ISSN 2181-8622

Manufacturing technology problems

# Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX COPERNICUS INTERNATIONAL

Volume 9
Issue 4
2024

Google Scholar Crossref doi SLIB.UZ Scientific library of Uzbekistan

# ANALYSIS OF THE MAINTECHNOLOGICALPARAMETERS OF THE CONDENSER

## GANIKHANOV KHUSANKHON

Doctoral student of Tashkent Institute of Textile and Light Industry, Tashkent, Uzbekistan
Phone.: (0897) 707-9144, E-mail.: ganikhanovxusan@mail.ru

## MAVLYANOV AYBEK

Professor of Tashkent Institute of Textile and Light Industry, Tashkent, Uzbekistan
Phone.: (0888) 008-8201, E-mail.: mavloniy82@mail.ru

## ABDUSAMATOV ALISHER

Assistent of Tashkent Institute of Textile and Light Industry, Tashkent, Uzbekistan
Phone.: (0893) 411-9126, E-mail.: abdusamatov.alisher@inbox.ru

## MIRZAUMIDOV ASILBEK

Associate professor of Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
Phone.: (0850) 100-0088, E-mail.: abdusamatov.alisher@inbox.ru
*Corresponding author.*

**Abstract**: The article is presented an analysis of the results of the study of the main technological parameters of the existing and improved cotton fiber condenser. The air flow rate and the coefficient of resistance inside the existing and improved condenser are investigated.

**Keywords:** cotton, separation, condenser, main parametrs.

**Introduction.** The condenser is used to separate the cotton fiber from the air, as well as to thicken the dissolved fiber mass and feed it into the press box. Condensers are at the same time the simplest fiber cleaning machines, since a part of finelitter, dust and short fiber is released through their grid drums with exhaust air [1-6].

**Methods.** To describe the motion of a fiber in a condenser, equations can be used that take into account the forces acting on the fiber, as well as the characteristics of the airflow and the interaction of the fiber with the surface of the condenser.

The condenser developed by us is low-speed and differs from its predecessors in simplicity of design and maintenance, small dimensions, low cost and reliability. The prototype of the condenser was manufactured at PAXTAGIN KBLLC under the brand name "2КВУ"(Fig. 1) [7-9].

The task of the new model is to create a simplified fiber condenser with higher performance, ensure safe conditions for maintenance personnel and improve fiber quality indicators.

This installation (Fig.1.) consists of a housing 1 in which a grid drum 2 is mounted, relative to which a movable sealing roller 3 and a fixed removable roller 4 are placed at a certain angle and gaps, mounted in a carriage 5, under which the unloading mine 6 is located.

The housing is a welded metal structure providing dynamic rigidity of the entire installation. The grid drum consists of a rigid frame and a grid wrapped around the outer diameter. The sealing and removable rollers are grooved cylinders rotating relative to each other.

The process of separating the fiber from the air mass in this machine is carried out as follows: fiber mixed with air from a battery of gins through a fiber drain enters a condenser on a grid drum 2.

The air passing through the grid cells, separating from the fiber, is sucked out by the pneumatic transmission system and fed into cyclones. In this case, the fiber settles on the grid surface of the grid drum.

During its rotation, the grid drum feeds the settled fiber layer under the sealing roller 3, which forms the fiber in thickness and lifts it from the surface of the grid drum. The removable roller 4 removes this fiber layer and, in interaction with the sealing one, directs it into the condenser shaft 6, after which the fiber enters the press box along an inclined tray.

During the preliminary type tests, the following were carried out: -monitoring the operation of the machine; -assessment of the convenience of maintenance and repair; -assessment of technological indicators; -measurement of aerodynamic parameters; -measurement of power consumption a tidle and underload.

Below is a table of the data obtained in comparison with similar data from another condenser that is currently being operated in most cotton gins in the Republic of Uzbekistan.Table1shows the main parameters based on the measurement results.

