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Research Article

ADVANCED TECHNOLOGY OF CONTROLLING THE CLEANING PROCESS OF THE COTTON

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ABSTRACT

In the article, due to the impossibility of controlling the cleaning process in the UXK cleaning unit used in the process of cleaning cotton from small and large impurities, an improved scheme of the UXK cleaning unit was developed. After the cleaning process in the improved aggregate, the cotton is cleaned from small impurities in pile drums, it is possible to clean it from large impurities in the cleaning departments of the UXK unit.

KEYWORDS

Cotton, small and large impurities, aggregate, cleaning, drum with piles, drum with saw, grid with colander.

INTRODUCTION

The UXK unit, which is used to clean cotton from small and large impurities, uses continuous cleaning technology, that is, the cotton directed to the cleaner is cleaned in all its cleaning sections and then transferred to another process. In these sections, cotton pieces from the separated waste are regenerated in a separate drum. Existing scrubber suppliers use a manually operated mechanical system to control its performance. These factors do not provide an opportunity to control the cleaning process when the quality indicators of cotton change. During cotton processing, the inability to control the efficiency of the ginning process and the frequency of ginning prevents obtaining fiber with the same quality

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index. It causes technological difficulties in the processing of cotton fiber in further processes. Cottons of high industrial grade and low grade pass through the upper cleaning parts of the UXK unit. This does not affect the natural quality indicators of cotton. It will not be possible to perform the cleaning plan specified in Table 1.

Considering these shortcomings, an improved scheme of the UXK cleaning unit was developed (Fig. 1). In this improved unit, the cleaning process goes as follows: After the cotton raw material is cleaned of small impurities in pile drums, it is alternately cleaned of large impurities in the cleaning sections of the UXK unit.

After the dirtiness of the cotton reaches the recommended amount of dirtiness before ginning, the cleaning unit is removed from the cleaning unit by means of a section controlled in five parts and transferred to the next technological process. This control technology allows changing the cleaning process depending on the initial dirtiness of the cotton.

Recommended cleaning plan for medium fiber cotton

1-Table

Cotton			Cleaning plan	Cleaning efficiency,%
Class	**Var**	**Impurity, %**	**UXK cotton cleaning a set of aggregates**	
For good cleaning cotton selection				
1	I - II	5,0	1XK + UXK (1)*	84
	III	8,0	1XK + UXK (2)*	88
	IV	12,0	1XK + UXK (2)*	90
2	I, II, III	12,0	1XK + UXK (4)*	92
	IV	16,0	1XK + UXK (2)*	90
3	I, II, III	18,0	1XK + UXK (4)*	88
	IV, V	22,0	1XK + UXK (2)*	86
For hard to clean cotton selection				For hard to clean co

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					ttonselection
1	I - II	5,0	1XK + UXK (2)* + 1XK	80	
	III	8,0	1XK + UXK (4)* + 1XK	84	
	IV	12,0	1XK + UXK (2)* + 1XK	86	
2	I, II, III	12,0	1XK + UXK (4)* + 1XK	88	
	IV	16,0	1XK + UXK (2)* + 1XK	86	
3	I, II, III	18,0	1XK + UXK (4)* + 1XK	82	
	IV, V	22,0	1XK + UXK (2)* + 1XK	80	

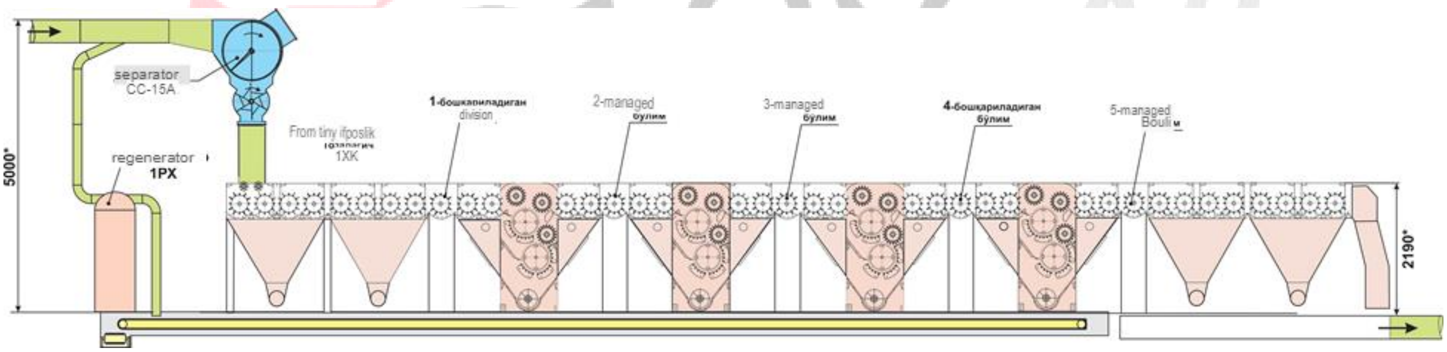

Figure 1. UXK cleaning unit with controlled cleaning frequency

In order to check the cleaning process of the UXK cleaning unit of the proposed scheme, researches were conducted on the cleaning of easily cleaned industrial varieties at the cotton ginning enterprise owned by Sultan tex LLC of Kashkadarya region, and on the cleaning of difficult-to-clean industrial varieties at the Saykhunabad cotton ginning enterprise of Sidaryo region.

