TISSUE INDICATORS AFFECTING TISSUE PROPERTIES

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ABSTRACT:

Based on high-quality production of complex terry fabrics, of course, it is necessary to study the process from raw materials to the finished product and to determine the parameters that affect it. To do this, the effect of geometric and physical-mechanical properties of complex terry fabrics on its performance in the technological process was studied. The hygroscopicity, air and vapour permeability, electrification, optical and thermal storage properties of materials used in the group of geometric, physical properties of the fabric, as well as the tensile strength, elongation and deformation properties of the mechanical properties are determined and their effect on the weaving process studied.

Keywords: Terry woven. Warp yarn. Weft yarn. Ground yarn. Terry warping. Surface density. Air permeability. breaking force. Deformation. Elongation.

INTRODUCTION:

In the production of high-quality textile products in our country, terry products play an important role and there is a certain experience and scientific developments in the creation of finished products with desired properties [1]. However, in the process of forming a finished high-quality product, taking into account the raw materials available for the production of terry products, its mechanical properties lead to a change in the gloss of the surface of the products and a decrease in cost. One of the main tasks is to obtain quality products that meet the needs of today's consumers, using the properties of terry fabrics. Terry towels are known to come in a variety of sizes and uses. Each range of towels is washed several times and its mechanical properties change.

For this purpose, the mechanical properties of the fabric of terry products, woven from yarns of various linear densities and various spinning methods, were studied.

MATERIALS AND METHODS:

The mechanical properties of textile materials, which affect the properties of the fabric, show their relationship with the action of various forces. These forces can be large or small and can be repeated once or periodically. Forces can act in the direction of the width, length of the textile fabric or at a certain angle to them. As a result, bending, elongation, twisting and other deformations occur in the tissue.

According to the classification of Professor G.K. Kukin, the mechanical properties of fabrics are divided into three classes - half-cycle, single-cycle and multi-cycle. "One cycle" means that the tissues are under the action of force (load), are released from the action of force (release) and rest (rest) [2].

The properties of fabric samples of terry products have been determined, in our case, these are towels produced at the enterprise "ART SOFT HOLDING" LLC in Namangan. 4 different terry cloth samples were taken for scientific research.

Samples of terry cloths were produced on a J-9500 ITEMA loom (Italy).

Table 1. Numbers and spinning methods of yarn that were used to produce terry cloth

Fabric samples	Yarn for the base	Yarn for pile	Yarn for weft
1 sample	Nm 34/2 ring spinning	Nm 27/1 ring spinning	Nm 27/1 ring spinning
2 sample	Nm 34/2 rotor spinning	Nm 27/1 pneumatic spinning	Nm 27/1 pneumatic spinning
3 sample	Nm 34/2 ring spinning	Nm 40/2 ring - spinning	Nm 27/1 ring spinning
4 sample	34/2 Nm rotor spinning	40/2 Nm pneumatic spinning	Nm 27/1 pneumatic spinning

The mechanical properties of all woven samples were determined based on GOST-11027-2014. All experiments were carried out in a modern laboratory for testing knitted and woven fabrics, organized at the Namangan MIT [3].

These properties are used to demonstrate the absolute mechanical properties and quality of fabrics. To identify them, samples are made of fabric in the form of a rectangle 50 mm wide and 200 mm long, i.e. 50x200 mm. For textile fabrics, the transverse and longitudinal directions are determined separately. The tests are carried out on a PT-250M cut-off machine. The obtained values and their mean values, variance and coefficients of variation are calculated and presented in table 2. The average values of the mechanical properties of terry cloth samples obtained in production are presented in the form of a diagram.

