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Change in The Quality Indicators of Knitted Fabrics Obtained Based on Mixing Cotton Fibers with Secondary Material Resources in Different Quantities

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Abstract: In this article mixing machine 15.0% recovered cotton fiber, 20.0% polyester fiber, 65.0% cotton fiber blend, 30.0% recovered cotton fiber, 10.0% polyester fiber, 60.0% cotton fiber blend, 15.0% spinning waste, 20.0% polyester fiber, 65.0% cotton fiber blend and 30.0% spinning waste, 10.0% polyester fiber, 60.0% cotton fiber mixed knitted fabrics were obtained and quality indicators were determined.

Keywords: Fiber raw material production and waste disposal, double-layer knitted fabric, air permeability.

Introduction: In the global textile industry, research and development work is being carried out aimed at developing new scientific and technical solutions for the efficient use of raw materials and resource-saving technologies and equipment for competitive textile production. The most important direction in this regard is the reuse of production waste, which significantly reduces the use of natural resources and, as a result, the production of finished products that significantly reduce environmental pollution. Since the amount of work and energy spent on waste processing is 2-3 times less than in primary production, modern technological equipment of light industry minimizes the emission of harmful substances into the atmosphere during operation, and some completely recycle and recycle production waste. However, these environmentally friendly technologies are very expensive (sometimes the cost of cleaning equipment is 25% of the product price), as these industries have many additional devices that require a lot of manual labor, material and energy costs, and cannot fundamentally solve environmental problems.

Currently, in our republic, comprehensive measures are being taken to develop resource-saving equipment and technologies that allow for the effective use of secondary material resources, and certain results are being achieved. The new Uzbekistan Development Strategy for 2022-2026 sets out important tasks, including “improving equipment and technologies for the production of new types of competitive products through the effective use of secondary material resources”. In implementing these tasks, the creation of technically and technologically modernized machines that, in accordance with the established procedure, can produce a new range of finished knitted products from a mixture of various fibers and

secondary material resources and carry out their high-quality processing for export is of great importance.

It is impossible to produce competitive products without reducing the material volume of textile products, that is, along with optimizing the assortment and structural characteristics of products, it is necessary to use waste and secondary material resources (SMR). As is known, the use of waste and SMR allows you to significantly reduce the cost of raw materials, load idle (or accumulated) production capacities, and create additional jobs. The reduction in the cost of raw materials is especially noticeable when using waste in the production of textile products - non-woven products, which require a large amount of materials, the quality of the initial raw materials is not important. We should not forget about the environmental factor, the use of textile waste significantly reduces the negative impact on the environment associated with the production of fibrous raw materials and waste disposal.

The rational use of raw materials and material resources in the garment and knitwear industry is one of the main problems, and not only enterprises, but also university scientists and specialists are actively involved in creating waste-free and low-waste technologies.

METHODS

Currently, a promising direction for expanding the range of two-layer knitted fabrics is the use of single knitted fabrics combined for the layers and various methods of their connection. What is common to all structures of two-layer knitted fabrics is that each layer is an independent fabric of a single fabric - main, derivative, patterned or mixed. In the process of knitting, fabrics or layers are connected with each other on the reverse side through some elements of the loop structure, in which case it is possible to remove one layer and keep the other without breaking the loop connections. Several scientists have conducted scientific research on two-layer knitted fabrics. The studied two-layer knitted fabric variants differ from each other in the method of connecting the knitted layers. In the proposed variant, the layers of the two-layer knitted fabric are made by knitting a row of elastic knitted fabric loops on the front and back knitting needles. The right and wrong layers of the knitted fabric are made of a plain fabric formed from polyacrylonitrile warp yarn with a linear density of 31 tex x 2. Textured polyester + lycra yarns with a linear density of 18.8 tex were used as a connecting thread. In order to expand the range of knitted products and effectively use local raw materials, a new range of two-layer knitted fabrics from cotton and bamboo yarns was developed. The difference from existing fabrics is that, firstly, cotton and bamboo were used as raw materials, and secondly, a new method of obtaining a new structured fabric was developed. 4 variants of a two-layer knitted fabric with a press on a derivative plain basis were developed on a flat two-needle knitting machine of the LXA-252 model manufactured by the Chinese company “LONG XING” (Fig. 1).

