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ADVANCED TECHNOLOGY FOR ROCK DISINTEGRATION USING PLASMA ENERGY

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Purpose. Presentation of efficient approach to hard rocks disintegration using a low-temperature plasma jet.

Methodology. The study of plasma technology was carried out by real field experiments and laboratory research.

Findings. Specialists of the Institute of Geotechnical Mechanics of the NAS of Ukraine developed the technology of well reaming by the thermal method using a low-temperature plasma (3000-3500 °C temp of jet). The electric arc plasma generator with gas-vortex stabilization of the direct-current arc of power 150-200 kW was developed as a working tool of the new-generation mining machine. The technology was successfully tested in the real ore-mines of Kryvyi Rih (Ukraine) ore bass.

The studies of the IGTM of the NAS of Ukraine found the basic requirements for the abovementioned technology, which provide high efficiency of this method. The mechanism of the process of thermal brittle fracture of the hard ferruginous quartzites and associated rocks of high hardness and abrasiveness has been studied in ore fields of the mines. It is proved that the thermal (plasma) method is feasible during destruction of hard rocks and associated rocks with the hardness of $f = 16-18, 20$ and more according to Prof. M.M. Protodiakonov scale of hardness at the varying metasomatism. The theoretical fundamentals of rock disintegration process under plasma impact were proposed.

The successful results of technology application make it a promising on future growing worldwide.

Key words: plasma technology, hard rock disintegration, well reaming

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SYSTEM APPROACH TO SELECTION OF A NEW TRANSPORT MEANS FOR WORKING IN DEEP MINES

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Purpose. To develop a methodology for a sufficient justification of the parameters of prospective transport means for using in conditions of surface mining of mineral deposits at deep mines and calculation of economic effect from implantation of new technological solutions.

Methodology. The research are the reviewing and systematizing the experience of using known transport means for surface mining operations, analyzing a number of approaches to their selection and theoretical substantiating of a new methodology taking into account the key technological parameters of surface mining and technical and economic indicators of mining transport systems.

Findings. The classification of transport means for using in conditions of surface mining of mineral deposits is presented according to the degree of prevalence, experience of use and implantation into industry. There are three groups of transport means: common, minor and prospective. Various approaches to the justification of the mining transport systems, taking into account the units of which include equipment from the various classification groups are proposed. A new methodology of assessing the benefits of new transport means, based on the methods of the system approach, analogies, technical-economic analysis and logical engineering solutions, is developed. There are three conditions for transition to a new transport mean: economic, technological and ecological.