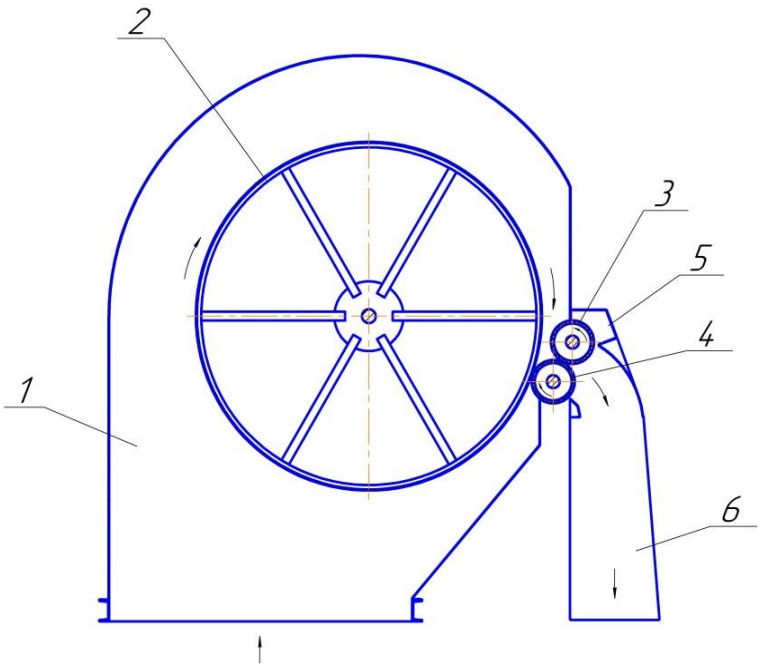


**Fig.1.New construction of the condenser**

*1- working zone; 2 – grid drum; 3 - movable sealing roller; 4 - fixed removable roller; 5 – carriage; 6 - unloading mine*

Below is a table of the data obtained in comparison with similar data from another condenser that is currently being operated in most cotton gins in the Republic of Uzbekistan. Table1shows the main parameters based on the measurement results.

Table 1

The main parameters based on the measurement results

| **The main parameters based on the measurement results** | **5KB (8KB)** | **2KBУ** |
|---|---|---|
| Fiber capacity,t/h | 5 | 5,4 |
| Installed capacity,kW | 9,5 | 5,5 |
| Idle power consumption, kW | 3,5 | 2,2 |
| Power consumption underload, kW | 6,15 | 4,1 |
| The rotation speed of the drums, rpm<br>- grid<br>- grooved<br>- sealing | <br>215<br>26<br>13 | <br>20<br>150<br>135 |
| Air consumption, no more than $m^3/s$ | 12 | 12 |
| Aerodynamic resistance of the condenser, $kgf/m^2$ | 172 | 92 |
| Capacitor resistance coefficient | 3,6 | 2,15 |
| The amount of air sucked through the condenser, $m^3/s$ | 2,57 | 0,93 |

**Results.**As can be seen from the results, the new condenser is easy to maintain, does not require fast-wearing scarce spare parts and can be used in cotton gin manufactures.

From the information given in the table 1, it can be seen that the performance of the recommended fiber condenser is 5,4 tons per hour, which is higher than that of the existing 5KB condenser by 0,4 tons per hour. But at the same time, the installed capacity of the recommended fiber condenser is only 5,5 kW, whereas the existing one has 9,5 kW, which is 42% more than the recommended one. Thus, at idle, the recommended capacitor consumes only 2 kW per hour, whereas the existing one consumes 3,5 kW per hour. And under load, the existing 5 KB fiber capacitor consumes 6,15 kW per hour, while the recommended one consumes only 4,1 kW. Also, the capacitors differ in the frequency of rotation of the working bodies. The existing 5KV condenser is high-speed, since the rotation frequency of the grid drum is much higher than the rotation frequency of the grooved and sealing drums. While the recommended condenser is slow-moving, therefore the rotation frequency of its grid drum is much lower than the rotation frequency of the grooved and sealing rollers. This increases the reliability of the machine and the safety of its operation.

The aerodynamic characteristics also give better performance for the recommended condenser than for the existing one. The aerodynamic resistance of the recommended condenser is 92 $kgf/m^2$, and for the existing condenser this indicator reaches 192 $kgf/m^2$. The resistance coefficient of the existing condenser is 3,6, while for the recommended

condenser this indicator does not exceed a value equal to 2,15. The amount of air sucked through the existing condenser reaches 2.57 $m^3/s$, and in the recommended condenser, this indicator reaches only 0,93 m3/s. The reason for this is the low-speed operation and design features of the recommended fiber condenser, which differs from its predecessors in simplicity of design and maintenance, small dimensions, low cost and reliability.

From theseis analyzed Depending on the fiber content of the waste to the resistance of the condenser when changing the size of the diameter grid cell of the condenser grid drum (Fig.2).