Fig. 1. LONG XING LXA 252 flatbed fang machine.

LONG XING LXA 252 flat fan machine produced elastic knitted fabric from yarns obtained from 15.0% regenerated cotton fiber, 20.0% polyester fiber, 65.0% cotton fiber blend, 30.0% regenerated cotton fiber, 10.0% polyester fiber, 60.0% cotton fiber blend, 15.0% spinning waste, 20.0% polyester fiber, 65.0% cotton fiber blend and 30.0% spinning waste, 10.0% polyester fiber, 60.0% cotton fiber blend.

The machine's loop-forming system weaves the elastic fabric in row 1 from left to right and row 2 from right to left. In row 3, the machine's weaving system weaves the weft yarn over the wefts of the elastic fabric and weaves a press loop in the back loop row. Row 4 weaves the elastic fabric and weaves the weft. Row 5 weaves the press loop in the front loop rows from left to right and continues this rapport from row 1 to row 5. Variant VII.

A method for producing warp-knitted elastic fabrics from 20 tex x 3 cotton yarn with a linear density was developed using the technological capabilities of the flat two-needle “LXA-252” machine manufactured by the Chinese company “LONG XING”. In order to study the effect of warp yarns and press rings in the composition of warp-knitted elastic fabrics on the technological parameters and physical and mechanical

properties of the fabric, as well as to expand the scope of application of cotton yarn and the technological capabilities of the machine, methods for the formation and production of 3 variants of warp-knitted and pressed elastic fabrics were developed.

A wide range of knitted and technical knitted products and products are produced from knitted fabrics. Including outerwear (for men, women, children), sports knitwear, technical knitwear, products used in electrical engineering and mechanical engineering, products used in medicine (special hoses, bandages, masks, etc.), products used in agriculture. It should be noted that knitted fabrics produced in industry are divided into two groups - those used for underwear and outerwear. Innerwear is used for the production of men's and women's underwear, shirts, and thermal underwear.

RESULTS

Another important parameter of knitted fabrics is air permeability and penetration.

The air permeability of knitted fabrics indicates the volume of air passing through a surface of 1 square meter in one second under conditions of a known difference in air pressure on both sides of the sample.

The air permeability of fabrics depends on their longitudinal and transverse density, the fineness or coarseness of the yarns, finishing, and other parameters.

Fabrics form folds and creases as a result of bending and compression deformations. The resulting folds and creases can only be removed by ironing them with a damp cloth. The shrinkage of fabrics depends on their fiber composition, the thickness of the yarns used in their structure, the type of weaving and finishing, and their density.

When fabrics are subjected to wet-heat treatment in weaving, their dimensions also decrease (shearing process) or increase (stretching process). The shrinkage during wet-heat treatment is called forced shrinkage.

With the help of forced shrinkage, a certain desired shape is given to woven products. Shrinkage other than forced shrinkage is a negative characteristic of fabrics. As a result of shrinkage of fabrics, shrinkage and deformation of products and parts of products made from them can occur.

The quality indicators of recycled and knitted fabrics with different fiber compositions were determined. The test results obtained are presented in Table 1.

Table 1

Changes in the quality indicators of knitted fabrics obtained by mixing cotton fiber with different amounts of secondary material resources

№	Indicators	Fabric obtained from a blend of 30.0% recycled fiber, 70.0% cotton fiber under production conditions	Composition of the mixture,%			
			33.0% recycled fiber, 67.0% cotton blend fabric	Fabric made from a blend of 16.5% recycled fiber, 16.5% spinning waste, 67.0% cotton fiber	Fabric obtained from a mixture of 33.0% spinning waste, 67.0% cotton fiber	Fabric from a mixture of 16.5% spinning waste, 16.5% polyester fiber, 67.0% cotton fiber
1.	Air permeability, dm^3/sm^2 sek	1880	2180	1781	2090	1924
2.	Shrinkage, %					
	based on	-7,5	-7,5	-6,5	-7,5	-3,5
	by the duck	-5,0	-5,0	-5,0	-6,0	±2,0

The histogram of changes in air permeability of knitted fabrics obtained by mixing cotton and polyester fibers into recycled fibers is presented in Fig. 1.

