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INVESTIGATION OF FIBER LOSS IN IMPURITIES FROM THE SS-15A SEPARATOR

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ABSTRACT

The effectiveness of the cleaning machines increases with the increase of the useful surface of the mesh in the separation process (separation of seeded cotton from the air) machines. As a result of the increase in the useful surface of the mesh surface in the separator and condenser machines, the aerodynamic resistance decreases. Also, the degree of separation of fiber with air is reduced.

Introduction. The high level of competition in the global market for fiber and finished products leads the way in the production of energy-saving technologies and equipment for waste prevention of competitive quality textile products and air purification. "Cotton fiber production is average in the world 23.0 million. One of the most important tasks is to prevent the loss of fibrous materials during the primary processing of cotton and clean the dusty air. In this regard, much attention is paid to the production of high-quality and energy-saving technologies to prevent the loss of fibrous materials and air purification.

After the ginning process at the cotton ginning plant, the cotton fibers are cleaned from various impurities and sent to press. The ginned seeds are sent to processes such as lintering and delintering, and fiber products such as lint (fluff) and wool are produced from them. Lintering and delintering of cotton seed, that is, separation of fiber and short fiber after ginning is extremely important as a basic process. As a result of the initial processing of seeded cotton in cotton ginning enterprises, fiber, short fiber, seed, technical seed, wool, and wool products are obtained.

The industrial grade of cotton fiber is determined based on indicators of breaking strength, degree of maturity, defects and contamination, and moisture content (percentage of dry weight). Tensile strength and degree of maturity are the most important criteria in determining the industrial grade of cotton fiber.

Methods. Fiber loss occurs in many looms of a cotton gin. These include SS-15A separator (machine for separating seeded cotton from the air), MEXNAT (machine for cleaning seeded cotton from small impurities and dust), 1-XK (machine for cleaning seeded cotton from small impurities), 4DP-130 (separating the fiber from seed ginning machine), 1OVP (fiber cleaning machine) and 5KV (a machine that pneumatically separates the fibers from the air during gin and fiber cleaning and collects

pressing flour), 5LP (a linter machine from the fibers remaining on the surface of the seed).

During the process of extracting the seeded cotton from the air from the SS-15A machine, the impurities and dust contained in the air were determined. According to the State Standard of Uzbekistan, 3 samples of 100 grams were taken and analyzed. The weight of fibers, small impurities, and large particles in the impurities are weighed on an electronic scale, and their amounts in the impurities are reported. The obtained samples were purified using an AX-2 analyzer and their amounts were determined as follows:

Table 2

Samples	Sample weight	Pollution composition	Amount (grams)	Percentage (%)
1	100 grams	Fiber	8.82	8.82%
		A seed fragment is a tangled short fiber	27.48	27.48%
		Small dirt	44.73	44.73%
		Sand	14.33	14.33%
		Natural loss in the workshop	4.81	4.81%
2	100 grams	Fiber	12.47	12.47%
		A seed fragment is a tangled short fiber	23.84	23.84%
		Small dirt	46.37	46.37%
		Sand	11.94	11.94%
		Natural loss in the workplace	5.38	5.38%
3	100 grams	Fiber	11.47	11.47%
		A seed fragment is a tangled short fiber	26.54	26.54%
		Small dirt	53.48	53.48%
		Sand	12.84	12.84%
4		Natural loss in the workplace	7.04	7%

Results. We take the arithmetic mean value of the results obtained for analysis and put them in Table 3:

$$\text{Fiber output - n}_{\text{t.ort}} = \frac{n1 + n2 + n3}{3} = \frac{8{,}82 + 12{,}47 + 11{,}40}{3} = 10{,}89 \cdot 10^{-3}\,\text{kg}$$

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The seed fragment is tangled short fiber - n

$$= \frac{n1+n2+n3}{3} = \frac{18{,}81+17{,}82+16{,}54}{3} = 17{,}72 \cdot 10^{-3}\ \text{kg}$$

Small dirt - $n_{\text{I ort}} = \frac{n1+n2+n3}{3} = \frac{44{,}73+46{,}37+53{,}48}{3} = 48{,}19 \cdot 10^{-3}\ \text{kg}$

Sand - $n_{\text{I ort}} = \frac{n1+n2+n3}{3} = \frac{14{,}33+11{,}94+12{,}84}{3} = 13{,}03 \cdot 10^{-3}\ \text{kg}$

Natural loss on the machine -$n_{\text{four}} = \frac{n1+n2+n3}{3} = \frac{4{,}81+5{,}38+7{,}04}{3} = 5.74 \cdot 10^{-3}\ \text{kg}$

We can express the calculated amounts in percentages, taking into account that we took 100 grams of the sample:

Table 3: Arithmetic average amounts and percentages of compounds in the impurities from the samples.

