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Determining the rational operating parameters for granite crushing to obtain cubiform crushed stone

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Abstract

Purpose. Determining the rational operating parameters for granite crushing under impact in the field of centrifugal forces to obtain cubiform crushed stone. In order to achieve the purpose set, the task is to determine the operating parameters for obtaining the main grain-size classes: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 and 5.0 mm.

Methods. The crushing process of granite crushed stone is studied in the conditions of the Kolomoievskyi Granite Quarry, Dnipropetrovsk region. Granite crushed stone with an initial grain-size of 100.0-0.0 mm and strength grade of M1400 is subjected to crushing. The accelerating rotor rotation frequency is the design value n = 200-1200 min^{-1}. Fine crushing of granite is performed in a centrifugal-impact crusher by a free impact in the field of centrifugal forces.

Findings. The optimal speed modes of centrifugal crusher operation, which provide the production of high-quality crushed stone with a maximum content of 90-95% cubiform fractions, have been substantiated.

Originality. The yield dependences have been obtained of the grain-size classes: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 and 5.0 mm depending on the speed mode of the centrifugal crusher operation.

Practical implications. The operating parameters for obtaining the main grain-size classes of cubiform crushed stone from granite have been determined: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 and 5.0 mm. In particular, it has been determined that for the production of cubiform crushed stone with -50.0 + 20.0 mm grain-size, the rotor rotation reasonable speed is 400-500 min^{-1} (the speed of material departure from the accelerating rotor is 45-50 m/sec); for cubiform crushed stone of -40.0 + 20.0 mm grain-size, the speed mode is 200 min^{-1} (25 m/sec); for cubiform crushed stone of -20.0 + 10.0 mm grain-size – 600-650 min^{-1} (70-80 m/sec), respectively. The maximum content of cubiform fractions in the -20.0 + 10.0 mm grain-size class is 95%, which is achieved at a rotor speed of 650-700 min^{-1} (departure speed is 75-80 m/sec). The maximum content of cubiform fractions in the -10.0 mm grain-size class is 94-95%, which is achieved at the accelerating rotor speed within 700-800 min^{-1} (departure speed is 70-80 m/sec). The obtained data make it possible to practically choose a rational speed mode of the centri-fugal-impact crusher operation to obtain the maximum yield of cubiform crushed stone.

Keywords: *granite, crushing, cubiform crushed stone, centrifugal-impact crusher, operating parameters*

1. Introduction

Crushed stone is an inorganic granular bulk material with grains larger than 5.0 mm, which is obtained by crushing rocks, gravel and boulders, as well as by screening quarry rocks. Crushed stone is widely used in construction, as well as a filler in concrete, a component of road pavement surface, for railway track ballasting, etc. Deposits of various rocks, which are used for the production of rubble stone and crushed stone, are known in all geostructural regions of Ukraine. Their explored reserves are mainly represented by igneous and metamorphic rocks: granites, granodiorites, andesites, gabbro, crystalline schists, quartzites, etc. As of 2021, there are 946 deposits of building stone on the State Balance of Ukraine, of which 428 are under development [1], [2].

The largest balance and prospective reserves of building stone are concentrated in Zhytomyr region of Ukraine (1725.8 thous. m^3), Zaporizhia region (1018 thous. m^3), Donetsk region (878 thous. m^3), Rivne region (846 thous. m^3) [3].

Today, an urgent problem in the construction industry is obtaining high-quality cubiform granite crushed stone, the flakiness index of which (the content of lamellar and needle-shaped grains in the total crushed stone mass) does not exceed 10-15%. At the same time, in his modeling, it is assumed that the cubiform crushed stone grain has the shape of a rectangular parallelepiped. The characteristic dimensions of the cubiform grain (length, width, thickness) are random values, with some specific to a particular crushed material, crusher type and crushing conditions [4]. Other authors propose a more universal approach to crushed stone modeling – to consider the crushed material composition from nine regular polyhedra (tetrahedron, as well as single and paired: pentahedron, hexahedron, heptahedron, octahedron) as "cubic", which fully corresponds to the correlations obtained from experimental results [5]-[7].

