

IN THE PROCESS OF EXPLOITATION OF OPEN MINES ADVANTAGES OF USING EXCAVATORS

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Abstract: In the article, the efficiency indicators of excavators used in open-pit mining processes proposed by the author were compared, and the indicators of efficiency in the mine when excavators performing cyclic operations and dump trucks worked as a single excavator dump truck complex. This procedure significantly increases the probability of completing the daily plan. This transportation of rock mass due to the redistribution of dump trucks between mining and loading excavators cause the failure of one or more aggregates of mining and processing equipment. The reliability of excavator-dumper complexes is evaluated in three stages: initial data collection, i.e mathematical modeling of the operation of the excavator-dumper complex and calculation of efficiency indicators based on the system. When solving the problems of optimizing the distribution between the excavators widely used in the mine and ensuring the maximum productivity of the excavator-dumper complex, the research processes about the reliability assessment of the mining and exploitation processes based on the probability of fulfilling the daily plan for the transportation of the rock mass are cited. The proposed method is implemented as part of a computer program and allows to automate the operational management of the process of transportation of rock and the mass of the mined area in the quarry with the help of a mobile application. Currently, in the Republic of Uzbekistan, mines can be used in any quarries operated by road transport, regardless of the type of mineral extracted. This mining method, loading scheme, capacity of the park of digging and loading mechanisms will consist of controlled dump trucks.

Keywords: Excavators in the open pit, dump trucks, reliability of the transportation process in the open pit, system diagrams in the mine, mine mass, optimal mine plan, scheme of loading processes

Introduction

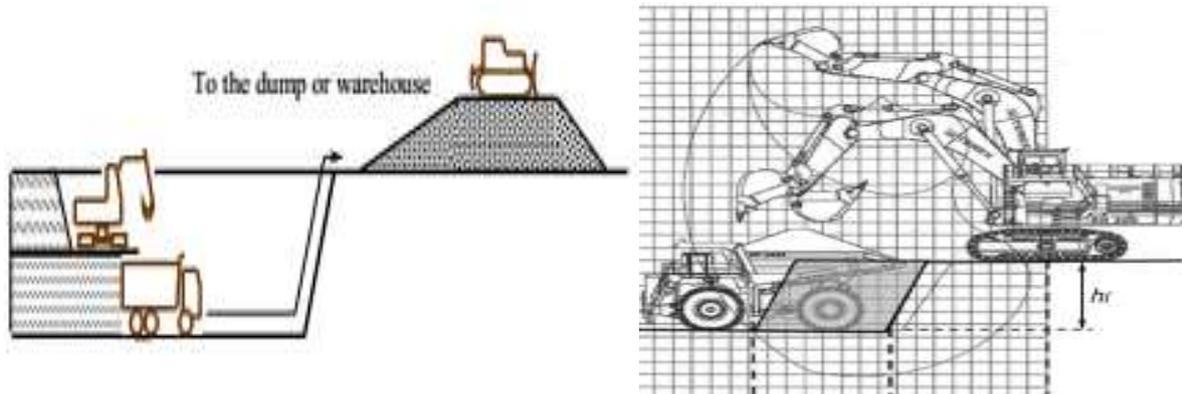
The volume of mine mass transportation in open pit mining operations per day is determined by combined methods, including the number of fully operational excavators and dump trucks, indicating the mining efficiency of the mine. Mainly remote mining in mines transportation of overburden and minerals to a landfill or warehouse, respectively, weather conditions affecting the condition of benches and haul roads, etc., are integrally related. Mining companies often have transportation plans in the event that mining is disrupted due to malfunctions in transport mechanisms, the mining and loading process will cause a stoppage. Unplanned maintenance in mines in such cases mechanisms significantly complicate the planning of mining operations. In mining enterprises, therefore, the only way carrying out the plan of transportation of overburden and minerals - redistribution of mining processes to have the most efficient operation of the excavator dumper complex, it is attached to the dumpers between the existing excavators. Various methods for determining the performance



