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FRACTURE INDICATORS AFFECTING THE ROCK BLASTING

Estimating of rock blasting for designing of massive explosions is the most important problem of engineering and geological provision for DBW in quarries but in many aspects it has not been solved yet. That is why the most accurate and complete determination of fractures indicators affecting the blasting of rocks will provide the determination of the optimum parameters of blasting and getting the rock mass of certain fraction.

The impact of fractures as the main factor of subversive destruction of the rock mass was investigated at different times by A.N. Hanukaev, L.I. Baron, B.N. Kutuzov and by other authors. However, none of them defined the most distinctive and significant parameters that affect the current process of rock blasting.

Fractures of the massif have a great influence on quality and yield of blocks of mining minerals. They determine the choice of technology and complete sets of equipment, location and direction of the front of mining operations as for angles of depression of the main crack. On the one hand, fractures facilitate the destruction of the rock mass due to the presence of ready cracks. For this reason fractures reveal the shape of rock mass pieces, especially in the zone of weak adjusting crushing. However, fractures significantly reduces the effect of the explosion on the massif since the voltage wave energy decreases due to the reflection from the crack surface, and the pressure of detonation products also decreases rapidly in the process of their penetration into open cracks. In addition, the natural cracks distort the system of radial cracks in the explosion, deflecting them from a given direction and limit their spreading.

Fractures have the following indicators:

1. *Intensity of fracturing* is the main indicator that affects the resistance of rock to explosive destruction. It is a part of almost all formula for calculating unit costs of explosives. Usually the degree of fracturing is characterized by the average size of parting, which is determined by direct measurement of core or bench in underground mining. Practice of drilling and blasting in quarries proved that with the increase of fracturing category (increasing of blocking) the proportion of explosives also significantly increases.

2. *The orientation of cracks system and crack density of each system*. When system fracturing occurs, spatial orientation of cracks and anisotropy of the massif (which is caused by different density of cracks of various systems) have significant influence on the results of the blasting. The same factors determine the form of parting in the massif and of large fractions pieces.

3. *The width of cracks* significantly affects the efficiency of the explosion because the loss of wave energy and the pressure of the gas explosion directly depend on it. However, the measuring of this parameter in field trials in open pits is associated with great difficulties, because the natural open fractures are generally not available for direct measurement in quarries .

4. *Filling of the cracks* affects the blasting of rocks in two ways: first, as the cement binding their partings, and secondly, as a medium that affects the loss of wave energy. In unaffected by reconciliation massif of sedimentary and metamorphic rocks, cracks usually do not have solid mineral filler. Air and water play the role of filler in them. With that, the cracks filled with air dramatically lower the intensity of the wave stress, and large cracks in this case completely extinguish them, playing the role of an open surface. However, if the cracks are filled with water, the waves propagate through them with a small energy loss.

5. *Cohesion between rock partings.*

6. *Physical and mechanical properties of rocks*. Resistance to explosive destruction of rock partings is mainly conditioned by their physical and mechanical properties, which are determined exclusively by mineral composition and textural and petrographic features of the rocks.

An important influence on rock blasting is produced by their strength. Strength is the property of rocks to perceive, under certain conditions, the influence of mechanical stress, thermal, magnetic, electrical and other fields without being destroyed. It is usually characterized by the coefficient of strength on Protodiakonov's scale. The higher the strength of rocks is, the higher energy intensity of their destruction is. Additional physical and mechanical properties of rocks, which affect their blasting are viscosity, which increases the energy intensity of their destruction; brittleness which reduces this rate; compression and porosity, which increase the energy loss of the explosion on the plastic deformation; and density, which determines energy consumption in some inertial forces. All the above-mentioned prove that it is necessary to study the relationships of rocks strength and their blockiness in geotechnical evaluation of rock mass blasting. The presence of such a relationship will simplify the local classification of rocks in a certain field, as it will be possible to assess this parameter within a particular engineering and geological litotype according to one factor - rocks blocking.