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The use of "cubiform" crushed stone determines a number of advantages: the durability index of concrete structures and asphalt-concrete coatings increases, the consumption of crushed stone, bitumen and cement decreases, the durability and frost resistance of the roadway covering increases, the duration of road construction works and labor costs decrease [8]. These advantages are conditioned by a greater strength of cubiform grains compared to flaky (lamellar) crushed stone, the smaller void space in the bulk state of cubiform crushed stone, and the greater cement stone strength in the spaces between granite grains. This occurs as a result of a decrease in the thickness of these void spaces and, accordingly, an increase in the share of cohesive grain contacts in thin structured "adhesive-substrate" films [9]-[11].

In practice, cone, jaw and roller crusher machines are used for crushing stone [12], [13]. The authors in [14] use a press-roller machine to obtain cubiform crushed stone. However, when using these crusher machines, the yield of cubiform crushed stone is, as a rule, 15-20%, not more than 50% [12], [13]. Moreover, cone crushers are productive, but very heavy and difficult to operate. At the same time, jaw crushers produce a crushed product of uneven size [12]. And roller crusher and a press-roller machines are mainly used for relatively soft shale rocks [13], [14].

It is possible to significantly increase the yield of cubiform crushed stone from the original shale stone by using rotary crushers, the drum of which is equipped with teeth of a special configuration proposed by the authors in [13].

From the point of view of increasing the cubiform crushed stone yield, the technology of rock crushing by impact in the field of centrifugal forces is considered promising [15]-[17]. This can be explained based on the analysis of possible grain destruction mechanisms in crushers: crushing, splitting, breaking, cutting, abrasing, shearing and subsequent cutting, impact [17]. The research in [18] indicates that lumps (angular and cubiform) from the original boulder are obtained under slow and relatively intense stresses (compression), as well as when applying intense stresses (impacts). At the same time, the yield of relatively large fragments with a size of 50-80% of the size of the original particle is maximum when crushed by compression. Upon impact, fragments of relatively small sizes are formed with a wide particle size distribution.

The main physical-technical properties of concrete with cubiform granite crushed stone are significantly better than those with ordinary crushed stone [18]-[20].

It is important to determine the rational operating parameters for crushing to obtain cubiform crushed stone and its maximum content in the crushed product.

The research purpose is to determine the rational operating parameters for granite crushing by impact in the field of centrifugal forces to obtain cubiform crushed stone.

To achieve the purpose, the task set is to determine the operating parameters for obtaining the main grain-size classes: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 and 5.0 mm. In particular, the following research tasks are set:

– determining the rational rotor rotation speed and the speed of the crushed material departure from the accelerating rotor for the production of cubiform crushed stone with the -50.0 + 20.0 mm grain-size;

– determining the rational rotor rotation speed and the speed of the crushed material departure from the accelerating rotor for the production of cubiform crushed stone with the -40.0 + 20.0 mm grain-size;

– determining the rational rotor rotation speed and the speed of the crushed material departure from the accelerating rotor for the production of cubiform crushed stone with the -20.0 + 10.0 mm grain-size;

– determining the centrifugal-impact crusher operating parameters at which the maximum content of cubiform fractions in the -20.0 + 10.0 mm grain-size class is achieved;

– determining the centrifugal-impact crusher operating parameters at which the maximum content of cubiform crushed stone in the -10.0 mm grain-size class is achieved.

2. Methods and materials

The crushing process of granite crushed stone is studied in the conditions of the Kolomoievskyi Granite Quarry, Dnipropetrovsk region. Granite crushed stone with an initial grain-size of 100.0-0.0 mm and strength grade of M1400, which has been obtained as a product for crushing of the crushed stone with -300.0 mm grain-size in a KSD 2200 cone crusher machine, is subjected to crushing. The crushed product of the cone crusher machine is fed to a vibrating screen. The undersize product with 100.0-0.0 mm in grain-size is fed to the CD-50 centrifugal-impact crusher of fine crushing, in the working chamber of which the material is crushed by free impact in the field of centrifugal forces.

The CD-50 crusher accelerating rotor rotation frequency is n = 200-1200 min^{-1}. It is regulated using a hydraulic coupling. The initial and crushed material is exposed to screening in order to determine the granulometric characteristics.