of excavator-vehicle complexes in continuous and deep mining systems used in mines have been proposed. The instructions for this article are basically in the processes of distribution of dump trucks among excavators, it is important to choose based on the following: it is necessary to study the influence of mining and technical parameters on the work efficiency of the excavator-vehicle complex. Quantitative composition of excavator-vehicle complexes in mining enterprises it is necessary to observe the characteristics and conditions of their use in the quarry. In order to diagnose the technical condition of mining machines and control their operation, it will be necessary to ensure the operation of the loading system scheme, mining and transportation equipment in the mine with modern tools. Equality of volumes of mining and mine mass transportation requires finding the best option for the distribution of dump trucks among excavators. To solve this problem we it will be necessary to use methods of optimization of transportation processes, in particular, it will be necessary to calculate algorithms for determining the shortest distances and optimizing the transportation plan in mining enterprises. Open pit the calculation of the reliability of technical processes and systems depends on several mining processes. It will be necessary to formulate definitions of reliability and failure of rock transport process in the mine, as well as to systematize technical control methods to increase the reliability of transport due to uninterrupted operation. The results of the research are presented in the author's publications, For example, the method of calculating the reliability of the transportation process when using mines structural redundancy processes should be reduced. The level of study of the issue considered in this article in relation to specific tasks was carried out at a much higher level. We carried out research using methods of calculating the productivity of mining and transport equipment in the mines of quarries located in the Republic of Uzbekistan (Muruntau and Tebin Bulak metals), taking into account various indicators. In order to increase the efficiency of technological processes in the conditions of open mining, certain methods of optimization of transport processes are being used. However, the existing methods of mining and loading processes in mines do not fully cover the possibility of using the features of transportation process management in quarries with road transport due to many channels and in most cases. In the mine the issues of increasing the reliability of loading, digging and transportation means should be reconsidered. The task of our research is to develop a methodology for assessing the reliability of excavator road complexes based on the main structural excess distances. This is the solution to the problem automation of operational management of cargo transportation in the quarry by road transport, regardless of mining processes and open pit mining method, loading scheme system, digging and loading capacity will consist of increasing the load-carrying capacity of equipment and working dump trucks. According to the results of the calculation of technical performance indicators in mining processes, shift capacity of each dump truck the highway of the quarry depends on its general productivity. Any possible combination of excavators in the mine is identified for mining and loading processes. These calculations are easily done by a computer systems, as well as their distribution capabilities, were widely used. The option that provides the maximum overall performance will be optimal in all respects. At the next stage, it will be necessary to carry out a quantitative assessment of the reliability of the optimal option. Connection diagram of excavator-dumper elements based on the following considerations. In a quarry, loaders and mining excavators are sources of material flow. The end points of the flow are the waste rock or mined mineral deposit. Waste is it was pushed by bulldozers. In the



absence of a refinery, mined minerals are stored in the same manner. The presence of a processing plant in a mine restricts the flow of ore, coal, or other mined raw materials, and the mined rock in determining a geological mine reserve consists of materials from the quarry sent to the receiving hopper of the crushing line.



Picture 1. Excavator digging and loading height during operation.

In mines, mining and loading excavators, the high voltage loader allows controlled loading through its power system. loads the mined rock into the truck. It's just not practical in terms of reduction loading time, but the power system of excavators also allows you to control the filling factor, which depends on the payload rather than the load capacity of the shovel will also depend on the truck. This makes it possible to consistently achieve fill factors close to 80%. This, in turn, allows operations to close the gap in an ideal scenario, to the maximum productivity of trucks safely and without increasing costs shipping will be possible. Given that the mining and loading system in the mine has a desire to be a truck-filling factor average is 70%, it is important to approach 90%. During boot processes the potential improvement in productivity for the same number of trucks determines the economic performance of this mine. In some cases, it is productivity gains may even require a smaller fleet of trucks. For other operations, increasing the productivity of freight transportation from the mine to the distance that can change the production barriers these additional costs. The use of a wave loader also results in independent operation of shovels and trucks and away from each other, because the voltage loader eliminates the interaction between this equipment. This independence potentially allows for a wide range of shovels and trucks. Excavators mining and loading operations will be available. This creates different types and possibilities.

