

O. Shrol, Master student
R. Sobolevskiy, Dr. Engr. Sc., Prof., research advisor
S. Sukhovetska, Senior lecturer, language advisor
Zhytomyr State Technological University

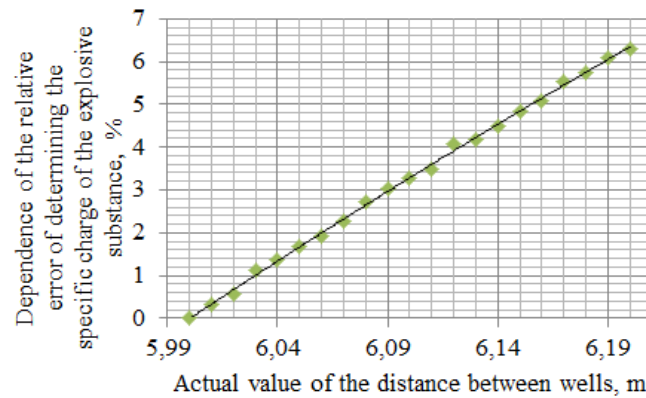
THE ACCURACY IN SETTING OUT THE DRAFT OF BLASTING OPERATIONS INTO THE SITE AND ITS IMPACT ON THE EFFICIENCY OF THE EXTRACTION PROCESS

Control of the intensity of rocks destruction by explosion is one of the most important scientific and practical tasks in the mining industry. The topicality of this research direction is confirmed by a large number of scientific publications. The process of realization of blasting operations in the conditions of Private Joint-Stock Company "Ushitsky Combine of Building Materials", which develops a deposit of granite "Bobrova Gora", was selected as a research object. Obtaining a high-quality crushed mining mass is possible provided that the optimum parameters of the blasting operations are met: the height of the bench, the diameter of the wells, the location of the wells, the type of explosives, etc. Any deviation from these parameters leads to deterioration of the quality of the rock mass (an increase in the percentage of oversized output, crushing), deviation of project marks of the bench-floor, increased danger of execution of blasting operations.

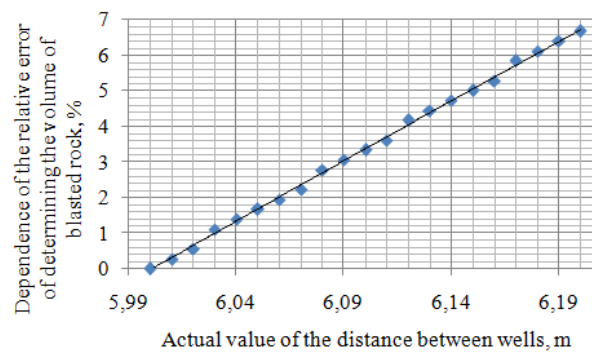
An important parameter for blasting is the distance between the wells. It should be noted that deviations from the designed values of the distances between the wells take place sometimes due to the errors in setting out the draft into the site when performing blasting and drilling operations. The deviation of the actual values of the distances between the wells in the range of 0.17% to 3.33% was modeled to evaluate the influence of the above-mentioned factors. In calculations, the following technological parameters were used: explosive substance: Grammonite 79/21; power coefficient $e = 1,02$; charging density: $0,85-0,9 \text{ g / cm}^3$; weight of explosive in one meter of well: 34-36 kg; height of bench: 12m, 15m; length of drilling wells L_{π} we accept: at $H = 12 \text{ m.}$, $L_{\pi} = 2,5 \text{ m.}$; при $H = 15 \text{ m.}$, $L_{\pi} = 3,0 \text{ m.}$; length of wells:

$l_{cg} = 14,5 \text{ m, } 18,0 \text{ m}$; actual diameter of wells: 225 mm; the estimated specific charge of the explosive substance in the conditions of the development of «Bobrova Gora» deposit is equal to $k = 0.43-0.9 \text{ kg/ha}^3$. Calculation is carried out on the reference explosive substance - ammonite №6 ZHV. The replacement of ammonite with other explosives is carried out taking into account the transfer coefficients of power (e) in the ideal operation of the explosion.

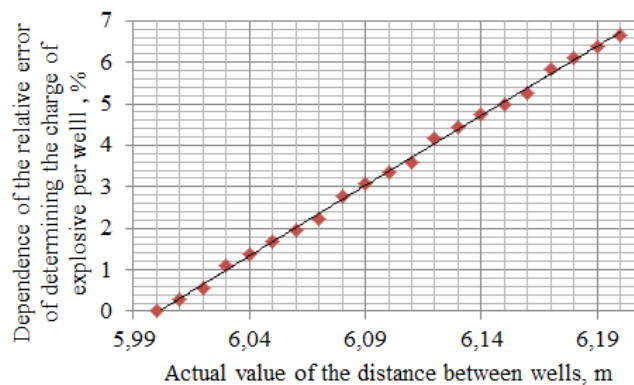
According to the results of the modelling, the graphic dependences were obtained (Pictures 1, 2 and 3).



Pic. 1. Dependence of the relative error of determining the specific charge of the explosive substance to the actual distance between the boreholes, %



Pic. 2. Dependence of the relative error of determining the volume of the blasted mass to the actual distance between the wells, %



Pic. 3. Dependence of the relative error of determining the charge of explosive per well to the actual distance between the boreholes, %

As a result of carried out research, empirical dependencies in the form of second-order polynomials of the following form were established:

for the dependence of the relative error of determining the specific charge of the explosive to the actual distance between the wells: $y = -11,54x^2 + 172,5x - 619,9$;

for the dependence of the relative error of determining the volume of the blasted mass to the actual distance between the wells: $y = -2,517x^2 + 64,52x - 296,5$;

for the dependence of the relative error of determining the charge of explosive per well to the actual distance between the wells: $y = -2,698x^2 + 66,69x - 303,0$.

In general, the analysis of modeling results showed that the deviation of the actual values of the indicators of blasting operations may reach 7%; although it is within the tolerances of normative documents, but it can lead to complications in planning and implementating certain technological operations, in particular - logistics of transportation of explosive substances.

Strict observance of the parameters of wells and the grid of charges arrangement on blocks will enable high quality and efficiency of blasting operations.

The main method of research used in carrying out this work is based on the analysis of scientific, technical and reference literature sources devoted to the study and development of methods for controlling the effective operation of industrial blasting works. At the same time, the studies to improve the quality of blasting without significantly disrupting the existing technological process of blasting operation and its economic statistics were thoroughly analysed.