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EXPERIMENTAL DETERMINATION OF THE FRICTION COEFFICIENT BETWEEN THE SEED AND THE WORKING SURFACE OF A COMPOSITE COLUMN IN LABORATORY CONDITIONS

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ABSTRACT: The speed of rotation of the raw material is important in increasing the efficiency of the saw fiber separator. Therefore, the coefficient of friction of materials in the working chamber should be taken into account. This research work is based on determining the results of the friction coefficient of the working surface of columns by comparing it with several materials. The experience was determined experimentally in laboratory conditions. The purpose of the research is to remove the fiber and seed from the working chamber in time without staying on the column. As a result, the efficiency of the saw fiber separator is greatly improved.

KEYWORDS: Friction coefficient, composition column, material, stainless steel, device, 32НК-ВИ, В2Ф grade steel, cast iron, grade, seed, laboratory, practical, working chamber.

INTRODUCTION

Large-scale scientific research is being conducted in the world aimed at improving the technology of pre-treatment of cotton, including the process of separating cotton fiber from the seed, techniques and technology. In this direction, among other things, the scientific foundations of increasing the efficiency of the cotton ginning process are being developed, and attention is being paid to improving product quality and reducing costs by accelerating the wide introduction of scientific and modern techniques and technologies into production. At this point, in the process of separating cotton fiber from seed, maintaining the initial quality indicators of fiber and seed, reducing energy consumption in the process, creating technologies that can manage product quality, and perfect equipment that consumes less material and energy have risen to the level of current issues of the industry. [1-2]

Main Body

The process of studying the coefficient of friction of materials was carried out on the T25 model device for determining the coefficient of friction, which is available in the laboratory department of the Namangan Engineering Technology Institute. In determining the coefficient of friction, the actual cast iron column material, B2F steel and 32HK-VI stainless steel materials were taken for the experiment. For the experiment, seed and seeded cotton of Andijon 35 tezsion, II industrial grade were taken.

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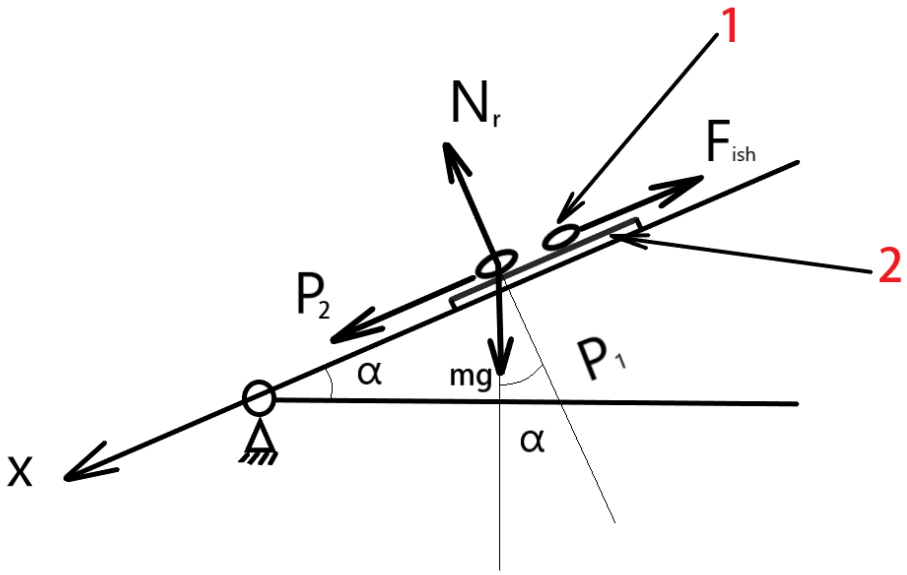

Figure 1. Constructive scheme of interaction of seed (1) and material (2) on an inclined plane

From (Figure 1), the following expressions are derived to obtain the results.

$$P_1/mg = \cos\alpha \qquad (1)$$

here: P_1 = gravity of the thing, N;

m = the mass of thing, kg;

g – acceleration of free fall, N/kg.