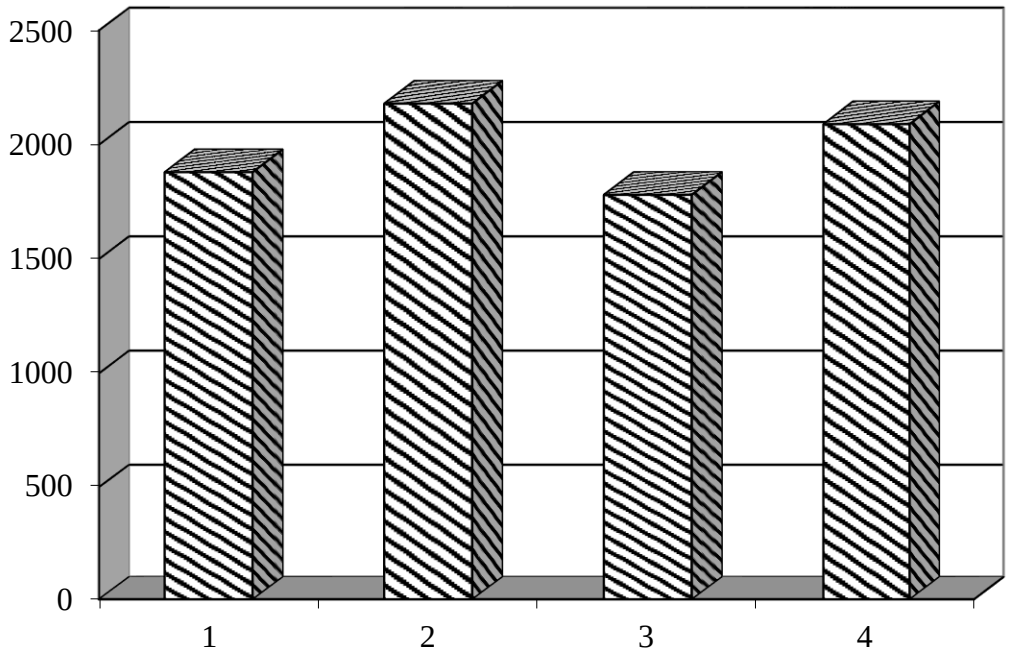

Figure 1. Research of the air permeability of knitted fabrics obtained by mixing cotton fiber with different amounts of secondary material resources.

Comparing the test results with the parameters of the knitted fabric obtained under production conditions, the air permeability of the knitted fabric obtained by mixing 100% cotton fiber to the mixture of 33.0% recovered fiber, 67.0% cotton fiber increased by 13.8%, 16.5% recovered fiber, 16.5% spinning waste, to the mixture of 67.0% cotton fiber The air permeability of the knitted fabric obtained by mixing 100% cotton fiber decreased by 5.3%, 33.0% spinning waste, 67.0% cotton fiber, the air permeability of the knitted fabric obtained by mixing 100% cotton fiber with a mixture of 16.5% spinning waste, 16.5% polyester fiber, increased by 10.1%. 100% cotton to 67.0% cotton fiber blend The air permeability of the knitted fabric obtained on the basis of fiber mixing increased by 2.3%.

CONCLUSION

The analysis of the results of the research showed that the air permeability of knitted fabrics obtained by placing piles in the laboratory and mixing them with cotton fibers compared to the fabrics obtained under production conditions, especially compared to other types of fabrics, the air permeability of the knitted fabrics obtained by mixing 100% cotton fibers with 33.0% recycled fiber, 67.0% cotton fiber mixture, and 13.8% increased air permeability.

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