The departure speed of a piece in the crushing chamber is determined by the Formula [17], [21]:

$$V = 0.95\omega R \cdot \sqrt{1 + B^2 + B\sin\psi}\ , \tag{1}$$

where:

$$B = \left(\sqrt{1 + f^2 - f}\right) \cdot \frac{\cos(\psi - \varphi)}{\cos\varphi}\ , \tag{2}$$

where:

ω – angular rate of accelerating rotor rotation of the CD-50 crusher machine, s^{-1};

R – the radius of departure of the accelerating ribs, R = 0.7 m;

ψ – the inclination angle of the accelerating ribs to the radius, ψ = 30°;

f, φ – coefficient and angle of the rock mass friction; φ = arctan f.

The research is carried out in stages, depending on the grain-size of the resulting cubiform crushed stone.

First stage: obtaining a crushed stone of the -50.0 + 20.0 mm grain-size. The yield of crushed stone fractions of -50.0 + 20.0 mm grain-size is studied depending on a speed mode of the CD-50 centrifugal crusher operation.

Second stage: obtaining a crushed stone of the -40.0 + 20.0 and -20.0 + 10.0 mm grain-size. The yield of crushed stone fractions of -40.0 + 20.0 and -20.0 + 10.0 mm grain-size is studied depending on a speed mode of the CD-50 centrifugal crusher operation with its productivity of 30 tons per hour and 75-85 tons per hour.

Third stage: obtaining a crushed stone of -10.0 + 5.0 mm and 5.0 mm grain-size. The yield of crushed stone fractions of the -10.0 + 5.0 and 5.0 mm grain-size is studied depending on a speed mode of the CD-50 centrifugal crusher operation.

3. Results and discussion

The first stage research results are shown in Figures 1 and 2. Figure 1 shows the yield of the -50.0 + 20.0 mm grain-size classes and Figure 2 – the content of cubiform crushed stone in the -50.0 + 20.0 mm grain-size class depending on the CD-50 crusher accelerating rotor rotation frequency and departure speed of granite grains from the rotor at productivity of 75-85 tons per hour (Fig. 1).

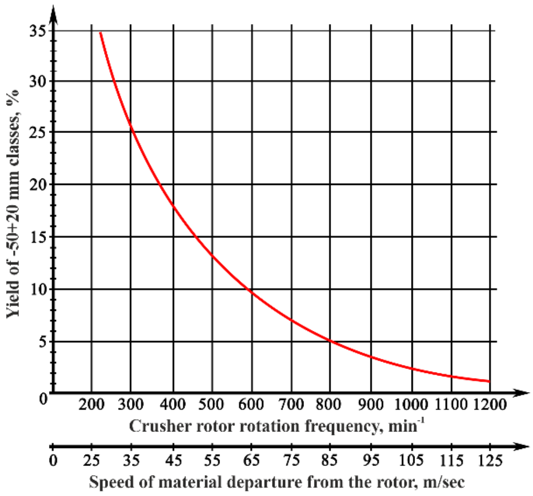

***Figure 1.** Dependence of the yield of -50.0 + 20.0 mm grain-size classes on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour*

An analysis of the determined dependence shows that with a decrease in the crusher rotor rotation frequency from 800 to 200 min^{-1}, the yield of fractions of the -50.0 + 20.0 mm grain-size class increases from 5 to 35%. Therefore, to obtain the maximum yield of -50.0 + 20.0 mm class, a speed mode of the centrifugal crusher operation should be kept within 200-250 min^{-1}, which corresponds to the speed of material departure from the rotor of 25-30 m/sec.

The change in the cubiform crushed stone content in the -50.0 + 20.0 mm grain-size class, depending on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour is shown in Figure 2. From the obtained dependence, it can be seen that the maximum 90% content of cubiform crushed stone in the -50.0 + 20.0 mm fraction is achieved at the centrifugal crusher rotor rotation frequency in the range of 400-500 min^{-1}. Thus, the speed of material departure from the rotor is 45-50 m/sec. As can be seen from the previous graph (Fig. 1), the yield of the -50.0 + 20.0 mm fraction at this speed mode is about 20%.