According to Newton's 3rd law, so that the thing does not sink and the support does not break, we take $P_1 = N_r$

$$P_1 = mg\cos\alpha, \qquad N_r = P_1 = mg\cos\alpha; \qquad (2)$$

The formula for determining the coefficient of friction is as follows:

$$F_{ish} = mgf * N_r \qquad (3)$$

here: F_{ish} – friction force:, N;

f - friction coefficient;

N_r – reaction force,N.

That is, formula (3) takes the form as follows: $F_{ish} = mgf * \cos\alpha$.

There is no possibility that the seed will rise up, but instead it will move down under the influence of the force of theft.

$$P_2 / mg = \sin\alpha \qquad (4)$$

$$P_2 = mg\sin\alpha, \qquad F_t = P_1 = mg\cos\alpha; \qquad (5)$$

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P_2 is always the projection of mg that causes the seed to fall down. If the force coefficient is equal to 0, the seed can move straight down.

In that case,

$$mg + N_r - F_{ish} = 0 \quad (6)$$

$$mg \sin\alpha - mg\, f \cos\alpha = 0, \text{ ya'ni } f = \sin\alpha / \cos\alpha = tg\alpha \quad (7)$$

So, the coefficient of friction is equal to (f) ► (tgα)

The results of the practical research were determined by repeating the experiment 3 times. For the experiment, cotton with a mass of 5.459 g and 1 piece of seed with a weight of 0.164 g were taken. The result of the above materials is as follows ;

In В2Ф brand steel sheet material:

mass 5.459 g in seeded cotton is $f = \sin\alpha / \cos\alpha = tg\alpha = 30^0 = 0{,}57$.

1) $tg\alpha = 32^0 = 0{,}62$ in 1 seed weighing 0.164 g.

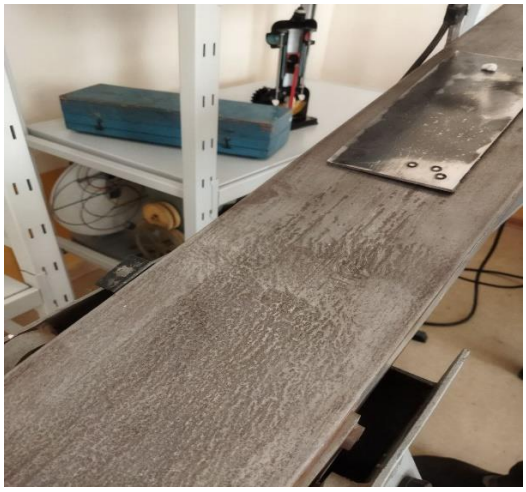
СЧ15-32 cast iron material:

1) $f = \sin\alpha / \cos\alpha = tg\alpha = 37^0 = 0{,}75$ in seeded cotton with a mass of 5.459 g.

2) $tg\alpha = 38^0 = 0{,}78$ in 1 seed weighing 0.164 g.

32НК-ВИ grade stainless steel sheet material:

1) $f = \sin\alpha / \cos\alpha = tg\alpha = 25^0 = 0{,}46$ in seeded cotton with a mass of 5.459 g.
2) $tg\alpha = 26^0 = 0{,}48$ in 1 seed weighing 0.164 g.



a)

b)

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Figure 2. 32 Determination of friction coefficient in 32 НК-ВИ brand material (a) and (b) degree indicator of the device

CONCLUSION

In the process of scientific research, the coefficient of friction was found to be μ=0.75 and 0.78 in the cast iron column material, μ=0.57 and 0.62 in the В2Ф brand steel sheet material, and in the 32НК-ВИ brand stainless steel sheet material. μ=0.46 and 0.48 were obtained. It can be concluded that it is appropriate to select and use 32НК-ВИ brand stainless steel sheet as the material with the lowest friction coefficient for the working surface of the new structure of the column. The conducted case study is presented in (Fig. 2).

By introducing the new composition of the column to the sawed gin machine, it is possible to increase the productivity and the seed falls from the smooth surface of the column faster than in practice, that is, the coefficient of friction is much lower compared to the current column.

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