Pollution composition	**Arithmetic average amount (g)**	**Percentage (%)**
Fiber	10.89	10.89%
A seed fragment is a tangled short fiber	17.88	17.88%
Small dirt	48.19	48.19
Sand	13.03	13.03 %
Natural loss in the workplace	5.74	5.74%

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Fig. 1. Components of the effluents from the SS-15A separator

If the air separation efficiency of SS -15 A seed cotton is 35% if we assume a working capacity of 15 tons/hour, about 1.5 kg of fine dirt will come out in 1 hour. The output of waste in a certain period will be as follows:

- Amount of small dirt released in 12 hours: kg
- Amount of small dirt released in 24 hours: kg
- The amount of small dirt released in 1 month: kg
- Amount of small dirt released in 4 months: kg

Now, using the above percentages, we will calculate the amount of fiber, fine dirt, and slag from the small dirt content that comes out approximately in 4 months:

Table 4

No	Name and symbol of quality indicators in Tolani's HVI laboratory system	Quality indicators in the HVI laboratory system		
		Fiber quality from SS -15 A	Fiber quality from OVP	Fiber quality from 1 to 5 kV
1	Upper average fiber length, mm	28.7	28.3	27.9
2	Uniformity in length, %	80.7	83.4	82.9
3	Short fiber index, %	9.6	9.8	11.7

4	Micronaire, fiber maturity, and thinness	4.4	4.6	4.5
5	Elongation at break, %	5.8	6.8	6.4
6	Relative breaking strength, gs/tex	32.4	34.2	30.6
7	Light reflection coefficient, %	64.6	62.8	60.6
8	The degree of yellowness of the fiber	10.0	9.8	9.8
9	Pollution code	6	4	5
10	The number of impurities	24	18	22
11	Area of dirty mixtures, %	1.8	1.4	1.3
12	Type of fiber by color	52-2	53-2	63-2

- Fiber output - t $= \frac{8640}{100} 10{,}89 = 940{,}9\,\text{kg}$
- Seed broke tangled short fiber - t $= \frac{8640}{100} 17{,}88 = 1531\text{kg}$
- Fine dirt - u $= \frac{8640}{100} 48{,}19 = 4163\text{kg}$
- Sand - I $= \frac{8640}{100} 13{,}03 = 1125{,}75\text{kg}$

Natural loss on the machine - I $= \frac{8640}{100} 5.74 = 495\,\text{kg}$

Results of quality determination in HVI 900-SA laboratory system of fiber obtained from fiber waste from SS -15 A separator, cotton grade 1, Andijon 35

Figure 2. Lint contained fatigue

The percentage of pure spinnable fibers in the waste from cotton fibers of I-type, S 65-24 selection grade is the maximum, i.e. 60-61 percent. As the industrial grade of cotton fiber decreases, the percentage of pure fiber obtained from its waste decreases accordingly.

Conclusion. Fiber loss occurs in almost every process of every cotton ginning enterprise in the primary processing industry of cotton. Due to the high air pressure in the MEXNAT machine, free and short fibers are combined with dust and impurities. Another reason is the increase in the density of the raw material and the pressing of the seeded cotton on the mesh surface. In the SS - 15 A separator, due to the small surface of the mesh surface, it is observed that the air escapes due to the high air pressure. Several foreign scientists, including N.E. Zhukovsky (Russia), S.A. Chapligin (Russia), MDBuser (USA), DPWhitelock (USA), JKGreen (Thailand), DIMisyulya (Belarus), BSSajin (Russia), LIGudim (Russia), VVKyzmin (Belarus) and others conducted scientific research.

Several scientists have researched the development of the fundamental issues that shed light on the theoretical-methodological basis of the creation of dust removal and transfer technology of cotton ginning enterprises in our republic, including XTAkhmedkhodjaev, RM Muradov, ON Alimov, MMSultanov, and others. because serious attention is being paid to its exit. To solve the problem of dust removal and retention of waste fiber materials in cotton ginning enterprises, it is necessary to introduce an effective technology to prevent the loss of fiber in certain processes of cotton ginning machines. Unfortunately, in the scientific research carried out in this regard, studies on the prevention of fiber loss have not been conducted sufficiently.

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