INVESTIGATION OF THE CONSTRUCTIVE PARAMETERS OF THE SAW INTERMEDIATE INSETS OF THE 5LP MACHINE FOR SEED LINTERING

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Abstract. *The article describes the methodological methods for preparing and conducting experiments with experimental saw spacers prepared for conducting experiments to improve the seed linting process and linting equipment, increase the productivity of the 5LP linter, and achieve energy savings.*
Key words: *lintering, experiment, saw, productivity, gasket, cylinder.*

Login. The increase in the cross-section of the working chamber in 5LP linters, which are currently widely used in the ginning workshops of cotton ginning enterprises, has made it possible to increase the linter's productivity by only 5-8%. The increase in the chamber volume did not accelerate the timely release of lintered seeds from the working chamber. As a result, an increase in the mass and density of the seed roller in the chamber occurred. This, in turn, led to an increase in the load from the seed roller to the saw cylinder. An 18.5 kW electric motor is installed in the saw cylinder to overcome the overload, give the seed roller the required speed, and carry out the linting process without clogging.

Literature analysis and methodology. As a result of theoretical research, researcher E.K. Nuraliev proposes a working chamber for the KL-7 linter, which is enlarged in volume. A mixer with an outer diameter of 240 mm is used in the chamber. At the end of the research work, it was found that the proposed working chamber had a positive effect on the productivity of the linter for seeds and lint due to the good mixing of the mixer seed roller used in it

Research results and discussion. The research process utilizes methodological manuals on theoretical and applied theory of machines and mechanisms, mathematical modeling of technological machine work processes, methods of mathematical statistics, and computational mathematics.

As a result of the analytical analysis, a working hypothesis was developed stating that replacing the inter-saw gaskets in the saw cylinder of the existing 5LP linter with relatively large-diameter ones (the width of the gaskets remains unchanged) positively

affects the processes in the linter's working chamber, relatively reduces seed density in the working chamber, and increases productivity through better mixing.

As a result of the implementation of the proposed working hypothesis, the following is expected: precise fastening of the saw shaft to the linter and the saw discs on it relative to the shaft is ensured, as well as the alignment of each grate section along the gap between the saws, due to which the deviation of one saw from its nominal position in the grate gap is expected to be significantly less than in the existing 5LP linter. Furthermore, the deformation of saws compressed by large-diameter saw spacers can be completely eliminated, thereby eliminating the need for hammer straightening before assembling the saws onto the shaft.

Calculations and measurements showed that up to 85% of the energy consumption of the electric motor rotating the saw cylinder in the existing 5LP linter is spent on friction of the saw cylinder against the seed layer and up to 15% on friction of the saw cylinder against the grate bars. In the developed improved linter, the saw cylinder penetration into the seed layer can be significantly reduced; in the existing 5LP linter, the saw cylinder penetration into the seed layer is 28 mm; therefore, under all other conditions, it is expected that the energy consumption for friction on the lateral surfaces of the saws in the improved linter will be significantly reduced, i.e., by 10-15%.

To implement the developed working hypothesis, a diagram of experimental gaskets for the saw drum of the 5LP linter was developed (Fig. 1).

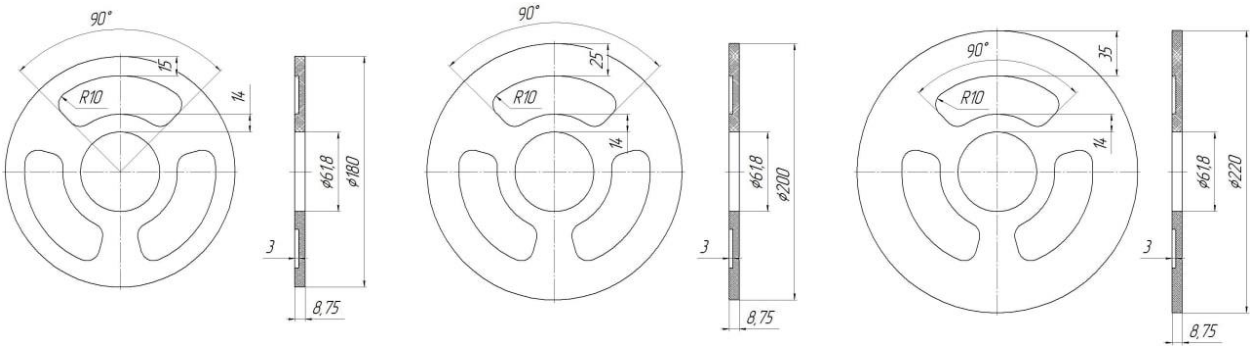

Figure 1. Schematic drawing of the experimental saw spacers

As shown in Figure 1, saw spacers with three diameters were selected for the experiments: 180 mm, 200 mm, and 220 mm.

To simplify the manufacturing process and reduce the cost of the gaskets, they were manufactured from solid DSP material. Thus, 161 saw blades were manufactured for each experimental variant, and 483 were manufactured for the three variants.

It is planned to assemble each variant of the prepared experimental saw spacers in turn in the assembly shop of the 5LP linter saw drum, load the assembled saw drum into the selected linter machine, and conduct the experiments. A cotton ginning enterprise in the Jarkurgan district of the Surkhandarya region was selected for the experiments. The

prepared experimental saw spacers are installed alternately on a single selected linter, and comparative experiments are conducted with the existing 160 mm saw spacer of the 5LP linter. To do this, the selected linter is first adjusted and uniform operating conditions are established. When installing existing and experimental saw spacers, the use of identical new saw blades with a diameter of 320 mm is ensured in all variants. The linter is supplied with ginned seeds of uniform fuzziness; the seed supply of the linter and the position of the seed comb are adjusted identically for all variants. Simultaneously, the prepared experimental saw spacers were delivered to the cotton ginning plant. A linter machine was selected for the experiments. Methodological methods for conducting experiments have been developed.

Conclusion. To implement the selected working hypothesis, the necessary spare parts variants were selected, and the experimental saw spacers were manufactured. A 5LP linter was selected for conducting research at the cotton ginning plant. Methodological methods for conducting the experiments have been developed.

It is expected that the thickness of the seed layer in the linter's working chamber will decrease by an average of 1.4–1.5 times compared to the current 5LP linter, as well as the absolute and relative speed of the seed layers will increase due to the support of large-diameter saw spacers in the rotating saw drum at the bottom of the chamber, their better mixing in the chamber, and accelerated mass transfer, which will increase the productivity of the produced linter by 1.3–1.4 times compared to the current 5LP linter.

References

1. O.Sh. Abdurakhmonov, A.B. Kurbanov. Substantiation of the scientific research direction for the improvement of the 5LP linter. Scientific-technical journal (STJ FerSTU, FarDTU ITJ, NTJ FerGTU, 2025, T.29, No5).

2. Kurbanov A.B., Abdurakhmonov O.Sh., Safarov N.K. Ways to improve the performance of the 5LP linter. Republican Scientific and Practical Conference on "Current Issues of Increasing the Competitiveness of Uzbekistan's Light Industry: Innovative Solutions and Digital Integration," Namangan, October 23-24, 2025.

3. Abdurakhmonov O.Sh., Artikova D.I., Kurbanov A.B. Results of preliminary experiments conducted on the laboratory stand of the UCHDM machine. Republican Scientific and Practical Conference on "Current Issues of Increasing the Competitiveness of Uzbekistan's Light Industry: Innovative Solutions and Digital Integration," Namangan, October 23-24, 2025.