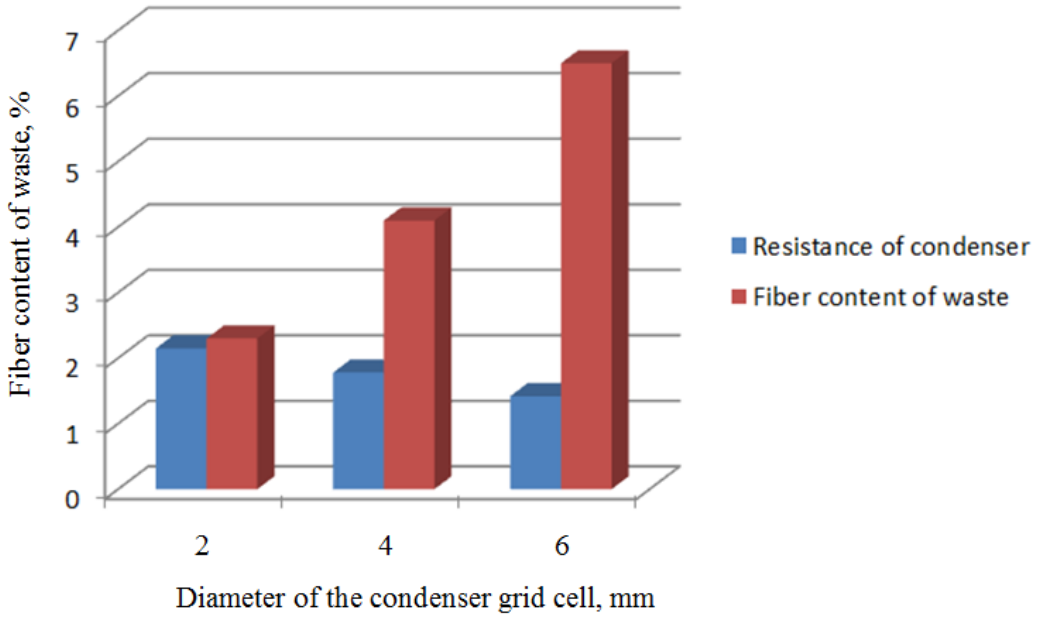


**Fig. 2.Depending on the fiber content of the waste to the resistance of the condenser when changing the size of the diameter grid cell of the condenser grid drum**

The figure 2is shown an analysis of the grid drum of an advanced fiber condenser. The analysis shows that with a grid drum cell diameter of 2 mm, the capacitor resistance coefficient is 2.15, and the waste fiber content is 2.3 percent. When the grid cell is increased to 4 mm, the capacitor resistance decreases to 1.78, but the waste fiber content increases to 5.2 percent. With a diameter of 6 mm, this figure reaches 9.1 percent, while the resistance of the capacitor drops to 1.42.

**Conclusion.**The task of the new model is to create a simplified fiber condenser with higher performance, ensure safe conditions for maintenance personnel and improve fiber quality indicators.The aerodynamic characteristics also give better performance for the recommended condenser than for the existing one.The analysis shows that reducing the grid cell diameter of the grid drum to 2 mm leads to a decrease in fiber losses, as a result of which fiber quality is maintained and stable operation of the condenser is ensured.

## References

1. Мирошниченко Г.И. Основы проектирования машин первичной обработки хлопка. М.: Машиностроение. 1972.

2. Салимов А.М., Лугачев А.Е., Ходжиев М.Т. Технология первичной обработки хлопка. “Адабиётучқунлари”. Ташкент. 2018.- С. – 112-115.

3. Лозинский И.Б., Пономаренко Д.И., Третьяков М.С. Модернизация конденсора волокна 3КВ. //Хлопковая промышленность. №1-1977.

4. Мухаммадиев Д.М. Исследование относительного движения волокна по поверхности конденсорного барабана. // Журнал Вестник аграрной науки Узбекистана. – Ташкент, 2003. - №4. – С. 101-105.

5.Мухаммадиев Д.М. Пульсаторли тола конденсори машина агрегатинитадқиқэтиш (IMAKVP) // Государственное патентное ведомство РУз. Свидетельство № DGU 00830. 10.09.2004 г.

6. Патент ПНР №*115870.* Конденсор / WoźnmkJerzy, LoszkowiczBogusław, BagińskiJan, SkoworońskiKazimierz, JanczakAntoni // WiadomościUrzęduPatentowegoPaździernik – 1982, №10.

7. Ganixanov, X. S., Mavlyanov, A. P., &Abdusamatov, A. A. (2023). Study of existing condenser designs for cotton fiber separation. *Modern Science and Research*, *2*(10), 421-427.

8. Хайдарова, Н. О. К., Ганиханов, Х. Ш. У., & Мавлянов, А. П. (2022). Новая конструкция конденсора волокна. In *Молодежь и XXI век-2022* (pp. 354-356).

9. Ганиханов, Х. Ш., Мавлянов, А. П., &Абдусаматов, А. А. (2023). Изучение существующих конструкций конденсоров для отделения хлопкового волокна. *Modern science*, *2181*, 3906.

# CONTENTS

## PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY

## GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES



## CHEMICAL TECHNOLOGIES