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OF THE SPEED CHANGE OF THE SAW CYLINDER ON THE SAWING MACHINE THE DENSITY, SPEED AND COMPOSITION OF THE SAW BLADE

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Abstract. In recent years, there have been many researches devoted to the theoretical foundations of the sawing process. However, among them, there are none devoted to the study of the process of extracting the fiber separated from the seed from the saw teeth. From this point of view and based on the existing problems of fiber removal in saw teeth, this research aims to fill this gap and analyze the problems related to this topic.

As we have learned from the literature analysis, when the density of the raw material increases, bad effect knots, combined knots and knots are formed in the weaving process. In order to reduce the ginning defects, the ginning process should be carried out in a relatively loose and stable density of the raw material.

In the process of separating the cotton fiber from the seed in the gin machine, the formation of raw material depends on several factors. The most important of these are the density of the raw material, rotation speed, fiber content, the amount of seeds separated from the fiber, etc. These factors have an effect on the performance of the gin machine and the quality of the obtained fiber.

The quality of the fiber depends on the density of the x forage and the increase in the density of the x forage has a negative effect on the quality of the fiber and the seed. The reason for the density of the raw material to exceed is the insufficient supply of the feeder, the position and speed of the saw, and the accumulation of seeds in the middle.

BIBekmirzai obtained experimental data on the influence of the density of raw materials on the quality of fiber and seed . It can be seen from them that the least fiber damage is observed when the density of the raw material is 325 kg/m ^{3} in the 1st class cotton , and 290 kg/m ^{3} in the 2nd class cotton .

In order to determine the density of the raw material with the change of the speed of the saw cylinder, experiments were carried out in the DP-30 laboratory stand in the

laboratory of the "Technology of preliminary processing of natural fibers" department of the Namangan Institute of Textile Industry.

Tests were conducted on seed cotton super elite and R3 grade, moisture 7.5% and dirt 2.8% handpicked cotton. The experiment was repeated 3 times and canceled. Experiments were conducted with different geometries of the saw, saw cylinder speed of 550, 700 and 850 rpm. To determine the density of the raw material, it was necessary to determine the volume of the working chamber.

For this, the method presented in [54] was used (Fig. 1). According to him, the surface of the working chamber

$$S = 0{,}11\ m^2$$

was taken as the length of the working chamber . $L = 0{,}53\ m$The size of the working chamber was determined using the following formula :

$$V = S \cdot L = 0{,}11 \cdot 0{,}53 = 0{,}058\ m^3 \qquad (1)$$

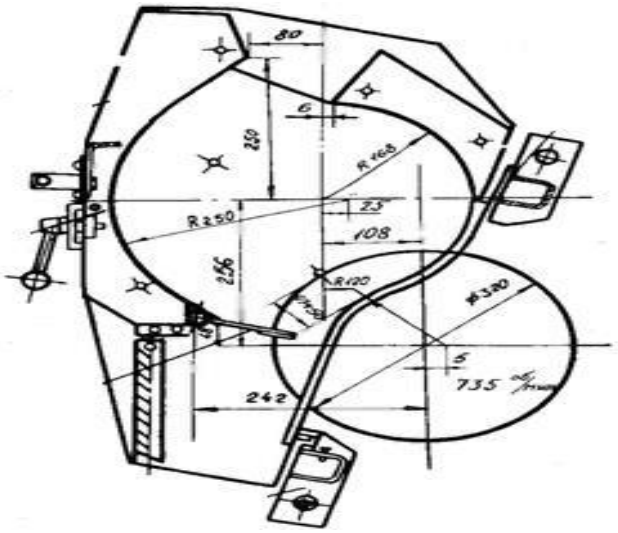

Figure 1. Cross-sectional diagram of the working chamber of the saw gin

In the experiment, stopping the gin machine while it is running, the mass of the shaft x is measured electronically was taken using a scale. Formula (2) was used to determine the density of the raw material in the working chamber:

$$\rho = \frac{m}{V} \qquad (2)$$

Based on the analysis of existing research on the speed of the sawing machine saw cylinder, the effect of the change of the speed of the saw cylinder on the density of the raw material using new devices of technological process control was determined (Table 1).

