

ИССЛЕДОВАНИЕ РАССТОЯНИЯ МЕЖДУ РЕЗИНОВЫМИ ПЛАНКАМИ БАРАБАНА И ПИЛОЙ

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Аннотация. В данной статье рассмотрены вопросы эффективного извлечения хлопковых волокон из отходов, образующихся при первичной переработке хлопка-сырца. В частности, экспериментально исследовано влияние расстояния между резиновыми планками разделительного барабана и пильчатой поверхностью, а также угла установки планок относительно центра барабана на эффективность регенерации и отделения в регенераторе 1RX. Установлено, что максимальная эффективность регенерации достигается при расстоянии между планками и пилой 4 мм и угле установки планок 15°. Данные параметры способствуют снижению потерь хлопка в отходах и повышению общей эффективности технологического процесса.

Ключевые слова. хлопок-сырец, регенератор, разделительный барабан, резиновые планки, пила, зазор, угол установки, эффективность регенерации, эффективность отделения, отходы хлопка, процесс очистки

STUDY OF THE DISTANCE BETWEEN THE RUBBER SLATS OF THE DRUM AND THE SAW

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Abstract. This article investigates the process of efficient extraction of cotton fibers from waste generated during primary cotton processing. In particular, the influence of the distance between the rubber slats of the separating drum and the saw surface, as well as the installation angle of the slats relative to the drum center, on regeneration and separation efficiency in the 1RX regenerator was experimentally studied. The results showed that the maximum regeneration

efficiency is achieved when the distance between the slats and the saw is 4 mm and the installation angle of the slats is 15°. These parameters contribute to reducing cotton losses in waste and improving the overall efficiency of the technological process.

Keywords. *raw cotton, regenerator, separating drum, rubber slats, saw, clearance, installation angle, regeneration efficiency, separation efficiency, cotton waste, cleaning process*

Introduction. In the primary processing of raw cotton, the recovery (regeneration) of cotton fibers from waste is considered one of the important technological stages. In this process, the efficiency of regenerator units largely depends on the parameters of their working elements. In particular, the design of the separating drum, the relative distance between its slats and the saw surface, as well as their angular positioning, have a significant impact on regeneration efficiency.

In existing technologies, the distance between the saw and the working elements in brush-type separating drums is typically set within the range of 0–2 mm. However, when rubber-slatted drums are used, excessively reducing this distance may lead to damage of the rubber by the saw teeth. Therefore, determining the optimal technological parameters is an urgent scientific and practical task.

The main part. In this study, using the 1RX regenerator as an example, the effect of the distance between the rubber slats of the separating drum and the saw, as well as the installation angle of the slats relative to the drum center, on the regeneration process was investigated.

In previous studies, the slats were mainly arranged along the drum axis and widely used in cotton cleaning machines. In this work, however, the inclined arrangement of the slats was considered, which ensures not only the separation of

cotton particles but also increases the repetition of the cleaning process as the cotton moves along the slat surface.

Under experimental conditions, the processed raw cotton of the first industrial grade had the following characteristics: contamination – 5.6% and moisture content – 8.6%. The amount of cotton particles in the waste supplied from the UXK cleaning system to the 1RX regenerator was found to be 20.6%.

During the experiments, the following parameters were studied:

- slat installation angles: 10°, 15°, and 20°;
- distances between the slats and the saw: 2 mm, 4 mm, and 6 mm.

Analysis. The obtained results indicate that both the distance between the slat and the saw, as well as the installation angle of the slat, have a direct impact on regeneration efficiency.

- 2 mm distance: although the cotton separation rate is relatively high, a larger amount of cotton remains in the waste.
- 4 mm distance: this represents the optimal condition, where the separation efficiency approaches its maximum values.
- 6 mm distance: as the distance increases, the efficiency of removing cotton from the saw teeth decreases, leading to greater cotton losses with the waste.

Regarding the effect of the angle:

- at 10°, the efficiency is at an average level;
- at 15°, the highest performance is observed;
- at 20°, the efficiency slightly decreases.

This can be explained by the fact that excessive inclination of the slats negatively affects the complete separation of cotton from the saw surface.



Figure 1. Waste separated from the UXK cleaning system

Regeneration efficiency of the cotton regenerator at a slat installation angle of 10° , depending on the distance between the slatted drum and the saw

Table 1

Distance between slat and saw, mm	Waste separated from 1RX regenerator, kg	Amount of cotton separated with waste, kg	Cotton content in waste, %	Regeneration efficiency, %
2	110,5	4,8	4,3	95,6
4	109,6	4,2	3,8	96,1
6	112,4	5,5	4,8	95,1

Regeneration efficiency of the cotton regenerator at a slat installation angle of 10° , depending on the distance between the slatted drum and the saw

Table 2

Distance between slat and saw, mm	Waste separated from 1RX regenerator, kg	Amount of cotton separated with waste, kg	Cotton content in waste, %	Regeneration efficiency, %
2	112,0	4,2	3,7	96,2
4	114,2	3,9	3,4	96,5
6	111,3	4,8	4,3	95,6

Results. According to the research results, the following key findings were obtained:

The highest regeneration efficiency was 96.5%.

The optimal parameters were determined as:

distance between the slat and the saw: 4 mm;

slat installation angle: 15°.

In addition, the maximum separation efficiency reached 99.2%.

It was experimentally confirmed that an increase in the distance between the slat and the saw leads to a gradual decrease in separation efficiency.

Conclusion. The results of the conducted scientific research showed that the efficiency of the rubber-slatted separating drum in the 1RX regenerator is directly dependent on its design parameters.

The optimal operating mode is recommended as follows:

distance between the slat and the saw: 4 mm;

slat installation angle relative to the drum: 15°.

These parameters:

increase regeneration efficiency,

reduce cotton losses in waste,

improve the overall efficiency of the technological process.

The obtained results are of significant scientific and practical importance for the improvement and optimization of regenerator units in the cotton processing industry.

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