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EXPERIMENTAL DETERMINATION OF THE LOAD ON THE MULTIFACETED COLUMNS ON THE ELASTIC SUPPORTS OF THE COTTON GINNER

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Abstract: Based on the experiments conducted with a change in the number of grate faces in the cotton dragging zone, it has a sinusoidal (triangular) shape relative to the cotton along the grate faces, with a different angle of location, which leads to the release of impurities of various masses and different depths of presence in the cotton. The force of the impact load has the greatest impact on the amount of released impurities, provided that the natural quality of the fiber is preserved; the distance of the grate from the rotating drum should ensure the free passage of the fly. When a cotton piece hits and interacts with the grate, it is important that the behavior of the specks results in a chaotic arrangement.

Keywords: raw cotton, cleaner, small and large trash, saw, spiked, transporting, drum, belt drive, motion law, motor, angular velocity, torque, power, stiffness, dissipation, productivity, cleaning effect.

Introduction. Analysis of the designs of domestic and foreign raw cotton cleaners from large debris showed that they are based on a set of cleaning modules, each of which includes a grate-shaped saw drum, an abrasive brush, and a removable brush drum.

The main direction for improving and creating new cleaning machines, their working parts, and mechanisms is to expand technological capabilities while maintaining high productivity and cleaning efficiency. When developing new cleaning machines, their elements, it is advisable to preserve the natural and physical-mechanical properties of raw cotton, as well as technological factors and conditions. Such properties of materials as extensibility (deformability), coefficient of friction, density, melting (burning) temperature, thickness, etc., predetermine certain requirements for the design of working bodies. [1,2,3].

With the installation of rotating grate bars, an increase in the number of flakes in the waste and damage to the fibers and seeds are observed. As the distance between the columns increases, the cleaning effect increases, but there is an increase in slime loss to debris.

The main objective of the experimental studies is to study the actual load of the recommended multifaceted grate bars on elastic supports with nonlinear stiffness.

At the same time, it is important to compare the load on the recommended grates with the existing grates in UKHK machines [4,5].

The obtained results will be used in theoretical research, as well as the necessary parameters of the system will be substantiated.

Methods of conducting experimental research.

The load on the conical grates arises when they interact with the raw cotton. At the same time, the grates mainly experience bending deformations [6,7]. Therefore, to measure the bending forces and vibration amplitudes of polyhedral conical grates during their deformation, the strain gauge method was used, the signals were amplified by an amplifier, and the recording was carried out on oscillographic paper [8,9,10].

This method is based on the use of strain gauges (wire strain gauges with a specific base and resistance). This method is based on the use of strain gauges (wire strain gauges with a specific base and resistance).

The experiments were conducted on the UKHK cleaner under factory conditions at the Kagan Cotton Plant in the Bukhara region, on the 1st and 2nd lines of the UKHK cleaner. Figure 1.1 shows experimental samples of multifaceted grate bars (a) and grate bars (b) with multifaceted grate bars, installed on segments through rubber bushings with variable thickness (eccentricity). It should be noted that in each section between the segments, multifaceted conical grates can be installed individually. Figure 1.2 shows photographs of the large-scale cleaning section of the UKHK line with a grate with multifaceted grate bars on elastic supports in working position (a), as well as options for manufacturing rubber bushings with variable thickness (b).

The general view of the UKHK cleaning line with experimental designs of a multifaceted grate on elastic supports is shown in figure 1.2, and figure 1.3 shows the general view of the electrotenzometric apparatus complex for tensometry. Figure 1.3 shows the electro-tenzometry scheme of the cotton cleaner columns. To measure the load on multifaceted columns on elastic supports, the following instruments and sensors were used: ПКБ -20-200,6 wire strain gauge sensors with a base of 20mm, which are glued to the grates in four places (two at the edges and two in the middle between the grid segments) according to a half-bridge scheme; power supply unit, which converts current and voltage for the UT-4 type amplifier; oscilloscope H 042.

When the grate bars are loaded, they deform, that is, they bend.

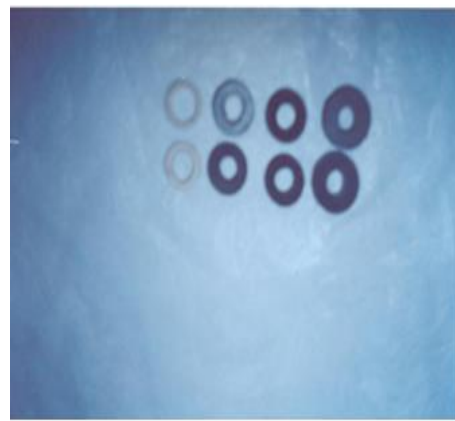
In this case, the wire strain gauges also deform, their resistance changes, which leads to a change in voltage.

