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DETERMINATION OF SEED DAMAGE IN THE PNEUMATIC TRANSPORT SYSTEM BY CONDUCTING EXPERIMENTS

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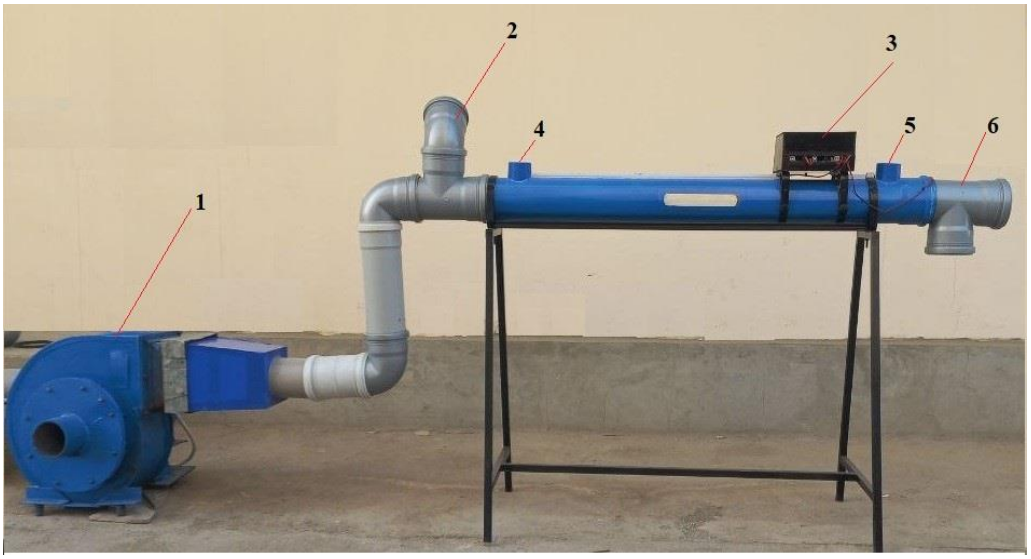
Abstract: In this article, a number of proposals for improving the process of transporting cotton by pneumatic vehicle are given. Research is primarily aimed at maintaining the quality of transported cotton, reducing seed damage. It was determined that the level of mechanical damage to the seed is reduced by fixing rubber to the bent working parts of the pneumopipe, which can affect the cotton raw material.

Keywords: raw cotton, pneumatic conveying, mass,fiber grade, device, adjustment, hopper, strain gauge, deformable.

Introduction. The quality of the products of the cotton ginning industry depends on many factors in the technological process of processing raw cotton, including its pneumatic transportation. When moving through pneumatic pipes, cotton raw material is repeatedly hit by turning corners of the pneumatic transport system, and its movement speed decreases. At the same time, the cotton hits the walls of the pipe and a part of the seed is damaged, resulting in mechanical defects.

The purpose of this study is to determine the damage of cotton seed during pneumatic transportation. In the experiments, Namangan-77 1st grade selection cotton with a moisture content of 8% in standard atmospheric conditions was used.



Photo/Figure 1. An experimental device for monitoring the parameters of factors affecting damage to cotton raw materials

1. Fan, 2. Cotton drop, 3. Control panel, 4. 5. Speed buttons, 6. Angle control button.

Methodology & empirical analysis. Experiments were carried out in a special laboratory device, where the movement of raw cotton at the turning point of the pneumatic pipeline was studied.

Photo/Figure 2. Control panel of the experimental device

1. Screen, 2. Required 45, 67.5, 90 angle changing buttons, 3. Alarm button, 4. Time control button, 5. Speed and force determining button, 6. Elastic and plastic material selection button.

An alarm button is installed at a distance of 1-1.5 m from the place of cotton raw materials, it is possible to choose the most optimal value by studying whether it hits the diverter and conducting experiments at different angles.

The cotton material alternately hits the elbows or bends of the pneumatic pipe, and mechanical damage is observed. As a result, seed damage was determined using standard methods. The experiments were carried out at an air speed of 20-28 m/s.

Results. In order to determine the degree of impact on seed damage at the angle of impact of cotton with the guide, the guide was installed at an angle of 900. In the experimental device, the location angle of the router is 45; 67.5 and 900 are also available.

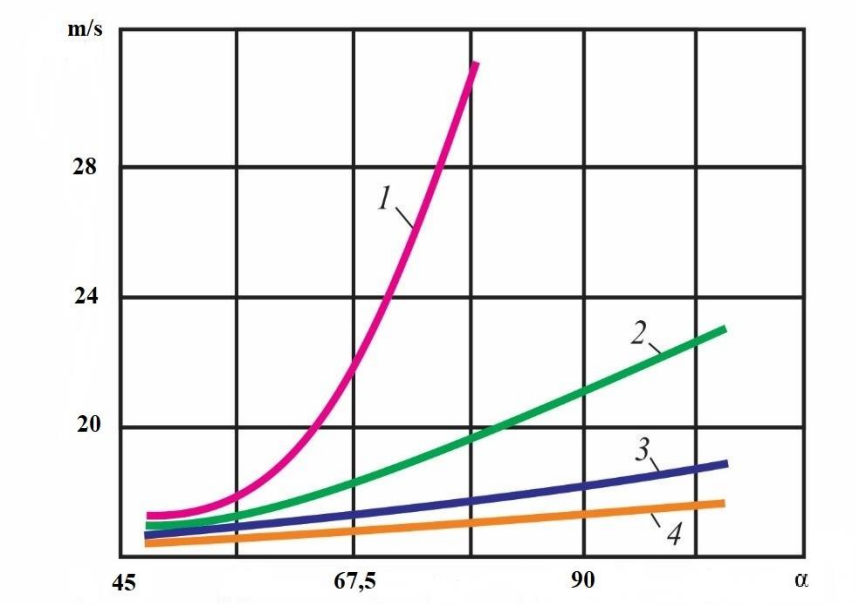
The higher the speed of transportation and, accordingly, the greater the impact force of cotton on the walls of the pneumatic pipeline, the greater the damage to the seeds. Experimental data agree well with practice.

The results in the experimental device show that the damage to the seeds increases as the contact angle between the cracks and the pipeline wall increases. However, at a speed of 20 m/s and an angle of impact of 450, this indicator is slightly reduced. In the experiments, this is explained by the increase in damage to cotton when the angle of contact of air currents with the guide is equal to 900, which has a negative effect on the storage of natural properties of cotton.

In order to determine the effect of the surface material on which the cotton material is hit on the damage to the seeds, experiments were carried out by attaching steel, aluminum or rubber material to the guide. A study of seed damage using rubber-coated guides showed a reduction in damage when conducted at the highest air velocity studied, approximately 20-28 m/s.

The damage of the seeds when hitting the rubber surface gave a much better positive result than the other materials (at an angle of 450).

Therefore, the pneumatic pipe lines should be manufactured in such a way that the angle of impact of the cotton with the pneumatic pipe wall during transportation is minimal. The impact corners of the pipeline on the elbows are covered with rubber, which has a positive effect on preserving the natural properties of cotton.



Photo/Figure 3. 1-steel 3 mm, 2-aluminum 3 mm, 3, 4-rubber thickness 4 and 5 mm

Conclusions. The degree of damage to the seed depends on the angle of contact of the raw cotton seed with the surface of the pipeline. Here, experiments were conducted with 3 different materials, thicknesses, and air speeds of 20, 24, and 28 m/s, and a graph is presented.

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