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# Changes in the Cleaning Efficiency of Cotton from Small and Large Contaminants

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**ABSTRACT:** In this article, in order to increase the cleaning efficiency of the machine for cleaning small defects in the laboratory of the department "Preliminary processing of cotton" instead of various surfaces installed ribbed grid and determined the effectiveness of cleaning cotton from small and large contaminants

**KEY WORDS:** various surfaces, available seed cotton on the rib cage, cleaner for minor defects, pile drum, dirt

## I INTRODUCTION

Equipping ginneries of the country with modern and advanced equipment and technologies to obtain quality raw materials is one of the most pressing issues today.

The large-scale reforms implemented in our country during the years of independence have become an important basis for strengthening national statehood and sovereignty, ensuring security and law and order, inviolability of borders, rule of law, human rights and freedoms, interethnic harmony and religious tolerance, created the necessary conditions for the realization of the creative potential of our citizens [1].

Tests in the laboratory of the department "Preliminary processing of cotton" in order to increase the efficiency of cleaning the machine for cleaning small defects, a ribbed grid was installed instead of different surfaces. The ribbed grids installed at the bottom of the pile drums consisted of ribs and base pieces. The diameter of the ribs is 10 mm and its length is 1900 mm. The ribs were placed in a spiral shape at the bottom of the pile drum. The distance between the ribs was 5 mm and the distance between the axes of the ribs was 2-2.5 mm. The ribs are made of ST-3 steel. The number of ribs is 33, and since the pile is placed at an angle of 1,200 to the bottom of the drum, the seed cotton is faced with a spiral-shaped surface when dragged over the surface of the rib cage. In this case, the value of the available seed cotton velocities in the rib cage was different, in the laboratory the samples were cleaned of small and large contaminants on the LKM instrument, the gin equipment was separated from the fiber seed and the mechanical damage of the fiber, physical and mechanical properties were determined. In addition, 20,0 tex yarns were obtained from fiber at the small-sized spinning machine "Sherli" at the Research Institute of Seed and Variety of the Republic of Uzbekistan and their physical and mechanical properties were studied using equipment from the laboratory "CentexUz" at the Tashkent Institute of Textile and Light Industry.

Prior to the research, all types of samples were stored in climatic conditions in accordance with GOST 10681-75.

The operation of the IXK fine-grained cleaning equipment is as follows: the seed cotton is unloaded into a mine mounted on supply rollers. The reciprocating supply rollers rotate against each other and transfer the seed cotton evenly to the pile drum.



The pile drum rotates clockwise, which in turn sifts the cotton wool over different surfaces and passes it to the second drum. In this order, the seed cotton is cleaned in all drums and separated from fine impurities. The separated contaminants fall down along the sloping walls of the contaminant bunkers through various surface holes in the bottom of the drums and are sucked in by pneumatic transport. The cleaned seed cotton is removed from the equipment and sent to the next technological process.

A view of the equipment in two different variants is shown in Figures 1 and 2.

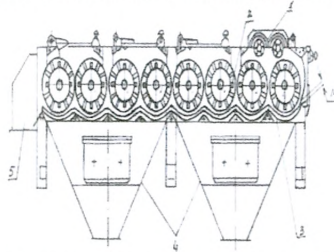


Figure 1. Cross-sectional diagram of the imperfect 1XK fine-grained cleaning equipment.  
1 supply roller, 2 pile drum, 3 mesh surface,  
4 dirt bunker, 5 tray

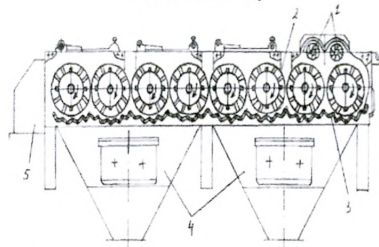


Figure 2. Cross-sectional diagram of the improved 1XK fine-grained cleaning equipment.  
1 supply roller, 2 pile drum, 3 mesh surface, 4 dirt hopper, 5 tray

The actual operating capacity of the equipment (m/h) is calculated by the following equation:

$$Q = \frac{3,6 \cdot L \cdot F \cdot \rho_c \cdot n \cdot \varphi}{T}$$

here: L- the length of the processing path in the cotton gin, mm; n=0,25-30- mesh surface utilization factor;  $\varphi$ - cleaner utilization rate, ( $\varphi=0,3-0,35$ );  $\rho_c$ - density of seed cotton, kg / m<sup>3</sup>; T- time of seed cotton standing (being) in the cleaner, s.

#### Basic maintenance of 1XK cleaning equipment indicators

1. Work productivity	5,0-7,0 t / h
2. Rotation speed:	
a) supply roller	0-14 ay1 / min
b) pile drum	480 ay1 / min
3. Technological distance (pile drum spacing with different surfaces)	14-20 mm
4. Cleaning efficiency	45-50%

Raw materials collected from cotton fields are handed over to ginneries and ginners. In order to store seed cotton from farms for a long time and to obtain high-quality fiber and seeds from it, it is necessary to store it in a bunch, depending on the moisture content, taking into account the type and grade of cotton.



Seed cotton stored at the specified humidity in gineries is first dried in drying shops, cleaned of weeds, separated from the fiber by machines and aggregates in a series of machines in the technological system of the enterprise, ginned with high-capacity units and then sent to textile enterprises, handed over to production plants.

