Western European Journal of Modern Experiments and Scientific Methods
Volume 2, Issue 6, June, 2024
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

THE EFFECT OF THE INTERMEDIATE DISTANCE BETWEEN THE WORKING PARTS OF THE CLEANING MACHINE ON THE DEGREE OF CLEANING

Mirzabayev Jamoliddin Bahriddinovich
PhD, Docent, Namangan Textile Industry Institute, Namangan, Uzbekistan

Abstract
In this article, the influence of the distance between the working parts of cotton ginning machines on the level of cleaning is studied. According to the study of the separating blade profiles, studies were conducted on the use of a perforated surface for the cleaning part. The structure, shape and cleaning process of the working parts of the cleaning machines used in the spinning enterprises and the experiments conducted on a smooth surface with different diameters of perforations are presented.
Keywords: cleaning, perforated surface, spacing, fibrous layer, pressure.

Introduction

Light industry, including the textile industry, is a strategically important and rapidly developing branch of the national economy. One of the main tasks facing the light industry is the production of textile fabrics and their delivery to the finished product, the introduction of new techniques and technologies, and the comprehensive solution of the issues of using local raw materials [1,2,3].

Today, the spinning enterprises operating in our country use the most modern equipment made by the world-famous companies "Rieter" (Switzerland), "Truetzschler" (Germany), "Marzoli", "Savio" (Italy), "Murata", "Toyota" (Japan). and is being equipped with machines. To make full use of installed equipment, to produce quality products in them, to effectively use fibers while maintaining the natural quality indicators of fiber, to adjust the parameters of equipment in order to maintain waste standards, it is necessary to determine the optimal parameters in accordance with the characteristics of national raw materials [4].

The fiber cleaning process is the final and crucial step in the initial fiber processing. The main purpose of this process is to remove various impurities in the fiber. At the same time, in the process of cleaning fibers, in addition to intensive shedding of waste, additional force is applied to it, which contributes to the formation of defects that negatively affect their spinning properties [5,6].

Materials and methods

It is known that fiber waste is generated as a result of cotton fiber processing in spinning enterprises [7]. According to the physical-mechanical properties of these wastes, the wastes of yarn spinning enterprises can be used as raw materials for the production of simple carding and hardware yarns [8,9].

In addition, the increased mechanical strength negatively affects the elasticity properties, strength and length of fibers, leading to a decrease in its properties.

Western European Journal of Modern Experiments and Scientific Methods
Volume 2, Issue 6, June, 2024
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

In the research carried out by the authors [10], reduction of the number of impurities and foreign bodies in the raw material was achieved by about 50%, that is, 13 impurities in the sorting were reduced to 8 after purification. It is concluded that this leads to the improvement of quality yarn spinning process.

From the conclusions of the conducted researchIt has been stated that the cleaning and combing machines produced by the company "Truetzschler" are more effective than the machines recommended by other companies [11].

According to the conducted practical studies and results, it was determined that it is advisable not to exceed 10-12 percent of the amount of carding nut and tarandi in the mixture when spinning yarn with a linear density of 29 tex in a simple carding system. Because it was observed that the quality of the spun yarn deteriorates when the total amount of carding oreshka and tarandi in the mixture exceeds 10-12 percent [12].

A theoretical study of changes in pressure, density and velocities in cotton fiber flow after passing through each hole was performed. The following assumptions were made to model this process.