Conclusion

The urgency of the problem of ensuring the reliability of excavator-dumper complexes in the processes of open mining and loading in mines determines the probabilistic nature of the actual volume of ore mass transported per day in quarries. This indicator is determined by the technical parameters of the mine. Including the number of excavators and dumpers used in the mine trucks, haulage distance respectively overload and warehouse, weather conditions determining the position of the benches and quarries and other factors affect. Available calculation methods the productivity of mining technical and transport equipment in open-pit mines fully ensures the possibility of full use of the features of the mine organization. This determines the choice of the research task - it will consist in the development of a methodology for assessing the reliability of excavator-dumper complexes based on the main distribution. The proposed methodology for evaluating the reliability of excavator-dumper

complexes consists of three stages: solving the problem of optimizing the distribution of dumpers between the processes of collecting preliminary data for mathematical modeling of the complex's operation and comparing the results. Evaluation of processes to ensure maximum productivity of the excavator-dumper complex execution of the daily plan and calculation of his work research has been carried out to reduce the distances for the transport of cochlear mass.

References:

1. O'g'li R. Z. Y., Abdaaliyevna E. Z. 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises. – 2022.
2. Mustapaevich D. K. et al. Underground mine mining systems and technological parameters of mine development //INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429. – 2022. – T. 11. – №. 10. – C. 110-117.
3. Mustapaevich D. K. O'telbayev Azizbek Alisher o'g'li, O'razmatov Jonibek Ikromboy o'g'li, & Mnajatdinov Dastan Mnajatdin o'g'li.(2021). PROPERTIES OF COAL, PROCESSES IN COAL MINING COMPANIES, METHODS OF COAL MINING IN THE WORLD. JournalNX-A Multidisciplinary Peer Reviewed Journal, 7 (10), 231–236.
4. Umirzoqov A. Justification of rational parameters of transshipment points from automobile conveyor to railway transport //Scienceweb academic papers collection. – 2020.
5. Djaksimuratov K. Comprehensive monitoring of surface deformation in underground mining, prevention of mining damage. Modern technologies and their role in mining //Scienceweb academic papers collection. – 2021.
6. Alisher o'g O. A. et al. Conveyor belt structure and mode of operation in mines //Eurasian Journal of Engineering and Technology. – 2022. – T. 11. – C. 72-80.
7. Khayitov O. et al. Calculation and development of a model of the blasting area in mining enterprises //International Bulletin of Engineering and Technology. – 2023. – T. 3. – №. 5. – C. 5-12.
8. Ravshanov Z. 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises //Scienceweb academic papers collection. – 2022.
9. Bekbawlievich S. B. et al. PROSPECTS FOR THE RATIONAL USE OF IRON ORE OF SULTAN UVAYS AT THE TEBINBULAK DEPOSIT //Galaxy International Interdisciplinary Research Journal. – 2021. – T. 9. – №. 12. – C. 609-613.
10. Ravshanov Z. Mining processes of drilling machines //Information about the technological alarm system of drilling machines. – 2022.
11. Ravshanov Z. et al. Evaluation of the strength of rocks in open mining processes in mining enterprises //Science and innovation. – 2023. – T. 2. – №. A4. – C. 96-100.
12. Ravshanov Z. et al. Methods of determining the safety and environmental impact of dust and explosion processes in mining enterprises //International Bulletin of Applied Science and Technology. – 2023. – T. 3. – №. 4. – C. 415-423.
13. Mustapaevich D. K. et al. Underground mine mining systems and technological parameters of mine development //INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429. – 2022. – T. 11. – №. 10. – C. 110-117.

