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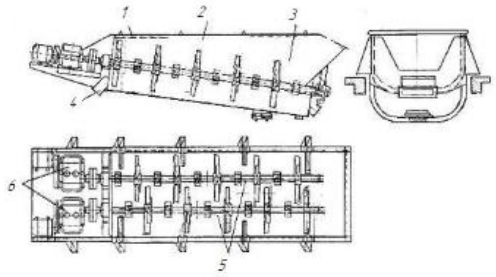
IMPLEMENTATION OF EUROPEAN EXPERIENCE FOR PROCESSING REFUSE OF BROKEN STONE QUARRY

Introduction. It is known that the process of broken stone production at granite quarries is accompanied by the formation of a significant amount of waste such as granite screenings, which is stored in dumps, outside the enterprise. In this case, the output of granite screenings estimates up to 20 - 25% off the source material. Production of cube-shaped broken stone of small fractions (5 - 15 mm) increases the amount of granite screenings to 40%. In general, granite screenings has a certain commercial value and this product is partly sold by enterprises to local consumers. At the same time, the full sale of granite screenings is limited by the high content of dust particles. Typical granite screenings at Ukrainian quarries contains up to 30% of particles of less than 140 μm in size, which have high water absorption and, therefore, do not allow the use of granite screenings in pure form for the manufacture of concrete. However, the rest of the 70% of granite screenings is valuable material, and under insignificant processing, it can become an additional commercial product for a quarry. Granite waste processing has a good market prospect.

Aim and methods. Today, this problem has been solved using processing technology with application of washing and sorting equipment: log washers, washing screens, pulp formers, sand washing equipment, high-frequency screens, vacuum desalinators, etc. The most widespread machines at the enterprises are log washers, used for the washing gravel and broken stone from clay (Pic. 1). The principle of washing is that the material is put into the loading part, filled in half with water. Moving from the center of log washer to the upper unloading hole, particles of granite screenings intensively mix and rub with each other. The unloading hole is located above the water level, near the upper wall of the log washer. Moving beyond the area of the drainage mirror, the material is sometimes rinsed with extra clean water, which is fed from a pipe located above the log washer. Sometimes water is fed through holes in the bottom of the log washer. Eroded polluted inclusions flow down through the drainage threshold in the bottom part of the machine and through the slits in the side walls. The size of the drained particles is regulated by the change in the height of the drainage threshold.



Pic. 1. Two- shafts inclined blade log washer: 1 - sink, 2 - blades, 3 - loading part 4 - unloading hole, 5 - shafts, 6- drive

Such equipment effectively processes 0 – 5 mm granite screenings fractions and considerably extends the assortment of products, giving several types of quality granite products after washing (2 – 5 mm fraction, 0.063 – 2 mm, 0 – 1 mm, and washed sand 0 – 0.063 mm with only 0,5% of clay and dust particles).

The installed washing equipment allows receiving high-quality raw materials from non-liquid fractions for producers of concrete. Moreover, the range of applications of new types of products is very wide. The washed granite screenings fractions of 0 – 1 mm, 0 – 0,063 mm are often used for production plaster and building mortars. Fractions of 0,063 – 2 mm, 2 – 5 mm are materials for the manufacture of products with decorative properties such as pavement tiles, park curbs, etc. In road construction, they can be used to form the foundation and to cover roads.

For example, at quarry which works out 1 million m^3 of rock, this technology and appropriate equipment allow to processing more than 300 thousand m^3 of granite waste per year and receiving more than 200 thousand m^3 of commodity broken stone and granite screenings per year.

Advanced European companies are engaged in processing of granite screenings. In particular, washing and sorting equipment, according to the experience of foreign companies, has a prospect of implementation at quarries as well as crushing and sorting factories of Ukraine.

Conclusions. The granite screenings dumps, located close to broken stone production, have been a severe problem for a long time, since they contain the lion's share of conditioned broken stone, which could be sald to consumers. In this work, attention was paid to one of the methods of processing granite waste through its washing in log washer and to getting quality granite products. Thus, it will enable the increase of the economic efficiency of an enterprise and reduction of the negative impact on the environment and human life.