II. METHODOLOGY

The ginning process is also important to maintain the quality of cotton received by ginners. Because the fiber or seed can be damaged in the cleaning process, as a result, the number of accidents in the subsequent processes will increase spontaneously, the quality of the fiber will deteriorate. Therefore, organizing the cleaning process on the basis of a defined chain allows you to improve the quality of the product. If the moisture content of cotton is higher than the standard values, it will not be well cleaned of fine and coarse contaminants, resulting in a negative impact on the quality of fiber, yarn and products derived from it, i.e. the finished products to be obtained may be defective. Therefore, in gineries, any amount of moisture is dried to the specified humidity in the standard and only then involved in the cleaning process. Therefore, after the improvement of the working parts of the IXK cleaning equipment for cleaning small defects in the ginning plant, samples were taken and the efficiency of cleaning cotton in the laboratory LKM was determined..

The test results are presented in Table 1.

Table 1  
The amount of fine and coarse contaminants in cotton change

T/ p	Cleaning equipment	Seeds of cotton humidity, %	Contamination content of cotton, %					
			General pollution		minor pollution		major pollution	
			cotton in riot	cleaning after the process	cotton in riot	cleaning after the process	cotton in riot	cleaning after the process
1.	Imperfect	9,8	6,89	0,43	5,14	0,27	1,75	0,16
2.	Improved	10,2	6,45	0,33	4,70	0,21	1,64	0,12

Based on the results in Table 1, Figures 3-4 show histograms of changes in the amount of total, fine and coarse contaminants in cotton after imperfect and improved cleaning equipment.

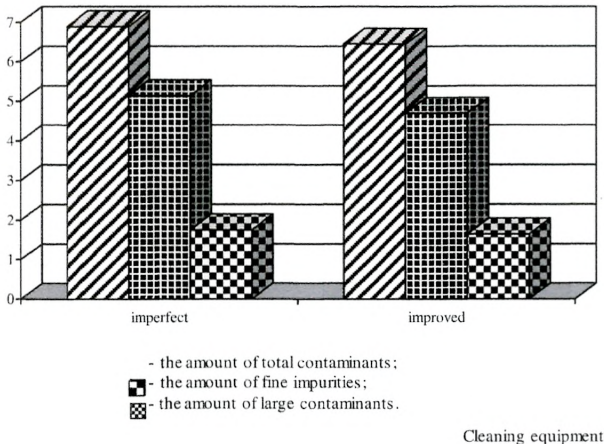


Figure 3. Changes in the cleaning efficiency of cotton in the gutter.

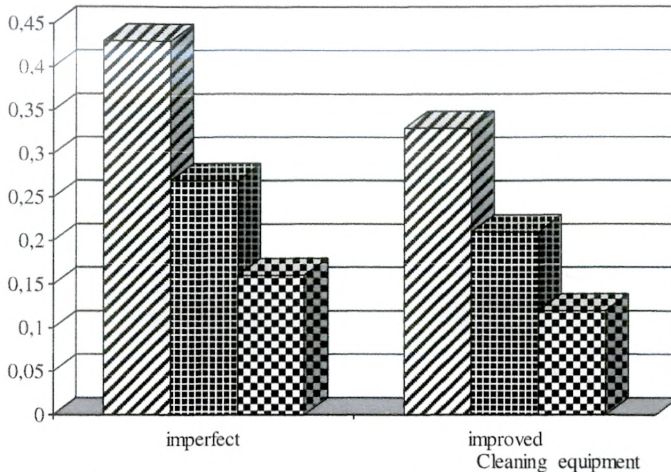





Figure 4. Changes in the cleaning efficiency of cotton after the cleaning process .

-  the amount of total contaminants;
-  the amount of fine impurities;
-  the amount of large contaminants.

### III. RESULTS AND DISCUSSION

Analyzing the results of the obtained research, the total amount of contaminants in the seed cotton after the imperfect cleaning equipment increased to 93.7% after the cleaning process, the amount of minor impurities increased to 94.7%, the amount of large contaminants increased to 90.8% after the improved cleaning equipment. The total amount of contaminants in cottonseed was removed after the cleaning process by 94.9%, small impurities by 95.5%, large impurities by 92.7%. It can be seen that after improved ginning equipment in ginneries, the ginning efficiency of cotton was higher than that of other imperfect ginning equipment.

At present, ginneries of the republic are equipped with modern equipment with maximum cleaning capacity. However, the amount of moisture in this equipment is very important. When the moisture content of seed cotton is high, it becomes difficult to remove impurities, the amount of tangled fiber in the fiber content, the amount of complex tangled fiber, the amount of impurities increases, resulting in deteriorating fiber quality. Even low humidity does not lead to good results. This is because the physical and mechanical properties of the fiber are degraded at low humidity. Therefore, optimal humidity is required.

In addition, seed cotton with a high moisture content will have a large amount of defects and waste, the cleaning rate of cotton will be low, leading to a deterioration in fiber quality. As a result, the quality of the finished product obtained from the fiber will be negatively affected. In addition, the cotton gets stuck between the working parts of the machine, the seeds hit or injured, causing an increase in the amount of fiber in the shell.

### IV. CONCLUSION

The higher the moisture content of the cotton, the lower the degree of cleaning of the cotton. If the moisture content of the seed cotton was 11%, after 3 minutes of cleaning, the cleaning rate of the seed cotton was 52.7%, and at



a moisture content of 14.5%, the cleaning rate was 25.9%. If the moisture content of seed cotton increased by 3.4%, then the degree of purification of seed cotton decreased by half.

In summary, it was found that the cleaning efficiency of cotton after the cleaning process after the improved cleaning equipment is higher than the cleaning efficiency of the cotton after the improved cleaning equipment after the imperfect cleaning equipment..

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