14. Axmet o'g'li M. A. et al. IN GEOLOGICAL AND GEOTECHNICAL PROCESSES IN THE MINE USE OF TECHNOLOGICAL SCANNING EQUIPMENT IN THE UNDERGROUND MINING METHOD //Intent Research Scientific Journal. – 2023. – Т. 2. – №. 1. – С. 20-27.
15. Alisher o'g O. A. et al. MINING TECHNOLOGICAL EQUIPMENT THAT DETERMINES THE SLOPE ANGLES OF THE MINE BY MEANS OF LASER BEAMS. – 2023.
16. Ravshanov Z. Determination of mineral location coordinates in geotechnology and mining enterprises //Scienceweb academic papers collection. – 2023.
17. Djaksimuratov K. Comprehensive monitoring of surface deformation in underground mining, prevention of mining damage. Modern technologies and their role in mining //Scienceweb academic papers collection. – 2021.
18. Хайитов О. Г. и др. Особенности разработки пластового месторождения фосфоритов //Глобус. – 2020. – №. 5 (51). – С. 19-21.
19. Хайитов О., Умирзоков А., Равшанов З. Анализ текущего состояния и пути повышения эффективности разработки нефтегазовых месторождений юго-восточной части бухаро-хивинского региона //Материали конференцій МЦНД. – 2020. – С. 8-11.
20. G'ofurovich K. O. et al. Justification of rational parameters of transshipment points from automobile conveyor to railway transport //World Economics and Finance Bulletin. – 2021. – Т. 1. – №. 1. – С. 20-25.
21. O'g'li R. Z. Y., Abdaaliyevna E. Z. 3D Technological System of Management of Geological Exploration Processes of Mining Enterprises. – 2022.
22. Ravshanov, Z. (2022). MINING PROCESSES OF DRILLING MACHINES. INFORMATION ABOUT THE TECHNOLOGICAL ALARM SYSTEM OF DRILLING MACHINES.
23. Ravshanov, Z. (2023). Coal Mine Design and Explosion Prevention Studies.
24. Ravshanov Z. RESEARCH ON SELECTION AND PERFORMANCE IMPROVEMENT OF BLAST HOLE DRILLING EQUIPMENT //International scientific journal «MODERN SCIENCE AND RESEARCH». – 2023.
25. Ravshanov, Z. (2023). INSTRUCTIONS FOR CREATING A STEP-BY-STEP PIT DESIGN IN MINING ENTERPRISES.
26. Yahyo o'g'li R. Z. et al. INSTRUCTIONS FOR CREATING A STEP-BY-STEP PIT DESIGN IN MINING ENTERPRISES //Open Access Repository. – 2023. – Т. 10. – №. 6. – С. 1-6.
27. Ravshanov Z. Y., Ergasheva Z. A., Sailau A. M. KARYERLARNING PASTKI GORIZONTLARIDAGI KON MASSASINI AVTOMOBIL TRANSPORTLARIDA TASHISH USULLARINI TANLASH //Инновационные исследования в современном мире: теория и практика. – 2023. – Т. 2. – №. 20. – С. 4-6.
28. Ravshanov Z., Ergasheva Z., Sailau A. MEASURES OF RECULTIVATION OF MINING AREA IN QUARRIES //International Conference on Management, Economics & Social Science. – 2023. – Т. 1. – №. 3. – С. 54-56.
29. Abdaaliyevna E. Z. et al. Coal Mine Design and Explosion Prevention Studies //Nexus: Journal of Advances Studies of Engineering Science. – 2023. – Т. 2. – №. 5. – С. 255-259.
30. Ravshanov Z. Расчет устойчивости нижнего участка борта карьера «Мурунтау» с учетом программной комплекс «Ustoi» //Scienceweb academic papers collection. – 2021.
31. Ravshanov Z. Technological Stages of determining the Distance to the Location of Rocks in the Development of a 3D Model of Mining Enterprises //Scienceweb academic papers collection. – 2022.

32. Ravshanov Z. Анализ текущего состояния и пути повышения эффективности разработки нефтегазовых месторождений юговосточной части бухаро-хивинского региона //Scienceweb academic papers collection. – 2020.