Table 1

The effect of the speed of the saw cylinder on the density of the raw material

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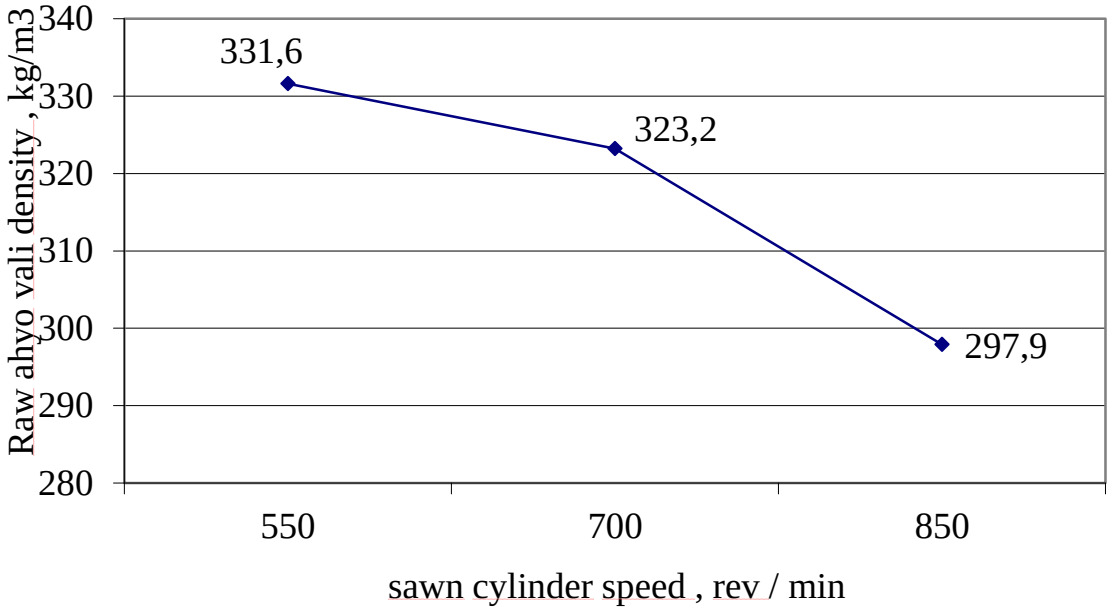
Saw cylinder speed, rev/min	Raw material mass , gr	Volume of the working chamber, m^3	Density of raw material , kg/m^3
550	9	0.058	331.6
700	8	0.058	323.2
850		0.058	297.9



2 . The effect of the speed of the saw cylinder on the density of the raw material

It can be seen from the graphs that the density of the sawmill depends largely on the speed of the saw cylinder, and the density decreases as the speed increases.

Speed parameters of the raw material shaft during sawing depends on the balance between the elimination process of the purified seed. Accordingly, it was determined that it is necessary to accelerate the release of fiber and sawdust from the working chamber of the saw gin in order to keep the ginning at the same rate.

If we take the speed of raw material in the working area of the colanders (point A) as 100%, the speed at point D is 130-160%, the speed at point B is 102-103 % , the raw material and in the area of contact with disks (point E) is 220-230%. When reaching point C, the movement of the material shaft is approx 0.9-1.1 m/sec, and 2-2.6 m/sec in the contact area with saw discs.