Experiments were conducted in the following manner:

1. After the drying section, the moisture content of the cotton was 8-9%.

2. The productivity of the UXK aggregate, the coordinated technology of the initial processing of cotton according to industrial varieties, was mainly determined by [8].

3. When the cottons of various impurities were cleaned, the UXK was stopped, its upper part was

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opened, and samples were taken from the cottons of the next sections.

4. Based on the samples "Oz DSt 592: Cotton. Impurity detection methods » impurities were detected after initial cleaning based on the state standard.

5. Based on the amount of impurities, the cleaning efficiency was determined for all cleaning departments.

The measurement of the mass fraction of impurities was carried out on LKM equipment using methods based on mechanical separation of impurities from the cotton mass.

The mass fraction is determined by the ratio of the mass of dry impurities to the mass of dry cotton.

The following were included in the dirty mixtures:

- mineral mixtures (pebbles, soil, sand, dust);

- organic compounds (leaves, vases, flowers, cobwebs, parts of branches, as well as dry, rotten and split cotton parts that do not have durability).

The following measuring tools and devices were used in conducting the experiment results:

- LKM device designed to separate cotton impurities;

- a laboratory scale with a weighing limit of no more than 1000 g and a permissible error of no more than □ 20 mg;

- SXL-3 laboratory dryer for drying cotton;

- the test was conducted when the moisture content of cotton did not exceed 12%. If the humidity is high, then the cotton was dried using a laboratory dryer.

Drying was carried out regardless of moisture in cases with green leaves, green bolls, green branches and other green impurities in the cotton.

The cotton sample is placed on a smooth surface and laid in a flat layer in the shape of a rectangle. If pebbles, soil and clay lumps are found, then they are picked up, crushed and spread evenly over the average daily (combined) sample. The daily (pooled) sample average is then divided into four equal parts. Two diagonally opposite parts are removed together with the dust and impurities spilled from them, the rest of the cotton is spread again in the form of a rectangle, and this situation is continued until the average mass of the sample remains 1 kg. From this sample, three test samples of 300 g each are taken, one of which is a control.

Rotten, broken and dried fibers that enter into dirty mixtures are removed from each test sample of cotton weighing 300 g. Then the test sample is cleaned of impurities for 3 min using the LKM device.

After stopping the device, it is necessary to sweep the dust from the walls of the dirt chambers to the sides of the device.

From the large dirty mixtures falling into the device, fibrous seed and seed that do not enter into dirty mixtures are collected.

Large impurities remaining in the cleaned cotton are picked and added to the separated impurities. Large and small impurities collected from the device are weighed on the scales together with partially separated dead and dust, rotten, broken and dried fibers collected by hand from the test sample of cotton.

The dead and free fibers that have come out of the guard are compensated by the small impurities left in

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the cleaned cotton. For some hard-to-clean cotton varieties that do not have this compensation, additional correction coefficients have been established.

The mass percentage (impurity) of cotton impurities is calculated according to the following formula:

$$З = \frac{m_{и} \times 100 \times K_{1} \times K_{2}}{m_{н}}, \quad (1)$$

where mi is the mass of separated (large and small) impurities, g;

mn is the weight of the cotton test sample with impurities, g;

K is a correction coefficient that takes into account the impurities remaining in the cleaned sample. For all varieties of selection except those indicated in Table 3.1

K = 1.00. For new selection varieties of cotton, it is allowed to temporarily use other values of the K coefficient developed and approved in the prescribed manner in the Basic Organization for the Standardization of Cotton and Cotton Products until it is included in the standard.

K2 is a coefficient that takes into account moisture in dirty mixtures.

K2=0.98 - if the test sample is not dried in a laboratory desiccator before cleaning (the mass ratio of moisture is 12% and less).

K2=1.00 - if the sample for testing was dried in a dryer before cleaning (mass ratio of moisture is more than 12%).

Table 2. A correction factor that takes into account the impurities remaining in the cleaned sample.

Selection variety	K_1 coefficient value	The mass fraction of impurity compounds with coefficient K_1, %
Bukhara-108	1,09	7% and more
S-6524	1,16	7% and more
S-6530, Bukhara-6	1,14	7% and more
Namangan-77, An-Bayaut-2	1,12	7% and more
S-6532	1,07	7% and more

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The permissible absolute difference (closeness of the method) between the results of the analysis of two parallel samples should not exceed:

- when the mass fraction of dirty mixtures is up to 10%

0.6%

- when the mass percentage of dirty mixtures is higher than 10%

1.0%.

CONCLUSION

An improved scheme of the UXK cleaning unit was developed to clean cotton from dirt and impurities.

The difficulty of cleaning cotton was determined after its sample was cleaned in a laboratory device for cleaning LKM seeded cotton from impurities.

One of the main controlled technological indicators is the productivity of cotton ginning machines, determined by the rotation speed of the supply rollers and determined by an empirical formula.

A recommended cleaning plan for medium fiber cotton has been developed.

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