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THE EFFICIENCY OF CRUSHING OVERSIZE SECONDARY MATERIAL BY HYDRAULIC HAMMER

Mining operations show that even using the most effective methods of blasting cannot completely exclude the output of a large fraction (oversized) material. Hydraulic hammers are commonly used for the destruction of the oversized material in quarries where, for some reason, there is a limit for blasting operations. Percentage of oversize output in the exploded mass can vary from 5 to 20 percent depending on the mining-and-geological conditions. Getting an oversized piece in the receiving slot of the crusher is associated with stopping the entire technological chain of the enterprise. Therefore, the method with the use of hydraulic hammer requires a detailed study.

Despite the effectiveness of blasting operations, there is still a large amount of rock material subjected to the secondary crushing. The presence of oversized pieces complicates conducting mining operations, deteriorates the efficiency of the rock mass preparation, and increases the cost of minerals extraction. To place oversized material it is necessary to occupy the area of the quarry face, which complicates the conduction of mining operations, especially when deepening quarries. Oversized material differs in physical and mechanical properties (density, strength, fragility, etc.), forms, sizes, etc., which determines the complexity of the choice of technical facilities for the destruction of oversized pieces and their following effective use.

The productivity of the destruction of oversized material depends on the technical parameters of hydraulic hammer and on the characteristics of an excavator used as the base on which the hydraulic hammer is fixed, as well as on its proper use. Oversized crushing is the most effective at right angle (90°) to the hydraulic hammer. In other positions of the hydraulic hammer, a skew stroke is carried out causing an adverse mode of operation – a blow-off (single shot) or lateral bounce. The maximum radius of fracture first of all depends on the length of the arrow. Radius, which allows a direct impact of the hydraulic hammer, also depends on the length of the handle and the length of the arrow. The front or the rear position to the base machine is recommended when working with a hydraulic hammer. Using hydraulic hammer from the sides of the base machine can lead to the sharp, devastating vibrations of the machine and it can overturn an excavator.

The performance of a hydraulic hammer in the destruction of oversized material is influenced by many different factors. The main factors are:

- Specific energy intensity of the oversized material destruction;
- The radius of the oversized material destruction, at which hydraulic hammer has the maximum clamping force, due to the weight of the handle.

Impact momentum determines the basic physical criterion of the destruction process – the specific force of an impact, i.e., the voltage under impact influence. Destruction occurs if the voltage exceeds the strength limit of the rock.

Technical performance of hydraulic hammer is determined by its effective power, that is, the product of the impact energy and the frequency of strikes. The greater the

strength of the material that needs to be destroyed with the help of hydraulic hammer is, the greater influence on productivity is caused by the impact energy. The impact energy of the hydraulic hammer must imply the destruction of the treated material for no more than 15-30 seconds.

Hydraulic hammer must be pressed to the oversized material with the help of hydraulic cylinders of working equipment to direct the resultant force of pressing along the axis of the hammer, which reduces the radius of an excavator operation.

REFERENCES

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