Thus, it has been determined that for the production of cubiform crushed stone with the -50.0 + 20.0 mm grain-size, a reasonable mode of the centrifugal crusher operation is a speed mode of 400-500 min^{-1}, which provides a speed of the crushed material departure from the accelerating rotor of 45-50 m/sec. The research results of the second stage are shown in Figures 3-7.

The obtained data analysis shows that for the production of cubiform crushed stone with the -40.0 + 20.0 mm grain-size, the rational mode of the centrifugal crusher operation is a speed mode of 200 min^{-1}, which provides a speed of the crushed material departure from the accelerating rotor of 25 m/sec.

As it can be seen from the graphs, the yield of the specified classes decreases with an increase in the rotor rotation frequency, that is, the speed of material departure from it.

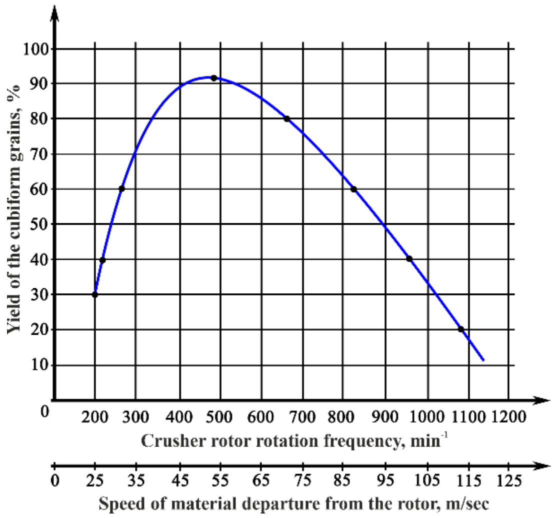

***Figure 2.** Content of cubiform crushed stone in the -50.0 + 20.0 mm grain-size class, depending on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour*

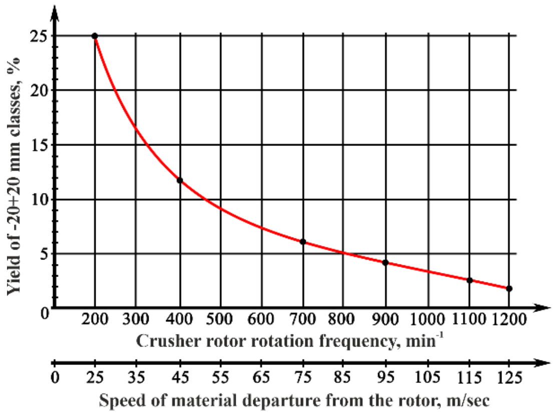

***Figure 3.** Dependence of the yield of -50.0 + 20.0 mm grain-size classes on a speed mode of the centrifugal crusher operation at productivity of 30 tons per hour*

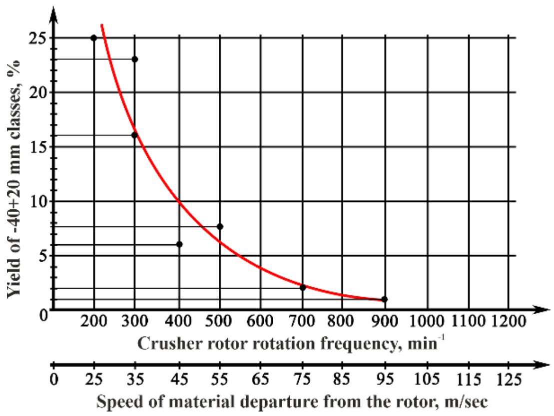

***Figure 4.** Dependence of the yield of -40.0 + 20.0 mm grain-size class on a speed mode of the centrifugal crusher operation at productivity of 30 tons per hour*

At the same time, the yield of cubiform crushed stone during crushing depends on the operating conditions of the equipment.

With the correct selection of equipment, taking into account the impact in the field of centrifugal forces, it is possible to obtain up to 95% of high-quality cubiform crushed stone (Fig. 5).

