

METHOD FOR DETERMINING THE DEGREE OF CRUMBLING OF THE INCISION IN GROUND PROCESSING

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It is known that the main parameters of machine separators are determined based on the hardness of the pieces in the ground to be processed . [1] Generally, the universal pendulum device shown in Figure 1 is used to determine the degree of grinding of a piece under different conditions under the influence of different forces .

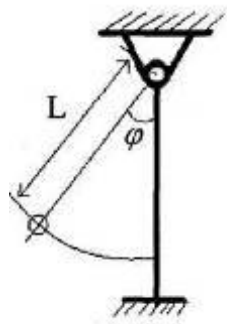


Figure 1. Universal pendulum device.

provides an opportunity to study the crushing of pieces under direct, oblique and test blows by striking them on various surfaces . Different speeds are achieved by changing the angle of deviation, the length of the cut.

consists of three stages. In the first stage, the pendulum device rotates around the 0-point with the cuttings installed on the tip . We use the theory of laws of change of kinetic moment to study the movement

$$\frac{dK_0}{dt} = M, (1)$$

where K_0 is the kinetic moment of the system relative to the "o" axis; M is the head moment of external forces relative to the "o" axis.

the length of the pendulum, which is much larger than the dimensions of the cross section, and the main moments of the external forces are the following quantities:

$$K_0 = \frac{1}{3}(3m_2 + m_2)L^2 \omega, (2)$$

$$M = -\frac{1}{2}gl(2m_1 + m_2)\sin \varphi (3)$$

where φ is the angle of deviation of the pendulum relative to the vertical axis. Taking into account the relations (1), (2) and (3), the theorem on the change of kinetic moments with time will have the following form.

$$\frac{1}{3}(3m_1 + m_2)l^2 \omega \frac{d\omega}{dt} = -\frac{1}{2}gl(2m_1 + m_2) \sin \varphi, \quad (4)$$

the factors in this differential equation based on the initial conditions $\omega = 0$, $r = a$, $\varphi = \alpha$, and determine the angular velocity of the system depending on the angular deflection

$$\omega = \sqrt{\frac{3(2m_1 + m_2)}{(3m_1 + m_2)l} g(\cos \varphi - \cos \alpha)}, \quad (5)$$

Based on this expression, when $\varphi = 0$, the angular velocity of the suspension corresponding to the time when it hits the vertical plane and the linear velocity of the body are the following quantities.

$$\omega_1 = \sqrt{\frac{6(2m_1 + m_2)}{(3m_1 + m_2)l} g \sin \frac{\alpha}{2}},$$

$$v_1 = \sqrt{\frac{6(2m_1 + m_2)gl}{3m_1 + m_2} \sin \frac{\alpha}{2}}$$

In the process of impacting a piece on a vertical plane, forces N_1 from the side of the plane and N_2 from the suspension side act on it. Based on the theory of impulses

(8)

$$m_1 v_2 - m_1 v_1 = R_e \Delta t,$$

where v_2 is the return speed;

R_e - the main vector of external shock forces;

Δt ;- shock time;

(8) is the coefficient of speed recovery factors in Eq

Taking into account k and projecting onto the "x" axis, we get the following

$$mv_1(l + k) = N_1 \Delta t - N_2 \Delta t \quad (9)$$

Impulses of moment change about the theorem support, angle speed line speed through expressing don't hang blow reaction the amount we define:

$$N_2 = \frac{m_2 v_1}{3\Delta t} (L + k) \quad (10)$$

N_2 reaction into equation (9), we get the following expression.

$$N_1 = \frac{(3m_1 + m_2)(l + k)v_1}{3\Delta t} \quad (11)$$

Substituting the linear velocity of the section from the equation (7), we get the following.

$$N_1 = \frac{l+k}{3\Delta t} \sqrt{6(3m_1 + m_2)(2m_1 + m_2)gl \sin \frac{\beta}{2}} \quad (12)$$

necessary to ensure that the impact reaction N_1 force cuts k and crushes it. The advantage of the pendulum device is that they allow the detection of even very low velocity impact forces by the deflection angle. The initial conditions for this type of action are as follows:

$$t = 0, \varphi = 0, \omega = \omega_2 = \frac{v_2}{l}$$

Putting these initial conditions into equation (12) and integrating it, we get the following equation

$$\frac{1}{3}(3m_1 + m_2)l\omega_2^2 = (2m_1 + m_2)g(l - \cos \beta) \quad (13)$$

In turn, this equation allows determining the initial angular and linear velocities when the pieces hit the surface.

$$\omega_2 = \sqrt{\frac{6g(2m_1 + m_2)}{l(3m_1 + m_2)} \sin \frac{\beta}{2}} \quad (14)$$

$$v_2 = \omega_2 l = \sqrt{\frac{6gl(2m_1 + m_2)}{(3m_1 + m_2)} \sin \frac{\beta}{2}} \quad (15)$$

If the coefficient of speed recovery is caused by the quantity ξ , we determine the shock reaction, taking into account the formulas (7) and (15)

$$N_1 = \frac{\sin \frac{\alpha}{2} + \sin \frac{\beta}{2}}{3\Delta t} \cdot \sqrt{6gl(3m_1 + m_2)(2m_1 + m_2)} \quad (16)$$

Conclusion: The mentioned relationships allow to determine the average amount of shock forces affecting the sections of the pendulum suspension through the angles of change before and after the impact. This, in turn, can serve as a basis for determining the parameters of the working parts of the grinding machine.

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