

Analysis of the Results of Comparative Testing of the Construction Used of Efficient Belt Transmissions in Cotton Cleaning Aggregate Operations

Kasimov Abror Aliyovich

Applicant, Tashkent Institute of Textile and Light Industry, st. Shokhzhakhon 5, 100000, Tashkent, Republic of Uzbekistan

Djuraev Anvar Djuraevich

Doctor of Technical Sciences, Professor, Tashkent Institute of Textile and Light Industry, st. Shokhzhakhon 5, 100000, Tashkent, Republic of Uzbekistan

Article Information

Received: January 02, 2022

Accepted: February 06, 2023

Published: March 06, 2023

Keywords: Cotton, cotton ginning unit, UXK cotton ginning machine, belt transmission, kinematic connections, management scheme, experimental tests, cotton moisture, cotton contamination.

ABSTRACT

The article presents the application of the modernized cotton ginning unit in the production of "REAL AGRO COTTON" UK cotton ginning plant and the analysis of comparative results. Due to the new construction, the cleaning efficiency has been improved.

The scheme of the proposed cotton ginning unit operations was improved and kinematic connections of the working bodies were ensured. The number of electric drives and power consumption have been reduced. An experimental copy of the cotton cleaning unit was installed in the 1st stream of the "REAL AGRO COTTON" UK cotton ginning system, and comparative tests were conducted with the existing structure in the 2nd stream. In this case, the power consumption in the recommended option is 3.7 kW less than in the series operation. A special feature of the proposed scheme of the unit operation is the kinematic connection between the main working bodies, saw cylinders, drums with piles and brushes, and an auger for removing impurities. In this case, the interdependence of the functioning of the working bodies is ensured, that is, as a single flow chain. This reduces clogging, improves cleaning efficiency and reduces cotton damage. Production tests were carried out on the 1st and 2nd flow lines of the UXK brand cotton cleaning machine from 01.11.2022 to 09.02.2023 Fig. 1 [2].



Figure 1. The process of conducting experimental tests on the UXK cotton raw material cleaning machine

The tests were carried out on raw cotton "Namangan-77" grade 1, grade 5, picked by hand. The dirtiness of the cotton raw material has a great influence on the cleaning efficiency. During the tests, the humidity and given dirtiness in the comparable sections of the flow line were kept in the same range. The analyzes were carried out in the factory laboratory Fig. 2.



Figure 2. Analytical process in the LABORATORY of "REAL AGRO COTTON" UK cotton ginning plant

Table 1 shows the results of comparison technological tests of UXK unit cleaning sections in serial and experimental designs.

Experimental test results

Table 1

Indicators, %	After the modernization of the 1st cleaning line of the UXK unit	After the existing 2nd cleaning line of the UXK unit
Cleansing effect after cleaning	92,5	81,6
Moisture	7,9÷10,9	7,9 ÷10,9
Garbage	2,6	2,8

Results of comparative technological tests of UXK cleaner on the 1st and 2nd lines of "REAL AGRO COTTON" UK (located in Ortachirchik district, Tashkent region). Figure 3 shows an overview of the proposed ginning machinery area [3].



Figure 3. View of the modernized cotton ginning unit

Experiments were performed in triplicate. The table shows the average values of the indicators. According to the test results, it was recommended to use the modernized construction of the UXK cleaner with a variable parameter belt transmission in the procedures of working bodies in the production of cotton factories.

The experimental copy of the recommended cotton cleaning unit was installed in the "REAL AGRO COTTON" UK production system, and comparative tests with the existing UXK unit were carried out. In the modernized cotton ginning unit, as mentioned above, the kinematic connection of the working bodies (drums with piles and saws) is implemented. They mainly transmit motion with variable transmission ratio belts. Instead of the existing four electric drives used in the construction, 11.0kW power, $n=1000\text{min}^{-1}$, $R=1.5\text{kW}$ for supply rollers, $n=(0\div 20)\text{min}^{-1}$, as well as $R=2.2\text{kW}$ for the separating brush drum, $n=1000\text{min}^{-1}$ electric drives are used. In the existing UXK aggregate cleaning section, the power driver of the saw drum is $R_p=5\text{kW}$, $n=1000\text{min}^{-1}$, that of the pile drum is $R_{k1}=3\text{kW}$, $n=1000\text{min}^{-1}$ and $R_{k2}=3\text{kW}$, $n=1000\text{min}^{-1}$, as well as $R_{ch1}=2$, for the separating brush drum. 2kW , $n=1000\text{min}^{-1}$ and $R_{ch2}=2.2\text{kW}$, $n=1000\text{min}^{-1}$ are set. The power consumption reduction in this design is 3.7 kW. Production tests were carried out from 01.11.2020 to 09.02.2023 in the 1st and 2nd flow lines of UXK cotton raw material purifier. Tests were conducted on Sultan-77 hand-picked 1st grade 5th grade cotton raw material. Table 2 shows the results of comparison technological tests of UXK unit cleaning sections in serial and experimental designs. The results of comparative technological tests of UXK cleaner on the 1st and 2nd lines of "REAL AGRO COTTON" UK (Yukorichirchik district of Tashkent region). Experiments were performed in triplicate. The table shows the average values of the indicators.

Average values of indicators

Table 2

Indicators, %	After the modernization of the 1st cleaning line of the UXK unit	After the existing 2nd cleaning line of the UXK unit
Cleansing effect after cleaning	92,6	85,6
Moisture	9÷12	9÷12
Garbage	4,12	5,60
Number of cotton swabs	1	3

The production test results showed that the kinematic connection of the working bodies with each other, their speed increasing enough, and the moving of the working bodies with piles and

saw drums at a variable angular speed made the cleaning system smoother, and there were no jams.

From the results of the experiment, it can be concluded that the efficiency of cleaning large and small impurities is 93% due to the new construction installed in the UXK cotton gin unit.

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