I. Klysovets, Master student
R. Sobolevskyi, Dr. Engr. Sc., Prof., research advisor
S. Sukhovetska, Senior lecturer, language advisor
Zhytomyr State Technological University

SPECIFIC ASPECTS OF CRACKING AND BLOCKING FORMATION

The existence of crack systems in granite deposits is quite logical and is related to the structure and the process of these deposits formation of magma. Tensile strength during movement and contraction tensions during cooling of the newly hardened rock as well as other factors cause cracks formation, first of all, tensile cracks, in primary separation. Contraction cracks are associated with the reduction of rock mass and; they are oriented perpendicular to the direction of the reduction. The direction of the reduction depends on the position of the cooling surface and the speed of cooling. If deep intrusive bodies cool slowly the whole mass of the rock cools as a single whole. Cracks, parallel to the contacts with lateral rocks, occur along the edges of massif, thus, a plate-like joints appear. The thinner joint, the faster it cools. If cracks appear perpendicular to the contacts, the location takes the parallelepiped form. When ball-like bodies of intrusive deposits, flows, etc., cool stronger than in perpendicular direction, the decrease in density of a flow causes strong development of cracks perpendicular to surfaces of this flow; in this way, prismatic or columnar joints appear.

Primary and secondary structures are distinguished in the process of granite deposits study and evaluation. The first concept includes primary linear textures that appear in a certain arrangement of grains of rock forming minerals; this corresponds to the period of liquid or plastic masses of magma. Primary cracks formed during fractures or splits in already hardened pluton also belong here. Secondary structures that cover the primary are the result of subsequent changes in granite massif and are manifested in additional systems of cracks, which often make deposits unfit for the development of precast stone.

For a long time, the relationship between the mechanical properties of gabbro-norites and labradorites with their structural and texture features was studied for obtaining optimal directions of fracture line and reducing labor costs when producing blocks. Experiments were conducted with rocks with different structural and texture characteristics. The lines of small stone fractures for all investigated fields have close azimuthal location, which is due to the direction of the magma flow along the entire crystalline shield. In particular, in Golovyno labradorites, the weakest cohesion of minerals is manifested between crystals of plagioclase and pyroxene, which forms are elongated in the direction from the northwest to the southeast; in Slipchitsky gabbro-norites the cohesion is manifested between crystals of plagioclase and pyroxene grains, which are oriented from northwest to south-east.

All studies during geological exploration and the creation of the project for the development of deposits give an average value regarding the choice of direction for advancing the mining front and the direction of anisotropy of massif. The results of stone deposits evaluation should include the definition of shape and size of possible blocks and their change with depth [1].

The shape of natural blocks is determined by the deposition of the cracks planes. Thus, the intersection of cracks at right angles allows separating blocks from massif in the form of regular parallelepipeds. If two of three systems of cracks intersect each other at an acute angle, the blocks come out in the form of monoclinic prism, which requires an additional passaging of a block, that is, giving it the shape of a parallelepiped by shearing. When passaging blocks, 25-35% of their original volume is lost in the form of ocellus, which leads to the decrease in the output of blocks and significantly increases extraction [2].

REFERENCES

1. Sobolevskyi R. Cluster analysis of fracturing in the deposits of decorative stone for the optimization of the process of quality control of block raw material // R. Sobolevskyi, N. Zuievska, V. Korobiichuk, O. Tolkach, V. Kotenko // Eastern-European Journal of Enterprise Technologies. – 2016. – Issue 5/3 (83). – P. 21–29.

2. Korobiichuk V. Definition of hue of different types of pokostivskiy granodiorite using digital image processing // V. Korobiichuk, V. Shamrai, O. Iziumova, O. Tolkach, R. Sobolevskyi // Eastern-European Journal of Enterprise Technologies. – 2016. – Issue 4/5 (82). – P. 52–57.

3. Levytskyi V. The optimization of technological mining parameters in quarry for dimension stone blocks quality improvement based on photogrammetric techniques of measurement/ V.Levytskyi, R.Sobolevskyi, V. Korobiichuk // Rudarsko-geološko-naftni zbornik. 2018. vol. 33. P. 83–90.