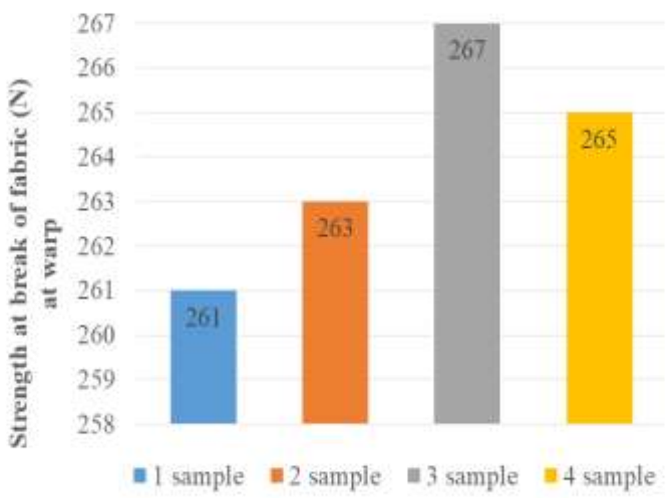

Figure 1. Diagram of the force at break of a terry cloth sample along the warp

Table 2. Variance and coefficients of variation

Fabric properties	1-sample Base 34/2 Nm Pile base 27/1 Nm (ring spinning)			2-sample Base 34/2 Nm Pile base 27/1 Nm (pneumomechanical)			3-sample Base 34/2 Nm Pile base 40/2 Nm (ring spinning)			4-sample Base 34/2 Nm Pile base 40/2 Nm (pneumomechanical)		
	Average value	dispersion	The coefficient of variation	Average value	dispersion	The coefficient of variation	Average value	dispersion	The coefficient of variation	Average value	dispersion	The coefficient of variation
Breaking load (N) By basis weft fabric	261 256	0,7905 0.8126	0,3029 0.5932	263 259	1,32287 0.72156	0,50299 0.39152	267 260	1,0545 1.0133	0,39494 0.49263	265 261	0.3193 0.5925	0.72164 0.51375
Elongation of the fabric at the break on the weft: mm,%	37,7 18.85	0,1141 0,0109	0,3024 0,0578	39,5 19,7	0,19312 0,12113	0,15131 0,06132	36,4 18,2	0,16481 0,07313	0,02341 0,13125	41,9 20,9	0,19321 0,13853	0,07213 0,01831
Elongation of the fabric at break along the warp: mm,%	27,5 13,75	0,0729 0,0519	0,6569 0,0837	32 16	0,09132 0,01547	0,00123 0,00122	24,4 12,2	0,13153 0,13002	0,00173 0,10304	30,9 15,4	0,0134 0,1302	0,02133 0,00131
Weft deformation of the fabric Elongation return	20,3 20,1	0,1923 0,4321	0,1354 0,3246	20,5 20,2	0,1031 0,0132	0,04843 0,13431	20,3 20,1	0,1831 0,1305	0,16517 0,00131	20,4 20,1	0,1921 0,1913	0,01325 0,01626
Deformation of the fabric along the warp Elongation return	20,7 20,2	0,01354 0,10064	0,0235 0,1200	20,2 20,1	0,1315 0,1325	0,00166 0,00133	20,5 20,3	0,7611 0,6131	0,35463 0,01353	20,2 20,1	0,09313 0,03163	0,01492 0,01326

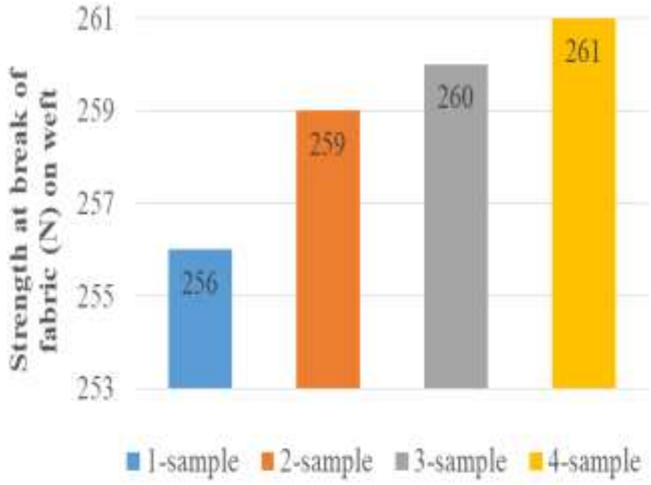

Figure 2. Diagram of the force at break of a pile fabric sample along the weft

The results for the tensile strength of the obtained pile fabric samples along the warp threads were as follows: The tensile strength of 1-2 samples was 261-263 (N). Samples 3-4 have a higher value of 267-265 (N) due to the fact that the pile loops used in fabrics 1-2 have a yarn counting HM27/1, and the root warp used a twisted yarn with a linear density HM - 34/2. Since the root warp is made up of yarn of linear density HM 40/2 at the base, the characteristics of samples 3-4 are high.

