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IMPROVING THE EFFICIENCY OF CLEANING SMALL TRASH FROM SEED COTTON IN THE CLEANING PROCESS

Kadyrova Feruza Muhammadjonovna
Namangan Institute of Engineering and Construction, senior teacher
E-mail: dilmurad1579@mail.ru
Sarimsakov Olimjon Sharipjonovich ,
Namangan Institute of Textile Industry, DSc, Professor
E-mail : olimjon 5008@ mail.ru

Abstract: the article deals with the development of high-efficiency cotton processing technology, the rational arrangement of working bodies, and the determination of movement trajectories of cotton components to ensure high cleaning efficiency.

Keywords*:* cotton, cleaning, dirt, supply drum, pile drum.

Introduction. Creation and improvement of techniques and technologies for cleaning cotton raw materials, including the development of effective techniques and technologies for cleaning cotton, determining the degree of influence of thermal and moisture indicators of cotton on the cleaning process, taking into account that cotton is a multi-component material, mode indicators and fibers of the cleaning process Research is being carried out in several priority directions, such as the development of cleaning parameters that ensure quality maintenance. Several domestic and foreign scientists have researched the improvement of cotton cleaning techniques and technologies, and others have made a significant contribution to the development of the science and technology of the field.

In many studies, the theoretical analysis of the separation of major impurities in cotton from the composition of raw materials, and the effect of cleaning aggregates on the quality of the fiber product, to justify the technological solutions of the cotton processing device, to determine its rational parameters, to develop recommendations for testing and implementation, and to determine the justification criteria corresponding to the cleaning technology.

However, the research carried out so far on cotton ginning is focused on the analysis of technologies and cleaning machines and working parts and mechanisms used in foreign and domestic cotton ginning enterprises and their efficiency improvement. problems of creating new constructions that provide high cleaning efficiency based on determining the movement trajectories of the components have not found an effective solution.

Materials and methods. We have conducted several theoretical and practical studies to create an effective cotton-cleaning technology. In our research, we theoretically analyzed the process of separation of dirt particles from cotton.

of $Rd\alpha$ separation of dirt particles from raw materials, we use G.A. Sevastyanov's model as shown above j [1].

$$\frac{dm_j}{m_j} = \lambda_j \frac{d\rho_j}{\rho_j} (1)$$

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Here $\lambda_j = \frac{1}{1+a_j}$, a_j is a positive constant parameter that is determined empirically. The equation λ_j is for the case where the parameters are constant $m_j(\alpha_j) = m_0$ $\rho_j(\alpha_j) = \rho_0$ Integrating under the condition, m_j we determine the connection between the reduced mass and the raw material density

$$\frac{m_j}{m_0} = \left(\frac{\rho_j}{\rho_0}\right)^{\lambda_j} \quad (2)$$

From the analysis of the formula (2), this inequality should be appropriate for the density of raw materials in each section when the condition of reducing the mass of raw materials is fulfilled. $\rho_j < \rho_0$ The calculation of the cleaning efficiency is determined using this formula [2].

$$\varepsilon_j = \frac{m_0 - m_j}{m_0} = 1 - \left(\frac{\rho_j}{\rho_0}\right)^{\lambda_j} \quad (3)$$

When calculating, the coefficient of friction between the raw material and the surface on the grid surface is determined using this formula:

$$f = f_0(1-\beta), \quad (4)$$

Surface utility coefficient

$$\beta = S_0 / S_t, \quad (5)$$

S_t - the total surface of the grid, S_t - the surface of the open part of the proposed grid surface.

The calculation was performed for the following parameters: $\alpha_0 = 30^0$ $n = 4$ $\alpha_3 = 150^0$ $Q_0 = 12000/3600$кг/с $R = 0.2$м $\omega = 52c^{-1}$ $p_{00} = 1500$Па $v_{00} = 5м/с$ $f_0 = 0.3$ $h = 0.0038$м $L = 1.7$м ρ_{00} coefficient of use of raw material density (a-lines) and speed (b-lines) along the cleaning arc for two values of the initial density of the raw material (without changing the initial speed $\beta = S_0 / S_t$) v_{00} distribution graphs are presented at different values of. (Figures 1, 2)

From the analysis of the graphs, it is observed that the density and speed of the raw material flow at the border of the sectors sharply decrease and increase, respectively, as a result of the impact of piles in the cleaning zone. A decrease in the initial density of the provider during transmission ρ_{00} can lead to a decrease in the maximum values of the quantities in the graphs. The usage coefficient has a high influence on the regularity of distribution of densities and speeds in the cleaning zone. β In its small sections, it can be observed that sharp changes in density and speed at the sector boundaries are at a high level.