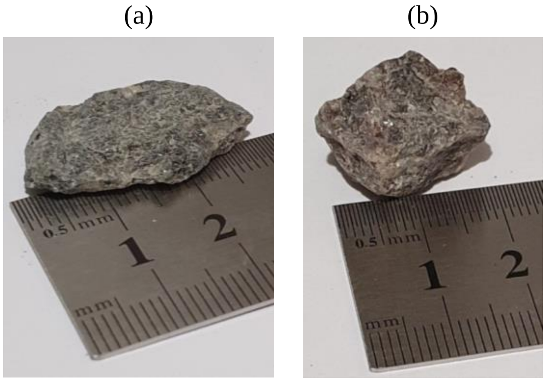

Figure 5. Obtained crushed stone: (a) classical form; (b) cubiform

The yield of -20.0 + 10.0 mm grain-size crushed stone fractions, depending on a speed mode of the centrifugal crusher operation with its productivity of 75-85 tons per hour and the change in the crusher rotor rotation frequency in the range from 1200 to 400 min^{-1}, is shown in Figure 6.

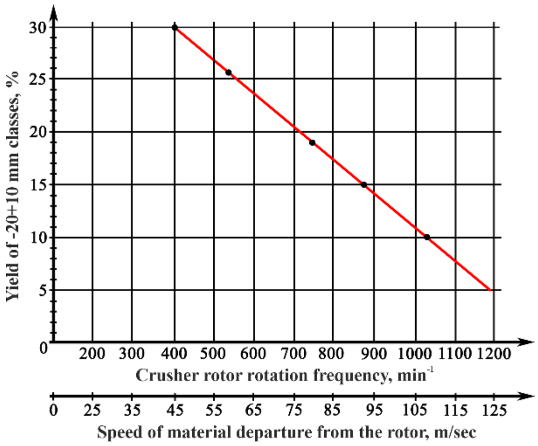

***Figure 6.** Dependence of the yield of -20.0 + 10.0 mm grain-size classes on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour, and, accordingly, the speed of material departure from the crusher rotor is 135-25 m/sec*

It has been determined that with a decrease in the accelerating rotor rotation frequency from 1200 to 400 min^{-1}, the yield of -20.0 +10.0 mm grain-size class increases from 5% to 30%. Thus, the most effective mode of the crusher operation for the yield of the -20.0 + 10.0 mm finished grain-size class is a speed mode of 400 min^{-1}, which corresponds to the speed of material departure from the rotor of 45 m/sec.

After determining the effective crushing mode for the equipment, the content of cubiform crushed stone in the -20.0 + 10.0 mm class has been studied. The research results are graphically presented in Figure 7. As it can be seen from the determined dependence, the maximum content of cubiform crushed stone in the -20.0 + 10.0 mm fraction is at the level of 94-95% and is achieved at a centrifugal crusher accelerating rotor frequency of 600-650 min^{-1}, that is, at a speed of material departure from the rotor of 70-80 m/sec.

In this case, the yield of the -20.0 + 10.0 mm fraction at such rotations is 25% in accordance with the data obtained in previous studies (Fig. 6).

Thus, in the production of cubiform crushed stone with the -20.0 + 10.0 mm grain-size, the scientifically substantiated mode of the centrifugal-impact crusher operation is a speed mode of 600-650 min^{-1}, or 70-80 m/sec for the studied rocks.

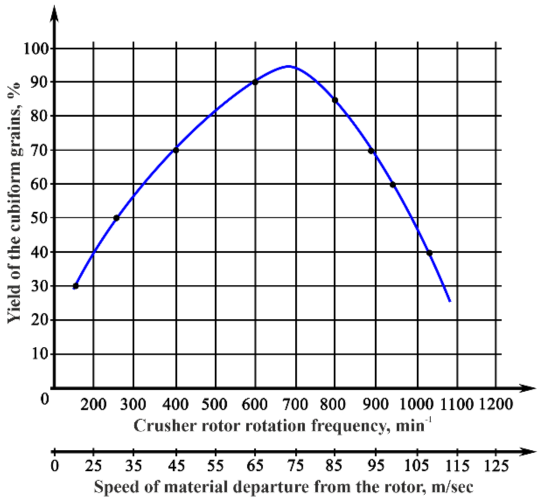

***Figure 7.** Content of cubiform crushed stone in the -20.0 + 10.0 mm grain-size class, depending on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour*

The third stage research results are shown in Figures 8-10.