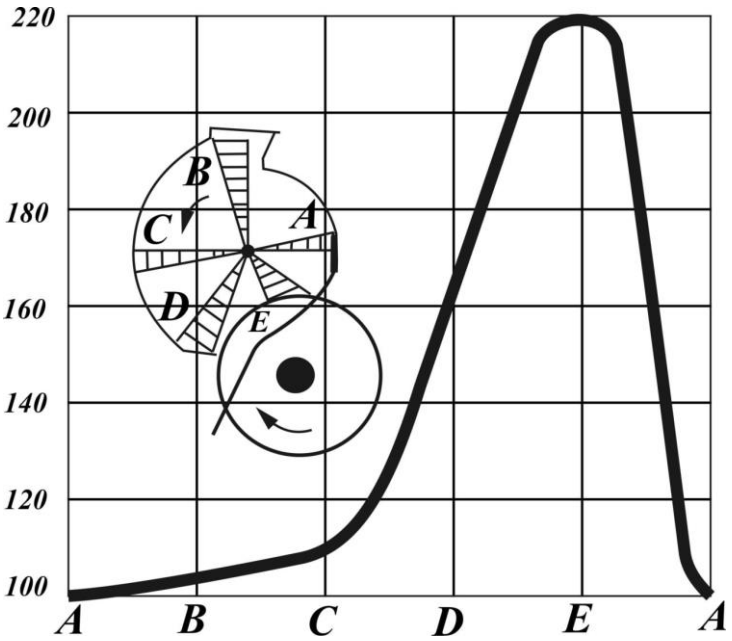


Figure 3 . The graph of the influence of the speed of the saw cylinder on the density of the raw material .

with the increase in the density of the shaft, the rotation speed of the shaft decreases due to the frictional forces of the working chamber in the lateral direction, and as a result, the grinding efficiency decreases.

The analysis of the literature on the subject [55] showed that the speed of the raw material shaft formed in the saw blade $V_{XAV}$is different in different areas of the working chamber. That is, the speed of the saw blade in the front apron area (BCD) $V_{\text{BCD}}$is 4-5 times smaller than the speed of the saw cylinder. According to the research, when the speed of the raw material shaft in *D*the working zone (point) of the mill is taken as 100%, *A*the speed at the point is 130-160%, *B*the speed at the point is 102-103%, and in the area of contact of the raw material shaft with the saw cylinder is 220-230%.

In order to study the effect of the speed of the saw cylinder on the speed of the raw material, a parallel experiment with the above experiment was conducted. The gin stand features a reduced width DP series gin working chamber used in the industry.

The speed of the saw cylinder was changed to 550, 700 and 850 rpm using a frequency converter. Saw cylinder with different geometries saw height 1.3 and 2.2 mm, saw step 2.35 and 2.97, diameter 320 mm.

The lengths of the working chamber areas were measured in advance. The experiments were repeated 3 times and the results were processed in Excel (Table 2).

Table 2

In the contact area of the saw discs with the working cam

(point E) number of teeth

	Pitch of the saw tooth, mm	S a w	The arc length of the saw cylinder in the working chamber, mm	The number of teeth in the working chamber
1	3	3	2	5 6
2	2	3	2	6
3	2	3	2	8

When compared with the experimental results obtained by JSC "Uzpakhtasanoat Scientific Center", it was found that the law of change of the raw material shaft speed is appropriate and the actual speed of the raw material shaft differs from the speed given in the literature, i.e. $AV$the speed in the arcs of andCA we can see that it is smaller, and the velocity in its arc is larger. BCIn addition, as the speed of the saw cylinder increases, the speed of the raw roller also increases.

A lot of scientific work has been done on the research of the gin machine and it is being improved. But ensuring uniformity of raw material density has not yet been resolved. The reason for this is that the composition of the raw material has not been fully studied.

Conclusion

Experimental studies were carried out to study the effect of the speed of the saw cylinder on the change in the composition of the raw material. The experiments were repeated 3 times, and the results are presented in Table 3.3.

In the experiment, stopping the ginning machine while it was working, the raw material in the working chamber was separated into 4 fractions: fully ginned seeds, partially ginned seeds, seeds that were not ginned at all, and damaged ginned seeds.

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