International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 9 Issue 02, February-2020

Detection of Influencing Forces of Cotton Flier on the Elastic Plate of Impurity Taking Grid of the Cleaner

Abrorxon Axmadxonovich Maxmudov [1], Aliyev Botirjon Toxirjonovich[2], PhD Abdug'ani Bobomatov[3]
Department General Mechanics,
Namangan Institute of Engineering and Technology, Namangan,
Uzbekistan

***Abstract*:- The article says that the use of elastic plates of steam-brush cleaner cotton allows a significant increase in the cleaning effect due to the additional shaking pappus chooses cotton elastic plates. The latest researches showed that the elastic plate vibrations occur impact on its pappus of raw cotton. The frequency and amplitude of oscillation of the elastic plate depends mainly from masses of cotton pappus, the rotation speed of the drum stick; the gap between the pegs and the surface of the elastic plate; geometric parameters of the elastic plate; and the other plate material. The calculations are built graphic changes depending on variations in strength of the perturbation masses of cotton pappus, the radius of the drum stick and frequency of its rotation. According to researches we can see that these curves have a straight character. This to obtain the amplitude of oscillations of elastic plates in the range (1.4-1.6) 10-3m necessary for effective cleaning of raw cotton acceptable values of the mass of the plate (0.35-0.45) 3.10 kg and the radius of the drum stick 0 20-0, 25m.**

Keywords: Elastic plate, Cotton cleane, Radius stake drum, Amplitude of fluctuations.

INTRODUCTION

Application of elastic plates in impurity taking grids of cotton cleaner allows substantial growth of cleaning effect due to additional jarring of cotton flier vibrated elastic platlets [1]. Fluctuations of an elastic plate occur under the influence on it by cotton flier. Frequency and amplitude of fluctuations of an elastic plate depends basically: from the weight cotton flier, rotation speed of stake drum; clearance between stakes and surface of the elastic plate; geometrical parameters of the elastic plate; material of plate etc. On fig. 1a shows the circuit of an elastic plate impurity taking grids of cotton cleaner from fine rubbish. Cotton flier operates on an elastic plate under the corner of $\theta_{пл}$. Therefore vertical making forces of action $F_в$ which results in fluctuations of the end of a plate in a vertical direction:

$$\overline{F}_в = \overline{F}_в + \overline{F}_{в_1};$$

$$F_{в1} = F_в \sin\theta_{пл};\ F_в = \sqrt{F_{в_1}^2 + F_{в_2}^2} \quad (1)$$

HEADINGS

Where, $F_{в_1}, F_{в_2}$ - vertical and horizontal making revolting forces from cotton flier.

Cotton flier in a zone of clearing of surface of stake drum 1to surfaces of the elastic plate 3 impurity taking grids 2 are overcome with distance on radius of a drum 1:

$$X_л = \Delta + h_к = \Delta + (R_1 + R_2) \quad (2)$$

Where, $h_к$ - the height is caustic 4; Δ - clearance between stakes 4 and the plate 3.

Flight of cotton flier from the end of stake occurs at linear speed:

$$V_к = \omega_\delta R_1 = (\omega_{ср} + \omega_1 \sin\omega_{ср} t) R_1$$

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TABLES, FIGURES AND EQUATIONS

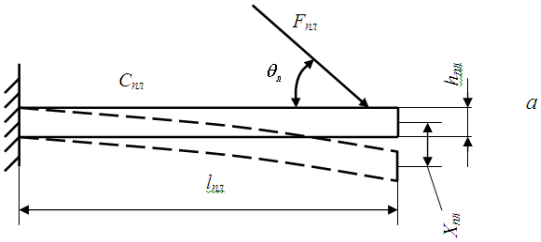

Fig: 1. - The Circuit of the elastic plate

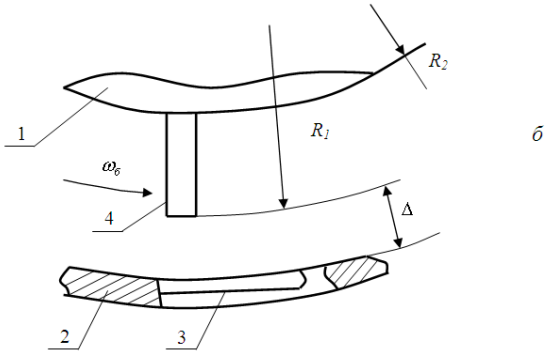

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Fig: 2. - The circuit of cotton clearing zone

Equations.