Since a centrifugal-impact crusher with an initial crushed material grain-size of -100.0 mm allows obtaining -10.0-5.0 mm grain-sized crushed material (with an appropriate speed mode of operation), the content of cubiform crushed stone in this grain-size class is of practical importance.

The results of the studied dependence of the content of cubiform fractions in the grain-size class of -10.0 (*1*) and 5.0 mm (*2*) on a speed mode of the centrifugal crusher operation are shown in Figure 8. Their analysis shows that the maximum yield of cubiform crushed stone in the -10.0 mm grain-size class, namely 94-95%, is achieved at a speed mode of the crusher operation with an accelerating rotor rotation frequency in the range of 700-800 min^{-1} and the speed of material departure from the accelerating rotor of 70-80 m/sec.

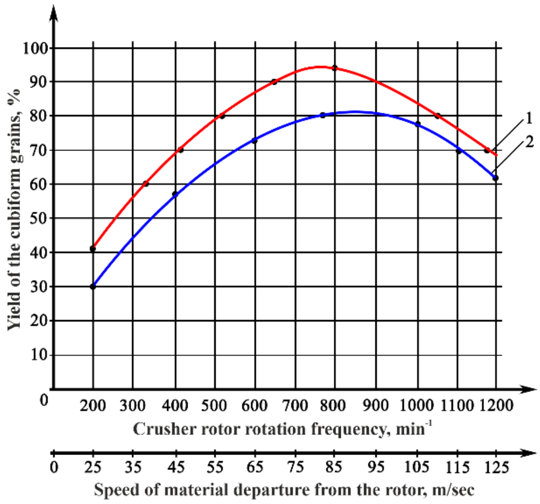

***Figure 8.** Dependence of the content of cubiform fractions on a speed mode of the centrifugal crusher operation: 1 – in the grain-size class of -10.0 mm; 2 – in the grain-size class of 5.0 mm*

If to compare this research results with the studies on the content of cubiform fractions in the -20.0 + 10.0 mm grain-size classes (graph in Figure 9), the conclusion can be drawn that this speed mode is the most effective for the -20.0 + 10.0 mm grain-size class.

In addition, it can also be argued that such values can be optimal and such a speed mode of operation ensures the maximum yield of cubiform crushed stone in the -20.0, +10.0, -10.0 mm grain-size fractions.

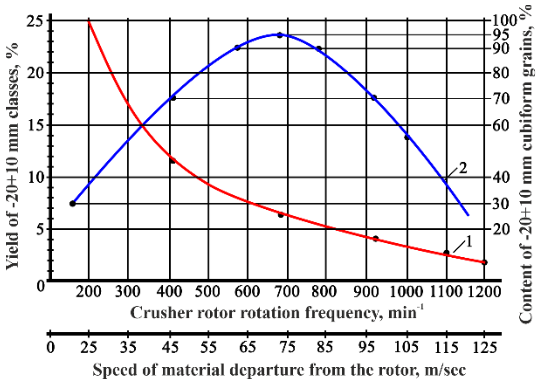

Figure 9. Dependence of the yield of -20.0 + 10.0 mm grain-size classes and the content of cubiform fractions on a speed mode of the centrifugal crusher operation: 1 – yield of crushed stone of the -20.0 + 10.0 mm grain-size classes, %; 2 – content of cubiform fractions, %

In the course of the research, it has also been determined that the maximum content of cubiform crushed stone (84%) in the -5.0 mm grain-size fraction is achieved at a speed mode of a centrifugal crusher operation of 800-850 min^{-1}, that is, at a speed of the crushed material departure from the accelerating rotor of 95-100 m/sec. This is confirmed by graph *2* in Figure 8.

To verify the above results, complex experimental research has been additionally conducted with simultaneous sampling of crushed material and a parallel analysis of the yield of the -20.0 + 10.0 mm grain-size classes and the content of cubiform crushed stone in these classes (graphs *1* and *2* in Figure 9). Analysis of the obtained experimental dependences shows that the maximum content (95%) of cubiform fractions in the -20.0 + 10.0 mm grain-size class is achieved at a crusher rotor rotation frequency of 650-700 min^{-1}, which corresponds to the speed of material departure from the rotor of 75-80 m/sec. In this case, the maximum yield of this grain-size class is achieved – 25%. Thus, the determined speed mode of the centrifugal crusher operation is optimal for this grain-size class.