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a) **b)**

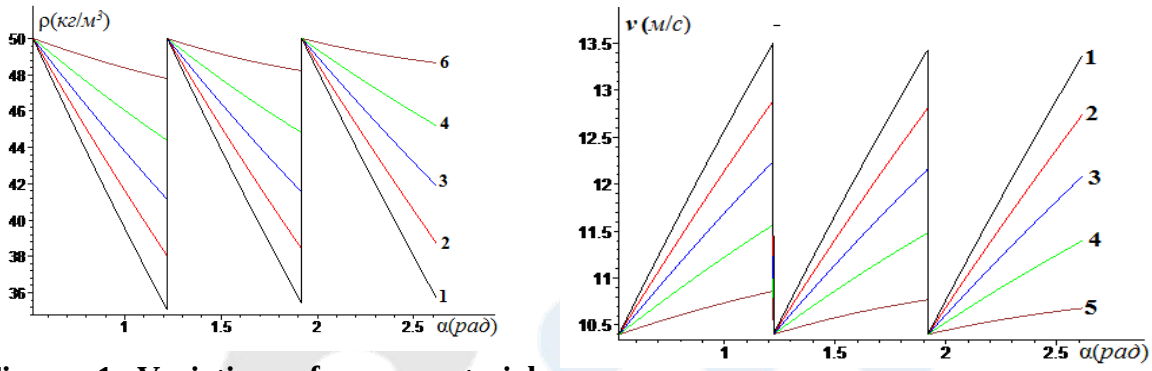

Figure 1 Variation of raw material density (a) and speed (b)

$\rho_{00} = 55$кг/м^3 **at** β different values of the parameter $1-\beta=0.1$, $2-\beta=0.3$, $3-\beta=0.5$, $4-\beta=0.7$, $5-\beta=0.9$ r(kg/m^3)

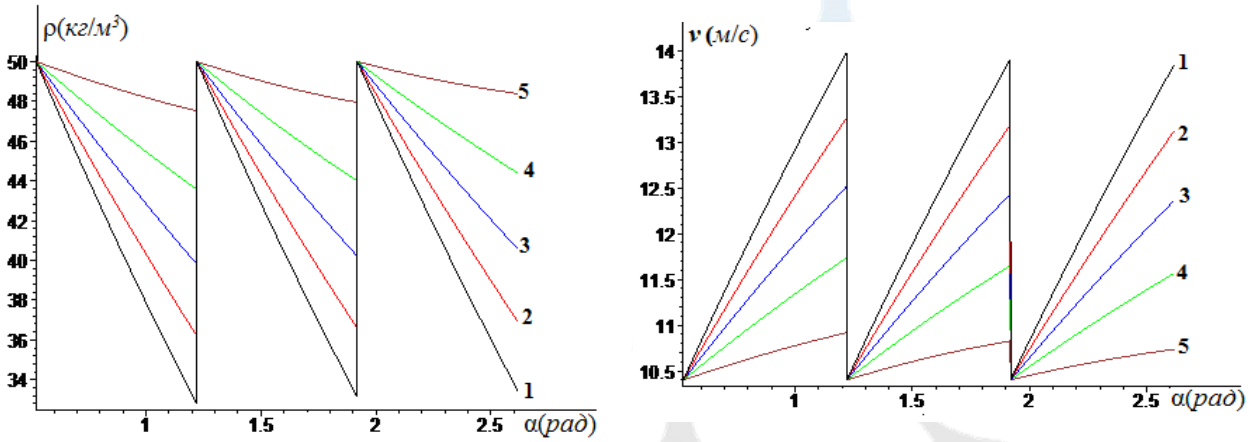

Figure 2. Variation of the parameter at β different values of raw material density (a) and speed (b). $\rho_{00} = 70$кг/м^3

$1-\beta=0.1$, $2-\beta=0.3$, $3-\beta=0.5$, $4-\beta=0.7$, $5-\beta=0.9$

Results and discussion. An increase in this coefficient reduces the friction coefficient and, as a result, can lead to a decrease in the gap between them at the borders of the sectors.

Based on theoretical studies, a new design of cotton cleaning equipment was developed and experiments were conducted.

During the cleaning process of the piled drum and fixed mesh surface, theoretical studies were conducted on the methods of determining the increase of cleaning efficiency under the influence of mechanical force with raw cotton. The theory of the probability of sticking cotton raw material about the saw drum, the interaction between the cotton raw material adjacent to the saw teeth and the rib cages during the cleaning process, the operation mode, the speed of rotation of the drums, the diameter, the distances between the cage and the saw, and the distance between the cages were studied and researched from a theoretical point of view. The size, structural structure, and cleaning efficiency of the newly improved structure of the device for the extraction (regeneration) of the cotton that has been added to the waste composition during the cleaning process from large impurities was determined based on theoretical research.

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To determine the highest cleaning efficiency and to optimize the linear speed of the drums, low-grade cotton raw materials with a moisture content of 13.5%, and dirtiness of 11.9%, And-35 selection, III industrial grade, and 2nd grade cotton raw materials were selected. Since the experiment was carried out during the production process, the test was repeated several times. Drum rotation minutes were checked on a special tachometer measuring equipment. The linear speed of the pile drum was 9.42 m/s, The linear speed of the saw drum was 8 m/s, and the cleaning efficiency was 51.3%. A brush drum with a diameter was used to extract cotton raw material from the saw cylinder 300 мм. Its linear speed was determined as 15.7 m/s. The amount of raw cotton pieces in the waste is 2.1%, 3.4%, and 4.1%, respectively, at distances of 12, 14, and 16, mm between saws. No changes in seed damage and free fiber content occurred in the raw cotton cleaned too.

Conclusion. It was determined that the model obtained as a result of theoretical research correctly represents the process of cleaning cotton, and cleaning decreases with the amount of dirt removed from the mass of cotton. Theoretical studies of cotton ginning revealed that the efficiency is high in the initial part of the ginning section and decreases in the later stages. As a result of practical research, it was found that cleaning cotton before placing it in the mold is more effective than cleaning cotton stored in the garam

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