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BASIC ENERGY ASSUMPTIONS FOR SOLID WASTE DISPOSAL

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ABSTRACT

In the crushing chamber, the crushing process of the waste constituents occurs as it moves from the receiving hole to the outlet hole. As a result of the impact of the hammers and the return of the plates and columns to the grate, the material moves under the influence of gravity as a result of the collision of the components of the waste. The behavior of the waste organizers depends on random factors such as the shape and size of the waste organizers, the physical properties of the material, and the position of the waste organizers against the impact of the hammer.

Keywords: paper and cardboard; food waste; metal (black and white); plastic; leather and rubber; bottle; wood, waste, efficiency criteria.

INTRODUCTION

The amount of energy required to grind a material to a certain size depends on many factors such as size, shape, relative position of the pieces, strength, brittleness, homogeneity of the original material, its moisture content, the size of the working surface. rhinitis and condition and other similar factors. Therefore, it is necessary to establish an analytical relationship between energy consumption and grinding, which is only a general view of the physical and mechanical properties of the grinding material and the results of the process.

The study of the energy intensity of the grinding process has been going on for a long time. In 1867, one of the first prof. P. Rittinger hypothesized that the work done by crushing the material was proportional to the newly formed surface: $A = K\Delta F$ (1)

where K – the proportionality coefficient; ΔF – surface area.

This hypothesis is called the second law of scattering or the law of volumes.

The dimensions of the newly formed surface can be expressed in terms of the initial and final dimensions of the crushed material, if the size of the average piece of material is not one piece Q (m^3) is equal to the Rittinger's law. D_{CB} The expressive formula is as follows.

$$A = K_R(i-1)Q / D_{CB} \quad (2)$$

It is very difficult to determine the proportionality coefficient between K_R the spent work and the newly formed surface, which in itself reduces the practical significance of this formula.

In 1885, Professor F. Kick, based on a formula in the theory of elasticity, determined the deformation of the work as follows.

$$A = \sigma_{СЖ}^2 V /(2E) \quad (3)$$

where $\sigma_{СЖ}$ – the stress resulting from deformation; V – the volume of the deformable body; E – elastic modulus.

According to the theory he raised, the energy required to uniformly change the shape of geometrically similar and homogeneous bodies would be proportional to the size or mass of the body.

Later, this hypothesis came to be known as the first law of scattering, or the law of surfaces.

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It was later proved that Professor V.L. Kirpichev also proposed this connection in 1874, long before F. Kick, based on the general law of similarity. Therefore, the second law of scattering is called Kirpichev-Cook's law.

According to this law, D a piece of size is crushed

$$A = K_2 D^3 \,, \qquad (4)$$

where K_2 is the proportionality coefficient

If the material $D_{ÑB}$ with the average size of the pieces Q (kg) enters the crumb, making the appropriate changes, we obtain:

$$A = K_k Q \lg \frac{D_{CB}}{d_{CB}} \,, \qquad (5)$$

This formula represents the Kirpichev-Kik law.

Kirpichev-Kick's law determines the energy expended on the elastic deformation of a material, does not take into account the newly formed surface, so this law is also valid because the main energy spent on the deformation of the material during the grinding process. Rittinger's law does not take into account the energy expended on elastic deformation, it is closer to the process of grinding (flouring) and forms a new surface by intense friction.

In 1940, academician Rebinder proposed the formula for energy consumption in fracturing.

$$A = K\Delta V + \sigma\Delta F \,, \qquad (6)$$

Here K, σ – the proportionality coefficients are: ΔV – deformed volume; ΔF – newly formed surface. There are no clear guidelines for the selection of the proportionality coefficient based on the specific situation. In this regard, this formula is not widely used.

In 1949, F. Bond proposed another hypothesis as the third law of decay. According to this hypothesis, the elementary work expended on grinding is proportional to the median growth between the volume and the resulting surface:

$$dA = K_B d(\sqrt{VF}) \,, \qquad (7)$$

where K_B is the proportionality coefficient.

According to B. Klushantsev, the above assumptions should be considered not as a law, but as an assumption, they are the practical results of the grinding process, and we must take into account the wide range of properties and size of the finished product.

The bonding work on the bond is 2.5 times proportional to the diameter of the first piece. Thus, Bond's hypothesis is considered to be proportional to the square and cube of the diameter of the first piece between the Rittinger and Kirpichev-Kick hypotheses.

The formula for the Bond hypothesis is as follows:.

$$A_Б = K_Б Q(\sqrt{i} - 1)/\sqrt{D}, \qquad (8)$$

In 1954, A. Rundqvist proposed a generalized formula that expresses that the elementary work of crushing a piece of material is proportional to the elementary change in its size to some extent.

$$dA_0 = Kd(D^{4-n}), \qquad (9)$$

where K – the proportionality coefficient; (4-n) is an experimentally determined degree indicator.

In this formula, n the degree indicator is 2; 1.5; Assuming equal to 1, it is possible to formulate the Rittinger, Bond, and Kirpichev-Kik hypotheses, respectively.

R. Rodin made an interesting energetic hypothesis, according to which the disruption of a piece of rock with a straight spherical shape and isotropic properties consists of the following steps:

Occurrence of relevant and elastic deformation of the parts (Figure 2.1, section 0-1);

formation of a complex compression zone, its growth and formation until the appearance of effective cracks (1-2 sections);

the appearance of effective cracks and its growth to critical dimensions (2-3 plots);

rapid enlargement of effective cracks (3-4 sections) and complete depletion of elastic energy reserves until the crumbling part is completely destroyed.

For example, the work spent on compaction deformation shown in Figure 2.1 was about 80% of the work spent on crushing hard limestone, and about 35% was spent on crushing medium-strength limestone.

The proposed hypothesis can be described as follows: the work done in the unit deformation of a piece of rock is proportional to the work done to form new surfaces, and the friction between the formed surfaces is in the compression zone on all sides.

CONCLUSION

A careful analysis of the essence of the above hypotheses suggests that none of the hypotheses in the theoretical determination of the spent energy gives a satisfactory result, even in short-term cases, for example, in the laboratory it is difficult to determine the energy expended in breaking a single piece of isotropic material. As many authors have pointed out, even new hypotheses only complicate the calculation of the energy expended on scattering, despite corrections and additions to the basic hypotheses under consideration.

If we take into account the nature of the primary anisotropic material, especially at the boundary of a place, and the nature of the decomposition process, which depends on many random conditions, then the information about all parameters of the process is not only complex but impossible.

We conclude from the fact that solid household waste is not multi-component and homogeneous, and in an anisotropic environment we can use these assumptions in initial calculations.

In determining the main parameters of the transmission, such as power, performance and design technology, we take as a basis one of the main assumptions (Bond hypothesis) and enter the parameters obtained through experimental studies to clarify it.

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