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THE ANALYSIS OF THE ACCURACY DETERMINATION OF OVERSIZE OUTPUT

The estimation of the accuracy determination of the oversize output by three known methods such as the method of direct measuring, the weighing method and the method of photogrammetric survey was carried out. The most accurate method for rational use in assessing the accuracy of the oversize output in a quarry was chosen.

Drilling-and-blasting is the main process of preparing rock to excavation. The criterion for assessing the quality of drilling and blasting is the intensity of the rock grinding. The heterogeneity of sizes of rock pieces is a serious drawback inherent in blasting. The percentage of oversize yield is of particular interest for enterprises because the performance and life expectancy of loading and transportation equipment and reliability of its work depend on the output of the oversized fraction. Thus, the justification of the most rational methods for determination of oversize yield is relevant and necessary to the quarry extracting block and rubble products.

A large amount of technical literature is devoted to the question of the influence of conditions and parameters of blasting on the intensity of grinding. Analyzing it, one can draw certain conclusions that with increasing strength and blocking of rocks, the middle piece of crushed rock and oversize yield increase, and also increase of the intensity of crushing of the rock mass is achieved by increasing the specific consumption of explosives (E).

That is why improvement of the efficiency of blasting operations, search for new ways of their perfection are urgent and important tasks of mining enterprises, as the competitiveness of products is the main technical task, which each mining enterprise should solve individually.

One of the ways to determine the amount of oversize is to use *the method of direct measuring*. This method is a unit record (measurement) of pieces of oversize, that are subject to repeated blasting. The output of the oversize is defined as the ratio of the total length of large oversized pieces Σl_n to the total length of the lines ΣL (1.1):

$$V_n = \Sigma(l_n / L) \quad (1.1)$$

To determine the amount of the oversize, it is necessary to multiply the obtained percentage of oversize yield by the total volume of the exploded block. Such work is rather time-consuming for the surveyor. This requires a significant amount of time on each unit measurement of oversize and a large amount of calculations of their volumes. The error of detection capacity of this method can vary in the range of 15..30% and therefore it is possible to draw a conclusion about the low efficiency of this method and the low use of it at the production due to high labor intensity and inaccuracy of measurements.

One of the most accurate methods of determining the volume of output of oversize is *a method of weighing*. After a mass explosion the entire flow of vehicles

with standard size pieces of rock from a specific research area can be directed through the scales.

Thus we can determine the total mass of granite that has been crushed to the required size in the explosion. The output of the oversize can be estimated by the formula (1.2):

$$\gamma_H = \frac{m_H}{m_H + m_{z.M.}} \cdot 100 \% \quad (1.2)$$

where m_H - the weight of oversize, t;

$m_{z.M.}$ - the weight of the standard rock mass.

When determining the volume of excavated rock and overburden production on the weighing results, the error margin of the mass of rocks is taken not more than 3%. Method for the determination of oversize by weighing does not require any serious measurements and calculations by the surveyor. For such accounting neither expensive instruments nor complicated software is needed. Nevertheless, a reliable accounting of the number of shipped vehicles should be provided. This allows to increase the productivity of the surveyor and simplify the calculations to the minimum. Given the accuracy of determining the oversize by this method (3%) we can conclude about its high economic efficiency and expediency of application.

Nowadays, one can see rapid development of digital and computer technologies, microelectronics and optics. It could not avoid the mining industry either. Scientific-production enterprise "Krivbassakademinvest" has introduced a new software product "Geoinformation system K-MINE". It has a special module of determining the granulometric composition of the exploded rock mass, which is called K-Granules.

Photographic images are prepared in a quarry in the working face, where it is necessary to conduct the testing. Work is performed with a digital camera and a scale bar. For this purpose two scale bars are placed at an arbitrary distance from each other (Fig. 1.3). Thus on a flat picture by using special methods, spatial coefficients of recalculation of rock pieces projections at true size can be calculated.

This method of determining the percentage of oversize yield using K-MINE is very efficient and simple. The surveyor does not need to perform any measurements on the collapse of the rock mass, only to photograph it. The software is fully automated and requires no in-depth computer knowledge. After practical studies and comparing this method with the weighing method, we can estimate the accuracy of the determination of oversize as very high (the error is not more than 5..7%).

Conclusion. After analyzing the methods for assessing the accuracy of oversize yield, it was determined that the most accurate method of determining the volume of oversize yield by the results is a weighing technique that does not require any serious measurements and calculations by the surveyor. For such accounting neither expensive instruments nor complicated software are needed. Only a reliable accounting of the number of shipped vehicles should be provided. This allows to increase the productivity of the surveyor and simplify the calculations to the minimum. However, taking into account today's rapid development of digital and computer technologies, microelectronics and optics, a few years ago scientific-production enterprise

"Krivbassakademinvest" has introduced a new software product "Geoinformation system K-MINE" which can be used to determine granulometric composition of the exploded rock mass. Determination of the percentage of oversize yield using K-MINE is very efficient and simple. After practical studies and comparing this method with weighing, the accuracy of the determination of oversize can be estimated as very high (the error is not more than 5.7%), which suggests that this method is very effective to use nowadays in comparison with the weighing method.

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