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Analysis Of Fibrous Wastes Generated During Spinning Of Cotton Fiber In The Re-Spinning System

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ABSTRACT

This article discusses the analysis of indicators for the detection of waste in the production of cotton yarn. Indicators for analysis and research were used to determine the properties of fibrous wastes. The results of HVI-1000 equipment were analyzed to determine the quality of toll waste. The amount of fiber suitable for spinning from fiber wastes has been determined. The analysis of the theory of fibrous wastes formed during spinning of cotton yarn in the recycling system is shown.

KEYWORDS

Fiber, fibrous waste, cotton, yarn, standard, shaving.

INTRODUCTION

The technical and economic indicators of cotton spinning factories depend on the quality of the raw materials used and the amount of fibrous waste generated in the technological process. [1]

Quality indicators of cotton fiber produced at ginneries of the Republic must comply with the state standard "Oz DST 604: 2016" [2], and on the basis of this standard the fiber is divided into types, industrial varieties and classes. For example, the amount of defects and impurities in cotton fiber depends on the type and class of industry, and their amount can range from 2 to 16% of the total weight of the fiber.

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In cotton spinning technology, the fiber impurities specified in the standard must be completely removed, and fibers that can be spun with impurities also increase the amount of waste due to mixing. One of the main tasks of industry experts is to analyze the properties of waste generated in cotton fiber spinning systems and identify opportunities for their effective use in the future.

To partially solve the problem, the authors conducted a study at "Kokand Indorama Textile", which specializes in yarn production in a cotton fiber re-spinning system.

MAIN PART

The classification of wastes generated in the technological processes of all cotton spinning enterprises is given in GOST 5159-60, according to which the wastes in the spinning mill belong to st-3, the wastes in the ginning process st-13 and the wastes in the re-spinning process belong to st-11. The company has a system of separation of waste into separate types and their separate packaging, and we have conducted research on types 3, 13 and 11. Due to the high content of impurities in the standard types 3 and 13 of the waste, a cotton analyzer type AX-2 was used in the laboratory to separate the fibers suitable for spinning. The results obtained are shown in Table 1. The physical and mechanical properties of the fibers obtained from the analyzer were determined in the laboratory of the enterprise HVI-1000, the results of which are given in columns 3 and 4 of Table 2.

Table 1

Naming	Sample weight		Invisible waste		Lint (Fiber length up to 6 mm)		The amount of waste		The amount of fiber	
	gr	%	gr	%	gr	%	gr	%	gr	%
Ст-13	50	100	2.404	4.404	6.293	12.61	10.883	21.79	30.42	60.84
Ст -3	50	100	1.491	2.982	9.586	19.18	10.01	20.02	28.91	57.83

Due to the absence of fine contaminants in the waste st-11 from the recycling machine, its physical and mechanical properties were determined directly on the HVI-1000 machine, and the results obtained are repeated in Table 2.

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Table 2

Indicators	Ст-11	Ст- 3	Ст-13
Micronaire indicator (mic)	4.13	4.4	4.3
High average length UHML (mm)	20.47	25.47	25.9
Light reflection coefficient Rd (%)	79.6	71.7	70.8
Yellowing rate + b (%)	10.1	9.6	9.9
Specific tensile strength Str (gf / tex)	28.5	28.2	29.5
Area of pollutants Area (%)	0.10	0.3	0.4
Number of dirty compounds Cnt	19	4	8
Elongation at break Elg (%)	6.1	6.4	6.4
Longitudinal uniformity indexUI (%)	67.2	71.2	67.2
SFI (%) with a short fiber index less than 0.5 inches (12.7mm)	47.3	22.8	25.2
Spinning property SCI	**43**	75	77
Fiber class, grade level	11-3	11-3	11-3
Pollution area	1	1	1

Standard -11 type of waste from the re-sorting machine is added to the volume of the working mixture in the pneumomechanical spinning system of the enterprise in the amount of 15% with a thick linear density (Nm = 20), The yarn was spun and its physical and mechanical properties were determined in the USTER TESTER-5 and USTER TENZORAPID-3 devices installed in the enterprise laboratory, and the data obtained are returned in Table 3.

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Table 3

№	Name of indicators	
1	Linear density, tex	50
2	Numbers , N_m	20
3	Nonlinearity in linear density, U%	11.68
4	Coefficient of variation in linear density, CV %/	14.79
5	Breaking force (Forse, sN)	421.3
6	Coefficient of variation in breaking strength, CV%	9.07
7	Relative toughness (Rkm) sN / tex	14.27
8	Coefficient of variation in relative toughness, CV%	9.07
9	Elongation at break (Elongation,%)	4.81
10	Number of thick places (Thin / -50% / km)	18.0
11	Number of thin spots (Thick / + 50% / km)	84.8

CONCLUSION

Based on the study, the following conclusions can be drawn.

1. We consider it expedient to develop a new standard for cotton fiber in the country and a new classification of waste, corresponding to the system of modern equipment in spinning mills and unique for spinning mills.
2. It was found that up to 60% of the waste types of standards 3 and 13 contain spinning fibers and that they correspond to types 6-7 of cotton fibers with an average length higher than their physical and mechanical properties.
3. After passing the waste types of standards 3 and 13 from special waste treatment machines (type AX-2), the fibers can be added to the working mixtures in spinning yarns in different amounts depending on the linear densities of yarns, spinning systems.
4. By adding 15% of standard 11 waste to the working mixture, it was determined that the

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quality characteristics of the yarn with a linear density Nm = 20 spun by pneumomechanical method correspond to 40% of the international standard USTER STATISTICS-2013 [3].

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