УДК 622.6

MAIN QUARRY TRANSPORT FACILITIES

Slesarenok E.V., senior lecturer
Basalai I.A, assistant professor
Belarusian national technical university
Minsk, Republic of Belarus

The development of an open-cut method for the exploitation t of mineral deposits, the growth of its technical and economic indicators are carried out due to the improvement of the development technology and the creation of new high-performance equipment. One of the most labor-consuming and expensive open-pit technological processes is the process of transporting rock mass. Progress in the field of quarry transport to a large extent forms the economy of enterprises for the open-cut exploitation of mineral deposits [1].

Quarry transport facilities can be subdivided into several classes, according to the purpose of application: in-pit transport – moving cargo inside the quarry, and external-pit transport – outside the quarry (on the surface). Inside the quarry, loads move along horizontal and slightly inclined tracks and along tracks with steep slope angles. By the principle of operation, facilities can be distinguished as discontinuous and continuous transport, by the nature of the work – mobile and stationary. The general characteristics of the quarry transport are: relatively small distances for movement of goods; high specific indicators of cargo turnover; heterogeneous properties of the transported rock mass; frequent movements of loading points, and in some cases unloading, etc. By now, there are three main transport facilities on open-pit mines, that are used in various combinations: automobile, railroad and conveyor.

Road transport is an indispensable mode of transport in the vast majority of quarries. High flexibility, mobility, maneuverability, adaptability to changing conditions of the field occurrence, comparative simplicity of location and arrangement of road communications and other features make the automobile transport the most suitable for the difficult exploitation conditions at deep horizons. Road transport is characterized by the autonomy of the energy source, the mutual independence of the operation of vehicles, which simplifies, especially at great depths, the traffic patterns. As a result of all these positive qualities, the concentration of work

increases, the possible rate of their deepening and the speed of moving faces increase. Road transport is used for different open-pit efficiency, from several hundred thousand to 70-100 million tons of rock mass per year. The main limitations that prevents road transport from using in deep quarries are transport distances and gradients. A serious disadvantage of vehicles with diesel engines in deep quarries is the emission of harmful exhaust gases. Therefore, in recent years, methods have been intensively sought to reduce their toxicity or to use other energy sources on cars.

Railway transport is very common in modern quarries. It has some advantages in comparison with other modes of transport in the exploitation of large-area deposits (the horizontal dimensions of which significantly exceed the vertical ones), having a high power, relatively calm and sustained bedding. It is distinguished by its low energy consumption due to the low resistivity of the rolling stock movement along the rail tracks. The main advantage of railway transport is the high reliability of its operation in various climatic conditions [2].

Conveyor transport is still used mainly for the transportation of soft and loose rocks, in the development of both large and limited in area, predominantly homogeneous in composition deposits. The main advantage of conveyor transport is its high level of labor productivity, achieved by automating the operation of equipment. Along with the advantages, conveyor transport has a number of disadvantages. Due to the intensive adhesion to the belt, the downtime of conveyors is great when moving wet and thixotropic rocks (clay, chalk, etc.), as well as when moving soft overburden rocks of the upper horizons. When blasted rocky highly abrasive formations are delivered, the wear of the belts increases, that requires its replacement after 12 – 18 months of operation.

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