Similar complex studies have also been carried out during the production of the -50.0 + 20.0 mm grain-size class typical for crushed stone. This research results are presented by graphs *1* and *2* in Figure 10.

It has been determined that the maximum content of cubiform fractions (90%) is achieved with a speed mode of the centrifugal crusher operation at a rotor rotation frequencies of 500-600 min^{-1}, which corresponds to a speed of the crushed material departure of 60-70 m/sec. At the same time, the maximum yield of this grain-size class is 22-23%. Thus, this speed mode of the centrifugal crusher operation is optimal for crushed stone of -50.0 + 20.0 mm grain-size classes.

Comparative studies of the cone crusher have determined that the content of cubiform fractions in the crushed products with a grain-size of -10.0 mm is 65%, which is 20% less than in the same crushed products of a centrifugal-impact crusher. In the -20.0 mm grain-size products crushed by a cone crusher, the content of cubiform fractions is 70%, which is 25% less than in products crushed by a centrifugal-impact crusher.

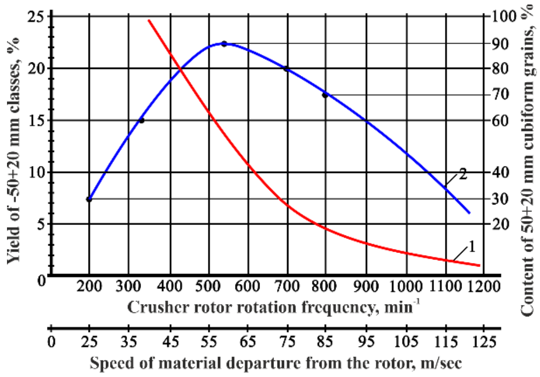

Figure 10. Dependence of the yield of -50.0 + 20.0 mm grain-size classes and the content of cubiform fractions, depending on a speed mode of the centrifugal crusher operation at productivity of 75-85 tons per hour: 1 – yield of -50.0 + 20.0 mm grain-size classes, %; 2 – content of cubiform fractions, %

Thus, experimental research on crushing granite in a centrifugal-impact crusher has confirmed that the optimal operating mode for -20.0 + 10.0 mm grain-size crushed stone production is a speed mode of 600-700 min^{-1}, that is, 70-80 m/sec, at which the yield of this fraction is 25%, and the maximum content of cubiform fractions is in the range of 94-95%. It has also been determined that at a speed mode of crusher operation of 400-500 min^{-1} (45-50 m/sec), the yield of the -50.0 + 20.0 mm fraction is 20% and the maximum content of cubiform fractions is within 88-90%. Thus, this speed mode is optimal for the production of crushed stone with a grain-size of -50.0 + 20.0 mm.

These results are new in comparison with known studies [16], [18] since rational operating parameters have been determined for obtaining the main grain-size classes of crushed stone: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 and 5.0 mm. As a result, high-quality crushed stone with a maximum content (90-95%) of cubiform fractions has been obtained using the specified rational crushing modes. For comparison, when using cone, jaw and roller crusher machines, the yield of cubiform crushed stone is usually 15-20%, but not more than 50% [12], [13].

In further research, it is planned to study the dependence of the efficiency of crushing the initial material in centrifugal-impact crushers on its hardness according to the M.M. Protodiakonov scale at different speed modes of the crusher operation. Moreover, it is expedient to determine the dependence of the yield of individual “cubiform crushed stone” subtypes, namely, tetrahedral, cubiform, single and paired pentahedral, hexahedral, heptahedral, octahedral, on the speed mode of crushing, in particular, on the departure speed of the initial material lumps from the accelerating rotor.

It is advisable to determine the specified dependencies in the form of statistical mathematical models, for which the corresponding planned experiments should be performed. In the future, this will make it possible to predict the qualitative and quantitative indicators of “cubiform crushed stone” depending on the original rock strength, the speed operating parameters of crushing.