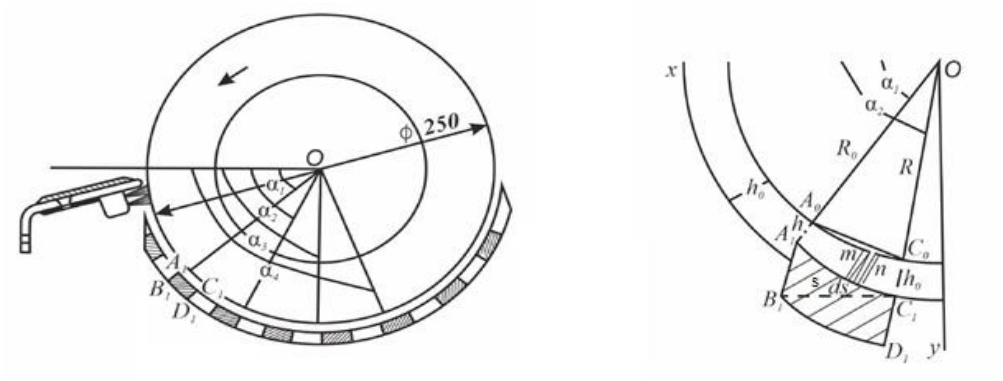
1. We assume that the cotton mass is stationary and the movement of the fiber flow is stationary. Then the flow efficiency is constant in the zone where the perforated surface is located, and Q_0 is equal to and foreign impurities released from the stream do not affect the performance.
2. The fiber flow behavior is assumed to be one-dimensional between the holes of the perforated surface.
3. We take the perforated surface in the form of an inclined plane in contact with the fiber. The holes in them are located at the same distance from each other in the cleaning zone.
4. An array of holes in an arbitrary perforated surface is in mutual contact with the fiber flow (the medium), and the penetration of the perforated surface into the medium is determined according to Hertz's law, or empirically. The velocity, pressure, and density (parameters) of the flow between each perforated surface row of holes and the cross-sectional area, respectively v_i , ρ_i and s_i we define with . $(i = l..n)$ n – the number of rows of perforated surface holes.

We determine the pressure parameters between the first and second row of holes.

Assume the initial parameters of the fiber flow (outside the surface area). ρ_0, v_0, h_0, and S_0 let it be The thickness of the fiber stream before contact with the hole array h_0 be , then is the fiber flow performance $Q_0 = \rho_0 v_0 h_0 L$ is equal to , where L the length of the coated surface of the sawtooth drum.

The zone of interaction of the flow layer with the perforated surface $A_1B_1C_1D_1$ and the flow parameters were determined in this zone. We placed the coordinate head at point 0 (Fig. 1).

Western European Journal of Modern Experiments and Scientific Methods
Volume 2, Issue 6, June, 2024
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

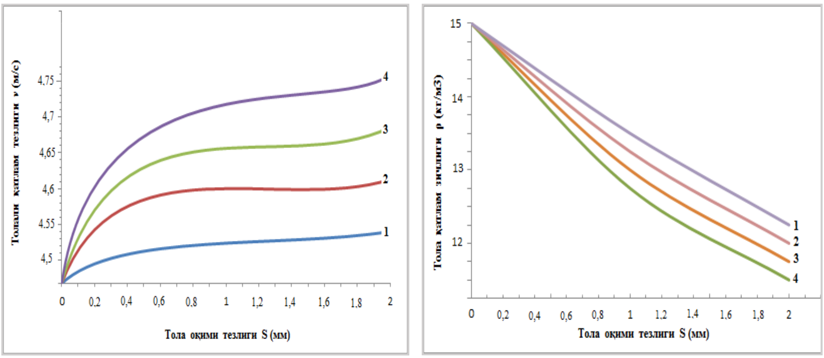


a) **b)**

Figure 1. The location of the perforated surface in the cleaning zone (a) and the scheme for calculating the thickness of the layer between the drum covered with sawtooth gear (b)

Figure 2 shows fiber flow rate as a function of (a) fiber layer density (b) in the layer between the perforated surface and the drum covered with sawtooth packing. S pressure coefficient with respect to the variable J of two and initial pressure p_0 graphs of changes in different values of Calculations were performed at the following values of the parameters: $p_0 = 15$ кг/м^3, $h_0 = 0.014$м, $h_0 = 0.011$м, $f_1 = f_2 = 0.3$, $\beta = 0.5$, $L = 1.5$м, $s_0 = 0.02$м. Selected coefficient J and pressure p_0 error in values $\delta = \frac{100(\delta_1 - \delta_2)}{\delta_1} = 100 J^2 \Delta p^2$ according to the formula did not exceed 12%.