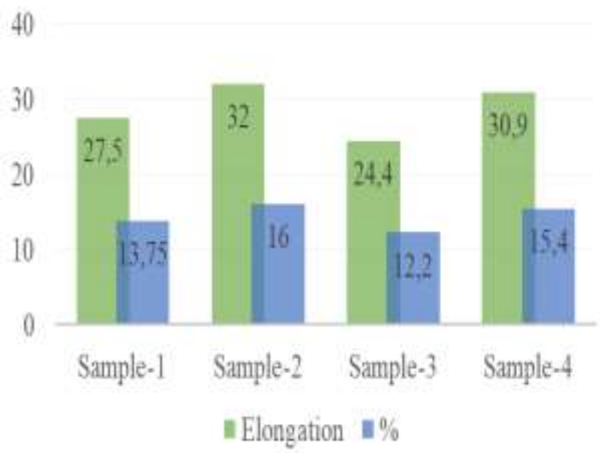

Figure 3. Elongation at break of fleece samples along the warp (mechanical)

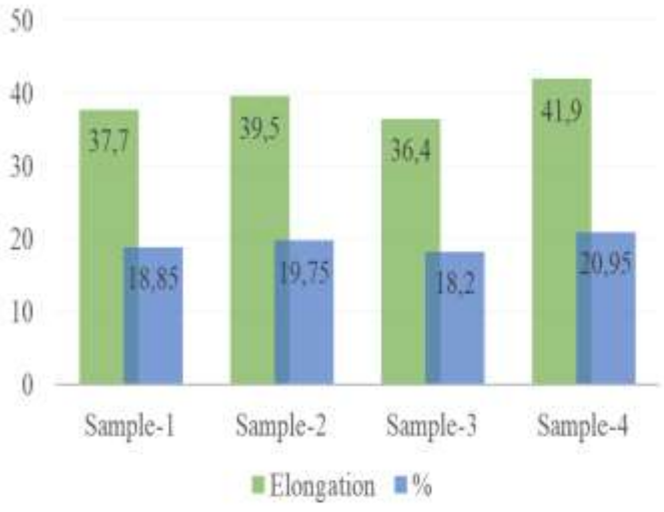

Figure 4. Elongation at break of pile fabric samples along the weft (mechanical)

The results of the tensile strength of the obtained pile fabric samples on the weft thread are 256 (N) for sample 1, the values obtained for samples 2-3-4 are almost close to each other, and the tensile strength of the yarn for the loops is the same as the linear densities weft yarn.

The elongation at break of the fleece samples along the backing is almost the same for all samples, that is, the results obtained on the backing with good results in elongation at break are close to each other.

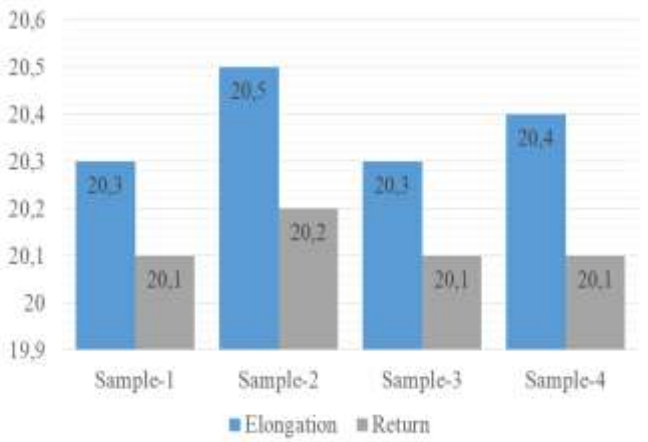

Figure 5. Elongation deformation of tissue samples (mechanical)

The deformation of elongation along the weft of samples 1-3 is the same as the return deformation. The results of the elongation and return strain indices of samples 3-4 are also close to each other and the results are good.

CONCLUSION:

1. When analyzing the tensile strength of the obtained pile fabric samples along the warp threads, samples 3-4 have a high value of 267-265 (N) due to the use of large thickness for looped threads in these samples.
2. Analysis of the results of tensile strength of similar samples of pile fabric on the weft yarns shows that Sample 4 has a value of 261 (N), which is higher than the rest of the values.

It can be concluded that the surface density of the tissue differs from the density of the rest of the samples.

3. The elongation at break of the fleece specimens is almost the same as for all specimens on the root basis, ie. the results obtained are close to each other, and the results are good results for elongation at break.
4. The elongation at break of the obtained samples does not differ from the elongation at break at the weft, the values of samples 1-3 are close to the same as for samples 2-4.
5. In the experiment, it was noticed that the loop yarn of the fourth fabric sample was of a higher linear density and the yarn was spun on rotor spinning machines, which affected its mechanical properties.

Thus, it has been found that towel fabrics woven from yarns with different linear densities and different spinning methods affect their mechanical properties.

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