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CONDITIONS IN WICH LIMIT SPEED LINK HOLDER EQUIPMENT DITCH ATTACHED MACHINERY WITH BASE MACHINE OVERHEAD LOADER

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ABSTRACT

The paper studies conditions in wich limit speed link holder equipment ditch attached machinery with base machine overhead loader. Along the abbreviate calculations on explore condition stability landportiere range the cutter plate.

1. Introduction

The link holder equipment assembled to base machine overhead loader are from the group of trench excavators.

In construction to these equipments, a large area have the operating part sort knife which, in analogy with sort buckets, have a smole mass, which take to decrease the dynamic effects in chain, increase his speed and increase the capability of machine.

2. The considerate elements

Unloading of the earth of knifes do to fore part, which take increase the crossed speeds of knifes.

But are some conditions which limit the speed of chain, thatis:

- cutting speed must assure gravitation discharge of the cutter knifes;
- the path to fall of earth must join in feeding area of the conveying spiral.

The quantitive knowledge to influence of speed chain about the performances of discharge is very useful in activity of projecting equipment.

These influence is establish function by angle of tilt of chain and by the length space covered by knife for earth discharge.

Either the reference system $x_1O_1y_1$ solidary with the knife and the forces who drive about earth particle with mass m_0.

The condition for equilibrium of earth particle on knife surface in the reference system $x_1O_1y_1$ is:

$$m_0 g\cos(\theta - \delta) - \mu_1 m_0 g\sin(\theta - \delta) + m_0 a \quad (1)$$

or $\ddot{x}_1 + g[\cos(\theta - \delta) - \mu_1 \sin(\theta - \delta)] = 0$, (2)

where: g is gravity acceleration; θ, δ - the angles of declivity chain, respectively of knife surface; μ_1 - frictional coefficient earth-knife.

Intregating equation (2) on establish:

$$x_1 = \frac{1}{2} g[\cos(\theta - \delta) - \mu_1 \sin(\theta - \delta)]t^2 \quad (3)$$

where: t is the necessary time for earth discharge to the knife.

The relative speed of earth particle v_1, who drop to the knife, is:

$$v_1 = \sqrt{2gl_c\{g[\cos(\theta - \delta) - \mu_1 \sin(\theta - \delta)]\}} \quad (4)$$

where l_c is length surface of knife.

The absolute speed of particle given the fixed system xOz - earth – is:

$$v = \sqrt{v_1^2 + v_2^2 + 2v_1v_2\sin\delta}, \quad (5)$$

where v_2 is the chain speed.

The chain speed, function to the machine speed and the section of delved ditch, is:

$$v_2 = v_d \frac{BHp}{3600\, V_c k_a}, \text{ [m/s]} \quad (6)$$

where: B, H are the breadth and depth of ditch; p - the step from the knife; V_c - the earth volume transported by one knife; k_a - the break up coefficient.
The angle of the earth particles who abandon thr knife surface is:

$$\gamma = arctg \frac{v_1 \cos\delta - v_2 \sin\theta}{v_1 \sin\delta + v_2 \cos\theta}. \qquad (7)$$

The covered space by knife on the moment of earth discharge, is:

$$S_c = v_2 \sqrt{\frac{2l_c}{g[\cos(\theta - \delta) - \mu_1 \sin(\theta - \delta)]}}. \qquad (8)$$

In the reference system xOz the earth particle trajectory droped to the knife on write:

$$z = (x - S_c \cos\theta) tg\delta - \\ - \frac{g(x - S_c \cos\theta)^2}{v^2 \cos^2\gamma} + S_c \sin\theta \qquad (9)$$

The best distance for complete discharge to earth from the knife, on deduct by equation $z = 0$, that is $x_0 = max(x_I, x_{II})$, where:

$$x_{I,II} = \frac{v^2 \sin 2\gamma}{2g}\left(1 \pm \sqrt{1 + \frac{2gS_c \sin\theta}{v^2 \sin^2\gamma}}\right) + \\ + S_c \cos\theta. \qquad (10)$$

3. Conclusion

For ensure the best run of equipment on select adequate the chain speed (correspondingly with the machine speed on the work process) and the discharge parameters of operating part.
These reduce the earth overflowing in the delved ditch.

4. References

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