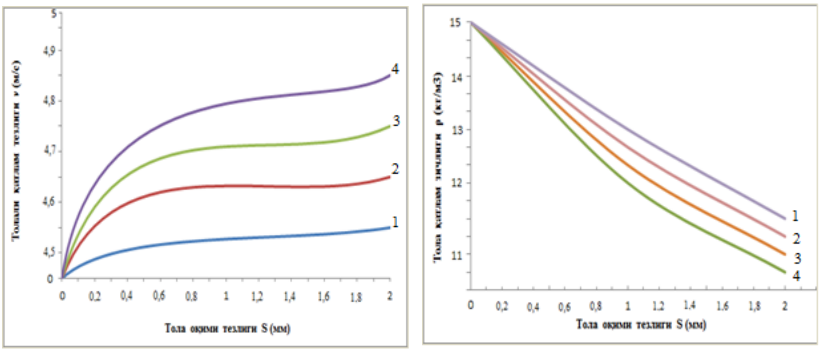
$J = 0.001$ Па$^{-1}$



a) **b)**

$J = 0.002$ Па$^{-1}$

Western European Journal of Modern Experiments and Scientific Methods
Volume 2, Issue 6, June, 2024
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed



a) b)

Figure 2. Fiber layer speed $v(\text{м/с})$ (a) and density $\rho(\text{кг/м}^3)$ (b) damping coefficient J of two and initial pressure ρ_0 Graphs of distribution in the cleaning zone at different values of (Pa): 1–in this case $\rho_0 = 5$; 2-in this $\rho_0 = 25$; 3-in this $\rho_0 = 45$; 4-in this $\rho_0 = 65$

Figure 3 shows the coefficient of variation of the efficiency coefficient J and pressure ρ_0 distribution graphs in the cleaning zone at different values of

$J = 0.001$ Па$^{-1}$ $J = 0.002$ Па$^{-1}$

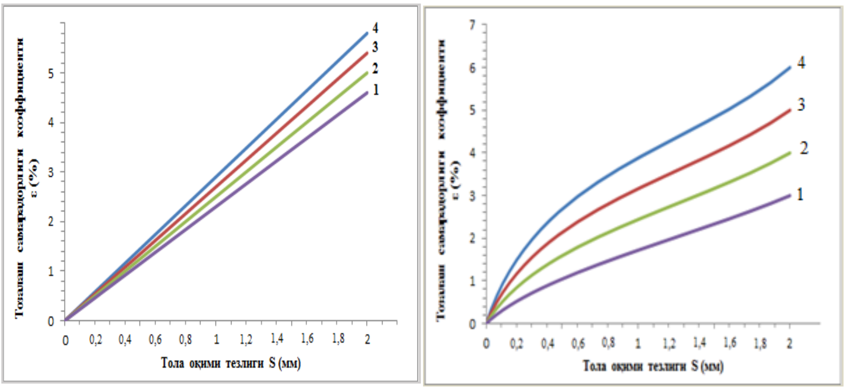


Figure 3. Cleaning efficiency coefficient ε (in percent) damping coefficient J of two and initial pressure ρ_0 Graphs of distribution in the cleaning zone at different values of (Pa): 1–in this $\rho_0 = 5$; 2-in this $\rho_0 = 25$; 3-in this $\rho_0 = 45$; 4-in this $\rho_0 = 65$.

From the analysis of the graphs, an increase in the initial pressure resulted in an increase in the fiber flow rate and, as a result, a thinning of the fiber layer. Such a law is the inverse of the fiber's slackness (the modulus of elasticity $K = 1/J$) coefficient J was also observed when it increased (Fig. 2).

Conclusions

From the analysis of the graphs, it was observed that an increase in the initial pressure leads to an increase in the fiber flow rate and, as a result, a thinning of the fiber layer. It was found that the thinner the fiber layer, the higher the cleaning efficiency. Such regularity was also observed when the damping coefficient of the fiber increased (Fig. 3).