These changes and signals are transmitted to the UT-4 amplifier. Enhanced signals are transmitted to an oscilloscope, through which the received signals are recorded on oscillographic paper. In this case, the sensors are calibrated in a static position. In this case, the sensors are calibrated in a static position.

Graphs of the change in the displacement of the oscilloscope probe from the change in the suspended load are constructed.



Fig.1.1. Section of a grate with multifaceted grate bars on elastic supports before installation on a cotton cleaner.



a)

b)

Figure 1.2. a - General view of a multifaceted grate
a - on elastic supports installed in the UKHK cleaner,
b- variants of rubber bushings with different thickness and eccentricity.



Fig.1.3. General view of the electrical measuring equipment complex for tensometry

The grate faces influence the strength of the sliver on the surface of the saw drum, breaking down the cotton density and unloading it repeatedly and evenly on the surface of the saw drum garnish, which allows for efficient removal of impurities from the cotton, resulting in an increased cleaning effect.

The impact load force maximally affects the amount of impurities released, provided that the fiber's natural quality is preserved, the distance of the grate from the rotating drum should ensure free passage of the flakes. During the impact and interaction of the cotton pieces with the columns, it is important that the behavior of the weeds leads to a chaotic arrangement.

Discussion. The force of the impact load has the maximum effect on the amount of released impurities, provided that the natural quality of the fiber is preserved; the distance of the grate from the rotating drum should ensure the free passage of volatiles.

When a piece of cotton hits and interacts with the grates, it is important that the behavior of the grains leads to a chaotic arrangement.

Conclusions. With multifaceted grate bars, it is possible to hold the weakest cotton bolls, this leads to repeated and uniform unloading of the saw drum on the tooth, as well as breaking down the density of the cotton lumps, which allows for efficient removal of impurities from the cotton, resulting in increased cleaning effect.

List of used literature:

1. Нуруллаева, Х. Т. (2023). Анализ и разработка конструктивной схемы обоснование параметров ременной передач с ведомым составным шкивом и с упругими элементами. *European Journal of Interdisciplinary Research and Development*, 15, 387-399.

2. Нематов, А. К., & Нуруллаева, Х. Т. (2023). Разработка конструкций и обоснование параметров ременных передач с составными шкивами с упругими элементами. *European Journal of Interdisciplinary Research and Development*, 15, 354-376.

3. Нуриллаева, Х. Т. (2022). Исследование конструкции колосников очистителей хлопка от крупного сора. *Science and Education*, 3(5), 571-577.

4. Махаммадрасул, Э., Дремова, Н. В., & Нуруллаева, Х. Т. (2021). Методика оценки влияния взаимодействия и отражения продольных волн от поверхности рабочего органа. *Universum: технические науки*, (5-3 (86)), 50-53.

5. Эргашов, М., Дремова, Н., & Нуруллаева, Х. Методика установления зависимости напряженного состояния ремня от конструктивных параметров передаточного механизма. *Universum*, 4-17.

6. Эргашов Махаммадрасул, Надежда Васильевна Дремова, Хосият Тухтаевна Нуруллаева. Алгоритм оценки влияния взаимодействия и отражения продольных волн от поверхности рабочего органа *Научно-технический журнал Титли текстильный журнал Узбекистана* № 3, 31-40

7. Нематов, А. К., & Нуруллаева, Х. Т. (2023). Разработка конструкций и обоснование параметров ременных передач с составными шкивами с упругими элементами. *European Journal of* 8. 8.Mamatova, D., Nematov, A., & Nurullayeva, K.

(2022). Full-factory experimental studies. *European Journal of Interdisciplinary Research and Development*, 2, 34-44.

10. Dilrabo Mamatova, Abbos Nematov, Nadejda Dryomova "Study of the influence of the parameters of the belt drive on the stiffness of the elastic element of the composite tension roller" *Journal For Innovative Development in Pharmaceutical and Technical Science (JIDPTS) Special Issue: International conference on Applied and Natural Sciences (J I D P T S) ISSN(O):2581-6934, 2021, pp. 214-216.*

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