Thus, cotton flier after the flight from the end it is stake interactions with the elastic plate overcomes distance minimum equal to the clearance Δ. If speed of accompanying air stream and small value of clearance Δ can be asserted, that change of speed $V_л$ will be insignificant. Taking into account normal acceleration of flier $a_n = \omega_\delta^2(R_1 + \Delta)$, And also time $t = \sqrt{2(R_1 + \Delta)/a_n}$ can define speed flier at the beginning of interaction with the elastic plate:

$$V_л = (\omega_{ср} + \omega_1 \sin \omega_{ср} t)\sqrt{2R_1(h_k + \Delta)} \quad (3)$$

According to the work [58, 60] force of interaction of flier with the plate:

$$F_л = m_n \cdot \frac{dv_л}{dt}$$

Or $F_л = m_n \cdot \omega_1 \omega_{ср} \sqrt{2R_1(h_k + \Delta)} \cos \omega_{ср} t$ (4)

From the received formula (4) it is visible, that with increase of weight cotton flier, frequency of rotation, radius stake drum on linear law from flier the amplitude of fluctuations of revolting force grows by an elastic plate impurity taking grids of a cleaner. The numerical decision of task carried out at the following values of parameters: $m_n = 0{,}2 \cdot 10^{-3} кг; R_1 = 0.25 м; \Delta = 0{,}016\, м; \omega_{ср} = 50{,}24 c^{-1}; \omega_1 = 12{,}5 \cdot c^{-1}$; $h_k = 0.06 м.$

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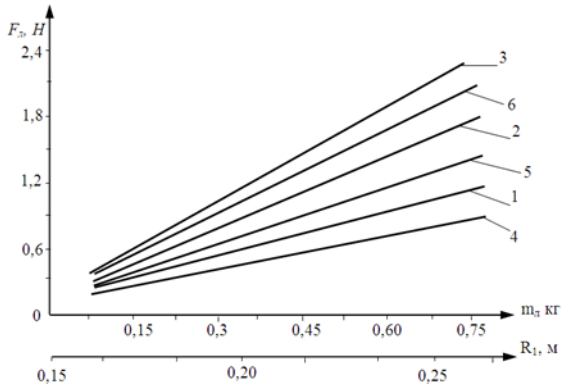

Fig: 3. - Dependences of influence force change of cotton flier, on the plate of impurity taking grids at change of cotton weight and radius of stake drum and frequency of its rotation

where, 1,2,3- $F_u = f(m_л)$,

1-at $\omega_{cp} = 50{,}24c^{-1}$;

2-at $\omega_{cp} = 57{,}5c^{-1}$;

3-at $\omega_{cp} = 62{,}3c^{-1}$

4,5,6- $F_u = f(R_л)$,

4-at $m_n = 0{,}2г$;

5-at $m_n = 0{,}4г$;

6-at $m_n = 0{,}6г$

CONCLUSION

By results of calculations graphic dependences of change of indignation force on a variation of cotton flier weight, radius stake drum and frequency of its rotation which are given on fig. 2 are constructed.

The received dependences have rectilinear character. For the receiving fluctuation range of the elastic plate in limits (1,4-1,6) 10^{-3}м necessary for effective clearing of cotton by acceptable values of the plate weight (0,35-0,45)10^{-3} kg and radius stake drum 0,20-0,25м

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