In conclusion, it can be said that at different values of damping coefficient and pressure, the efficiency coefficient also increases when the coefficient and initial pressure increase in the cleaning zone. During the removal of fibers from the surface of the cleaning drum, the laws of speed, density and pressure distribution were studied.

References

1. Ўзбекистон Республикаси президентининг 2020 йил 05 майдаги «Тўқимачилик ва тикув-трикотаж саноатини қўллаб-қувватлашга доир кечиктириб бўлмайдиган чора-тадбирлар тўғрисида» ПФ-5989-сон Фармони // Ўзбекистон республикаси қонунҳужжатлари маълумотлари миллий базаси, 06.05.2020 й., 06/20/5989/0533-сон
2. Ўзбекситон Республикаси Президентининг 2019 йил 16 сентябрдаги «Енгил саноатни янада ривожлантириш ва тайёр махсулотлар ишлаб чиқаришни рағбатлантириш чора-тадбирлари тўғрисида»ги ПҚ-4453-сон Қарори, 2019 й. // Ўзбекистон Республикасиқонун ҳужжатлари маълумотлари миллий базаси, 17.09.2019 й., 07/19/4453/3756-сон
3. Ўзбекситон Республикаси Президентининг 2017 йил 14 декабрдаги “Тўқимачилик ва тикув-трикотаж саноатини жадал ривожлантириш чора-тадбирлари тўғрисида” ги ПФ-5285-сон фармони,//ҚҲММБ: 06/17/5285/0409-сон/15.12.2017 й.
4. S.L.Matismoilov, Q.G’.G’ofurov, A.Pirmatov, Q.Jumaniyazov “Xom ashyoni yigirishga tayyorlash” Toshkent – 2018 y.
5. A. Pirmatov, S.L. Matismoilov, Q.G’. G’ofurov, SH.R. Maxkamova. “Yigirish texnologiyasi” darslik. Toshkent–2018 y.
6. Mirzaboev J.B., Jumaniyazov Q.J. “The efficiency of Cotton Fiber Cleaning and Analysis of Influencing Factors”. International Journal of Advanced Research in Science, Engineering and Technology (IJARSET)**.** Volume 7, Issue 11, November 2020, P. 15624–15627.
7. Mirzaboev, J., Jumaniyazov, Q., Mirzabaev, B., Sadikov, M. (2020). Measures for the formation and use of fibrous waste. ISJ Theoretical & Applied Science, 12 (92), P. 177–179.
8. Мирзабоев Ж., Жуманиязов Қ., Мирзабаев Б. “Толали чиқиндиларни хоссалари ва улардан самарали фойдаланиш имкониятлари”. НамМТИ илмий техника журнали. Том 4. №2, 2019 й. Б. 36–42.
9. Jamoliddin Mirzaboev (2022). Achieving the preservation of fibre properties by improving the working parts of the fibre cleaner in spinning enterprises. Universum: технические науки. №9/102. *https://7universum.com/ru/tech/archive/item/14295*
10. Mirzaboev Jamoliddin, Jumaniyazov Qadam, Mirzabaev Baxritdin (2020). “Analysis of the properties of waste coming out of carding machines of various types” ACADEMICIA: An International Multidisciplinary Research Journal ISSN: 2249-7137 Vol. 10, Issue 11, November 2020 pp. 1180-1183
11. Мирзабоев Ж, Жуманиязов Қ, Мирзабаев Б. Толали чиқиндиларни хоссалари ва улардан самарали фойдаланиш имкониятлари. Наммти илмий техника журнали №2, 2019 й.

Western European Journal of Modern Experiments and Scientific Methods
Volume 2, Issue 6, June, 2024
https://westerneuropeanstudies.com/index.php/1
ISSN (E): 2942-1896 Open Access| Peer Reviewed

12. Jamoliddin Mirzaboev. Analysis of changes in fiber properties during the openingcleaning process. Problems in the Textile and Light Industry in the Context of Integration of Science and Industry and Ways to Solve Them. AIP Conf. Proc. 3045, 030025-1–030025-3; https://doi.org/10.1063/5.0197363