4. Conclusions

The paper scientifically substantiates the optimal speed modes of centrifugal crusher operation, which provide the production of high-quality crushed stone with a maximum content of cubiform fractions of 90-95%.

In particular, it has been determined that:

– for the production of cubiform crushed stone of -50.0 + 20.0 mm grain-size, a reasonable mode of centrifugal crusher operation is a speed mode of 400-500 min^{-1}, which provides the speed of crushed material departure from an accelerating rotor of 45-50 m/sec;

– for the production of cubiform crushed stone of -40.0 + 20.0 mm grain-size, a rational mode of centrifugal crusher operation is a speed mode of 200 min^{-1}, which provides the speed of crushed material departure from an accelerating rotor of 25 m/sec;

– in the production of cubiform crushed stone of -20.0 + 10.0 mm grain-size, a scientifically substantiated mode of centrifugal impact-crusher operation is a speed mode of 600-650 min^{-1}, or 70-80 m/sec for the studied rocks;

– the maximum content (95%) of cubiform fractions in the -20.0 + 10.0 mm grain-size class is achieved with the crusher rotor rotation frequency of 650-700 min^{-1}, which corresponds to the speed of material departure from the rotor of 75-80 m/sec. In this case, the maximum yield (25%) of this grain-size class is achieved;

– the maximum content (94-95%) of cubiform crushed stone in the -10.0 mm class is achieved with a speed mode of the crusher accelerating rotor rotation frequency in the range of 700-800 min^{-1}, that is, at a speed of material departure from the accelerating rotor of 70-80 m/sec.

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Визначення раціональних режимних параметрів дроблення граніту для одержання кубовидного щебню

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Мета. Визначення раціональних режимних параметрів дроблення граніту ударом в полі відцентрованих сил для одержання кубовидного щебню. Для досягнення поставленої мети поставлена задача встановити режимні параметри отримання основних класів крупності: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0 та -10.0 + 5.0 і 5.0 мм.

Методика. Дослідження дроблення гранітного щебню проводились в умовах Коломоєвського гранітного кар'єру, Дніпропетровська область. Дробленню піддавали гранітний щебінь вихідної крупності 100-0 мм і маркою міцності М1400. Частота обертання розгінного ротора склала проєктну величину n = 200-1200 хв$^{-1}$. Дрібне дроблення граніту здійснювалося в дробарці відцентрово-ударного типу вільним ударом в полі відцентрових сил.

Результати. Обґрунтовано оптимальні швидкісні режими роботи відцентрових дробарок, які забезпечують отримання високоякісного щебню з максимальним вмістом кубовидних фракцій 90-95%.

Наукова новизна. Отримано залежності виходу класів крупності -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 і 5.0 мм від швидкісного режиму роботи відцентрової дробарки.

Практична значимість. Встановлено режимні параметри отримання основних класів крупності кубовидного щебню з граніту: -50.0 + 20.0; -40.0 + 20.0; -20.0 + 10.0; -10.0 + 5.0 і 5.0 мм. Зокрема, встановлено, що для виготовлення кубовидного щебню крупністю -50.0 + 20.0 мм обґрунтована швидкість обертання ротора – 400-500 хв$^{-1}$ (швидкість вильоту матеріалу з розгінного ротора 45-50 м/с); кубовидного щебню крупністю -40.0 + 20.0 мм – швидкісний режим 200 хв$^{-1}$ (25 м/с); кубовидного щебню крупністю -20.0 + 10.0 мм – відповідно 600-650 хв$^{-1}$ (70-80 м/с). Максимальний вміст кубовидних фракцій в класі крупності -20.0 + 10.0 мм 95% досягається при швидкості ротора 650-700 хв$^{-1}$ (швидкість вильоту 75-80 м/с). Максимальний вміст кубовидного щебню в класі -10.0 мм, а саме 94-95% досягається при швидкості розгінного ротора в межах 700-800 хв$^{-1}$ (швидкість вильоту 70-80 м/с). Одержані дані практично уможливлюють вибір раціонального швидкісного режиму роботи відцентрово-ударної дробарки для одержання максимального виходу кубовидного щебню.

Ключові слова: *граніт, дроблення, кубовидний щебінь, відцентрово-ударна дробарка, режимні параметри*