specific costs for different values of the distance between the crosscuts change in a parabolic dependence, due to a change in the height of the floor and the thickness of the ore. At the same time, specific costs significantly decrease with an increase in the total thickness of ore bodies and are insignificant with an increase in the height of the store.

With a store height of 40-100m, with an increase in the thickness of ore bodies from 2 to 6m, the distance between crosscuts (at which costs are minimal) decreases by 200-125m and 125-75m, respectively.

It should be noted that, in the context of constant changes in the cost of expensive equipment, materials, fuels and lubricants, the cost of driving mine workings and other indicators, the results obtained in this work may differ in a positive or negative direction and are subject to adjustment if necessary. The developed graphic-analytical technique with the use of a computer program allows quickly solving this problem.

REFERENCES

1. Hakimov Sh.I., Qobilov O.S., Abruyev S.Sh., «Murakkab kon-geologik sharoitda madanni nimqavatlardan maydalab tushirish tizimi samaradorligini oshirih,» III-Xalqaro konferensiya materiallari, Navoiy, 2022.
2. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., & Ашуралиев У.Т. Обоснование количества перегрузочных узлов в рабочих горизонтах шахты при использовании подземного транспорта и погрузочно-доставочных машин. In Ф79 Форум гірників–2019: матеріали міжнар. конф., 26–27 вересня 2019 р., м. Дніпро: Журфонд, 2019–379 с. (p. 291)
3. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., Определение минимальная длина и ширина карьерного поля при разработке горизонтальных пластовых месторождений, № 3, 34-38., 2020.
4. Таджиев Ш.Т., Кобилов О.С., Ермекбаев У.Б., & Ашуралиев У.Т. Исследование особенностей технологии разработки жильных месторождений кызыкумского региона подземным способом с использованием самоходных комплексов. In Ф79 Форум гірників–2019: матеріали міжнар. конф., 26–27 вересня 2019 р., м. Дніпро: Журфонд, 2019–379 с. (p. 32).
5. Раимжанов Б.Р., Хакимов Ш.И., Хамзаев С.А. Sublevel Mining System with Artificial Pillars Made of a Hardening Backfills for The Development of Veins in Difficult Geomechanical Conditions //Texas Journal of Multidisciplinary Studies. – Vol. 03. – Issue 12-12. – 2021. – P.98-103. https://zienjournals.com /index.php /tjm/article/view/394
6. Раимжанов Б.Р., Хакимов Ш.И., Хамзаев С.А., Равшанов А.А. Технологическая схема подэтажной системы разработки с искусственными целиками из твердеющих смесей для сложных геомеханических условий //Горный вестник Узбекистана. – Навои, 2022. – 1(88), – С. 16-20.
7. Хакимов Ш.И., Таджиев Ш.Т., Кобилов О.С., Гиязов О.М. Обоснование высоты этажа при разработке крутопадающих жильных месторождений //Горный вестник Узбекистана №1 (80) 2020 г. – с. 7-9.
8. Хакимов Ш.И., Кобилов О.С., Тошназаров А.Х., Суннатов С., Пулатов Д.Ш. Оценка возможности увеличения высоты этажа при разработке крутопадающих жильных месторождений // Материалы международной

научно-технической конференции на тему: «Перспективы инновационного развития горно-металлургического комплекса». – Навои, 2018. – С. 65.

9. Хакимов Ш.И., Кобилов О.С. Повышение эффективности систем подэтажного обрушения в сложных горно-геологических условиях // «Материалы Международной научно-практической конференции «Интеграция науки, образования и производства – залог прогресса и процветания», посвященной 5-летию основания Навоийского отделения Академии наук Республики Узбекистан», Том I: 9-10 июня 2022. – С. 356.
10. Хакимов Ш.И., Кобилов О.С. Новая технологическая решения совершенствования систем разработки с подэтажной отбойкой руды в сложных горно-геологических условиях // Innovations in technology and science education. – Volume 1. – Issue 1. 2022. – С. 130.
11. Таджиев Ш.Т., et al. "Подработка массива горных пород и подготовительных выработок при разработке пластов подземным способом." Стратегия развития геологического исследования недр: настоящее и будущее (к 100-летию МГРИ-РГГРУ). 2018..
12. Xakimov Shadiboy Ikmatullayevich, Qobilov Olimjon Sirojovich, & Abruyev Samandar Shodmon o‘g‘li. (2023). Murakkab kon-geologik sharoitdagi tog‘ jinslar massivi holatini boshqarishda qotuvchi to‘lg‘azmalarni qo‘llash samaradorligini asoslash. Innovative development in educational activities, 2(2), 124–133. https://doi.org/10.5281/zenodo.7583985
13. Xakimov Shadiboy Ikmatullayevich, Qobilov Olimjon Sirojovich, & Abruyev Samandar Shodmon o‘g‘li. (2023). Tomirsimon konlarni sun’iy butunliklarni qo‘llash bilan qazib olish texnologik sxemalarining parametrlari. Innovative development in educational activities, 2(3), 95–101. https://doi.org/10.5281/zenodo.7644430
14. Назаров Заир Садикович, Ермекбаев Умиджон Бобакулович, & Гиязов Отабек Мухитдинович. Разработка программы и аппарата выполнения исследований по обоснованию параметров и показателей разработки сложноструктурных месторождений фосфоритофых руд. Innovative Development in Educational Activities, 2(3), 29–35. Retrieved from https://openidea.uz/index.php/idea/article/view/738