

## **CHARACTERISTICS OF THE CRUSHING EQUIPMENT**

Nowadays, various types of crushing machines are created. According to the classification of A.P. Garshin, V.M. Gropianov and Yu.V. Lagunov, the equipment on the principle of mechanical action on crushed material is divided into such groups.

The first group is shredders for crushing. The crushing in them occurs by crushing or erasing, as a rule, with a low rate of action on the material that is crushed. This class of crushing equipment includes run, jaw, roll crushers. The equipment has a high performance (0,1 ... 40 t/h) and allows to get a product with a particle size of 2 ... 5 mm, which is most often used for further crushing on equipment of the second type.

The second group is spice grinding machines, intended for medium and fine grinding. The grinding in them occurs due to the impact and washing action on the material, unprotected crushed bodies. This group of crushers primarily includes ball, rod, tube and gravity mills. The productivity of these mills is 0.1 ... 10 t/h.

The third group is shredders, intended for rough, medium and fine crushing of materials of average plasticity. Crushing occurs due to a shock or crushing effect on the grinding material, rigidly or hinged fixed grinding elements, the relative speed of which has a high value. Such aggregates include hammer crushers, disintegrators, as well as mid-range ball and roller mills, reflecting rotary mills.

The fourth group is shredders for small and fine (colloidal) crushing of brittle and solid materials. At the heart of the process, as a rule, is the washing effect of the crushed bodies on the material that is shredded, or a shock effect with a high frequency. The final size of the powder particles at the same time is 0.5 ... 60 microns. The productivity lies within  $10^{-3}$  ...  $10^{-2}$  t/h. This group includes vibration, attitudinal and planetary mills.

Fifth group is shredders with a stationary crushed body. Applicable for fine shredding of plastic materials. The crushing takes place due to the free impact on the stationary obstacle (plate) of particles of the source material moving at a speed of 200 ... 250 m/s. This group includes pneumatic reflective mills and blasting mills.

The sixth group is shredders, in which the material is crushed by the coils of particles of the source material, which move at high speed, in free flight. The size of the resulting powder particles is generally less than 60 microns. This group includes vortex and jet mills.

The seventh group is shredders, in which the crushing occurs due to vibrational cavitation effect on the particles in the liquid. High-frequency (1 ... 103 Hz) vibrational cavitation effects are generated by the rotation of discs, rolls, gear wheels moving in a liquid, or electric discharge in a liquid. Such shredders include vibrocloud, cavitation and electrohydraulic mills [1; 2].

In addition to the considered, there are two more groups of shredders, which are becoming more and more used in practice. They are ultrasonic and electroerosive shredders.

Most often in the production of ball, vibration, attritor, vortex and jet mills are used, and as equipment for preliminary preparation of raw materials are jaw and hammer crushers.

The crushing is widely used in the processing and food industry to produce raw materials or semi-finished products with parts of such size that can significantly facilitate or accelerate heat treatment, transfer, transportation, dosing and other processing processes.

The crushing of raw materials or foodstuffs takes place by crushing, cutting, wiping and impacting.

Preferably, the crushing is carried out under the action of a combination of one or another method. So the crushing of solid materials is carried out by crushing and impact, and viscous materials is carried out by crushing and rubbing.

It is possible to carry out the following classification of equipment for grinding food raw materials:

- roller machines;
- crusher (disk, hammer, pin);
- mill (ball, combined, disk, pin, hammer);
- cutting machines (vegetable cutters, beetroot cutters, mandoline);
- meat grinders (cutters, colloidal mills);
- homogenizers (valve, disk, ultrasound) [3].

However, the analysis of existing methods shows that universal mills that could effectively replace the existing types have not yet been created. Mills in industrial practice as well as for research work should be selected taking into account the specific properties of the crushing material and the necessary characteristics of the final product.

Of course, the development or selection of a different machine, based on the optimal values of the finished product of the given dispersion per unit of energy consumption. That is why the energy hold-up for optimum run-off of the crushing mode is significant.

## REFERENCES

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