

**THE MAIN FACTORS OF ECONOMIC AND ENERGY EFFICIENCY  
OF MINING TRANSPORTATION MACHINES IN MINERAL  
EXTRACTION TECHNOLOGIES**

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*Annotation.* The increase in production capacity, depth of development and technological load flows, transportation distances and slopes of routes, as well as the need to reduce operating and energy costs of mining directly determine the main directions for the improvement and development of open-pit transportation systems and increase the operational performance, as well as individual types of mining transport machines used in mining operations.

The problem of economic and energy efficiency of mining transport machines used in the technologies of extraction of mineral raw materials during the conduct of underground and open-pit mining operations has been studied by many specialists and scientists, both in Uzbekistan and abroad: Anistratov Y.I., Arsentiev A.I., Dadonov M.V., Vasiliev M.V., Voroshilov G.A., Golubev V.A., Goncharov S.A., Dovzhenok A.C., Zhuravlev A.G., Zyryanov I.V., Lel Y.I., Novozhilov M.G., Potapov M.G., Rebrin E.Y., Sidorenko V.S., Sisin A.G., Smirnov V.P., Sorokin L.A., Stenin Y.V., Tarasov P.I., Terekhin E.Y., Fesenko S.L., Khokhryakov B.C., Etkina N.I., Yakovlev V.L., Derzko N.A., Buki P, Brown R., Chadwick, J.R., Boyd G., Vemba M., Chang D.J., et al.

When selecting the optimal transportation system for a particular enterprise, it is necessary to take into account a whole set of factors covering economic indicators and technical characteristics, largely determining the functionality of the transportation system.

The choice of a rational type of transportation, for specific conditions, is

determined by the physical-technical and chemical properties of mined rocks, conditions of the site location, climate, cargo turnover, distance of transportation, types and parameters of loading equipment, the period of existence of the mining complex, etc.

The analysis shows that for the next 10-15 years the main type of ore delivery to ore dressing plants and open-pit transportation at the depth of their development up to 120-150 m will remain road transport [1].

Energy and operational efficiency of using mining transport machines for delivery at mines and open-pit mining operations in specific mining and geological conditions depends on many factors, the main of which are catalogs and information and advertising materials of manufacturers of open-pit dump trucks. The type of mining transport machine; -productivity of the enterprise, which determines the volume of cargo transportation; -distance of transport communications; -road gradients; -equipment parameters at loading and unloading points; -quality of road surfaces and geometry of the route; -speed modes of rolling stock movement, which determine the intensity of cargo turnover; -factors that determine the state of the repair base, the level of transportation organization, rationing and planning of transportation and other [2].

Under different mining-technological and other equal conditions, the main factors determining the operational and energy efficiency of mining transport machines are the distance of transportation on different sections of the route -  $l_j$  (km), overcome gradients -  $i_j$  (%o ) and speed modes of movement -  $V_j$  (km/h). These factors, components of operational reliability at a given  $G$  (t/h) productivity determine:

- engine power consumption -  $N_{de}$  (kW);
- fuel consumption per transportation cycle -  $Q_{li}$  (kg or l);
- specific energy intensity of transportation operations -  $E_e$  [kWh/(t km)];
- other energy characteristics, for example, effective efficiency of a mining transportation machine -  $g_e = K_{ts}$ , determined by nominal (passport) value of machine efficiency -  $g_0$  and technical condition coefficient -  $K_{ts}$ .

Energy performance of mine dump trucks is determined on the one hand by thermodynamic characteristics of the machine propulsion system (diesel engine), and on the other hand by technological conditions of dump truck operation in the quarry (length of transportation, profile of the route, overcoming gradients, etc.). The optimal value of energy characteristics of dump trucks can be provided at relative equality of the effective power of the dump truck engine and the power spent on transportation of rock mass [1,2,4].

Various aspects and components of technological road transport have been subjected to modeling of its operation. In particular, the modeling of road transport as one of the processes of mining production is devoted to the works of Sheshko E.E., Mariev P.L. and others. More detailed description of modeling the operation of dump trucks is given in the studies of Kuleshov A.A. and Dyakov V.A. Calculation of the duration of the transport cycle is given attention in the work of Ayrapetyan V.G. Especially noteworthy is the study of Bogolyubov A.A., which outlines the general principles of modeling the movement of vehicles [1,2].

Technological modes of motor transport process are devoted to the work of Sheshko E.E. In the studies of Zemskov A.N. and Poletaev I.G. the issues of modeling of motor transport communications are considered. Functioning of excavator-automobile complexes, from the point of view of economy is described in Zhigalov M.L. and Vasiliev K.A. The influence of one of the main components of economic efficiency of technological motor transport operation - fuel consumption is given in catalogs and information and advertising materials. Modeling of economic indicators of motor transport operation is considered in the studies of Dokukin V.P. and Koptev V.Yu. Planning of motor transport productivity is studied in the works of Zyryanov I.V. and Egorov A.N. Methods of determining the area of rational use of road and railroad quarry transport are considered in the work of Sheshko E.E. Methods of operational management of dump trucks are described in the works of Potapov M.G. [2,3,5].

Thus from the analysis of researches the main conclusion that at a choice of optimum transport of ore delivery from ore storage of a shaft "Skipovoy" on GMZ-

4 at development of Zarmitanskaya gold ore zone for motor transport as determining factors the following are accepted: parameters and complexity of quarry roads, speed of movement of dump trucks on a route, gradients, consumption of diesel fuel, constructive characteristics of a dump truck (its load-carrying capacity, efficiency of transmission, wheel formula).

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