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INDICATORS OF MECHANICAL PROPERTIES OF WOOLEN FABRIC WOVEN ON THE BASIS OF THREADS OBTAINED BY VARIOUS SPINNING METHODS

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Abstract
Based on the 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 their 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, and 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, towels have an important place in our country, and there are certain experiences and scientific works on creating ready-made products with the necessary properties [1-5].

Nevertheless, taking into account the available raw materials in the production of towels, in the process of forming a ready-made quality product, its mechanical properties cause a change in the surface gloss of the products and a decrease in their price. It is one of the main tasks to obtain high-quality products using these features of towel products to meet the demands of the current consumer. We know that towels come in different sizes and uses. Each towel item is washed several times and its mechanical properties change [6-11].

For this purpose, the mechanical properties of towel fabrics woven from yarns of different linear densities and different spinning methods were studied.

Materials and methods

The mechanical properties of textile materials, which affect the properties of the fabric, indicate their response to the influence of various forces. These forces can be large or small and can act once or repeatedly. Forces can act in the direction of the length and width of textile fabrics or at a certain angle relative to them. As a result, bending, stretching, twisting and other deformations appear in the gas. According to the classification of Professor G.K. Kukin, the mechanical properties of gases are divided into three classes - half-cycle, single-cycle and multi-cycle properties. "One period" means that gases are under the influence of force (loading), released from the influence of force (release) and rest (rest) [12-18]. The properties of textile samples produced at the "ARTSOFT HOLDING" LLC enterprise in Namangan city were determined. 4 different tissue samples were taken. Tissue samples J-9500 were woven on the loom of the ITEMA company (Italy).

The following numbers of yarns were used in the woven fabric samples and the spinning method used:

1st sample, ground thread -34/2 Nm, tuft thread -27/1 Nm, hem thread -27/1 Nm, woven from yarn spun on spinning machines;

Sample 2 ground thread -34/2 Nm, tuft thread 27/1 Nm, hem thread 27/1 Nm, woven from thread spun on pneumatic spinning machines;

Sample 3 ground yarn - 34/2 Nm, women tanda yarn 40/2 Nm, jute yarn 27/1 Nm, woven from yarn spun on folk spinning machines;

The 4th sample is woven from yarn spun on pneumomechanical spinning machines.

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All mechanical properties of all woven samples were conducted on the basis of GOST-11027-2014. All experiments were carried out in the modern laboratory of weaving and textile fabric testing established under the Namangan MTI [19-22]. These properties are used to indicate the absolute mechanical capability and quality of gases. To determine them, rectangular samples of 50 mm width and 200 mm length, i.e. 50x200 mm, are prepared. For textile fabrics, it is determined separately in transverse and longitudinal directions. Tests are conducted on the PT-250M cutting machine.

The obtained values were processed and their average values, dispersion and coefficients of variation were calculated and presented in Table 1.

The surface density of the obtained hair tissue samples is the highest 442.2 in the 3rd sample and the lowest 327.4 in the 1st sample. This is because the 3rd sample is ground yarn Nm = 34/2, the hair is Nm = 40/2, and the 1st sample is ground. Tanda yarn Nm = 34/2 tuft tanda Nm = 27/1 obtained by ring spinning method tuft tanda Nm = 27/1 for one-ply section. In the 1st sample, the surface density is low, and in the remaining 3-4 samples, the average results are close to each other.

The thickness of the obtained fabric samples is high in the 3rd sample, that is, the yarns on the ground and the hair in the sample are double-layered, woven from the yarns obtained by the method of spinning, and the surface density is also high. on the other hand, the thickness of the 2nd sample turned out to be lower due to the fact that it was woven from yarns spun by the pneumomechanical method in one layer. The thickness of the remaining 3-4 samples turned out to be medium.

In determining the mechanical properties of fabric samples produced at the enterprise "ARTSOFT HOLDING" LLC

In the modern laboratory for testing textile and knitting products, established under the Namangan Institute of Engineering and Technology, the mechanical properties of hair tissue samples, i.e.Abrasion resistance, breaking strength of the fabric, elongation at break of fabric along the warp, elongation at break of fabric along the warp, Deformation of the fabric along the warp, Deformation of the fabric along the warp, the properties were studied, the average values and dispersion of the obtained results, coefficients of variation were determined, the obtained values are presented in Table 2.

The average values of the mechanical properties of the hair tissue samples taken from the production are shown in the form of a diagram.
Tensile strength diagram of the resulting hair tissue sample

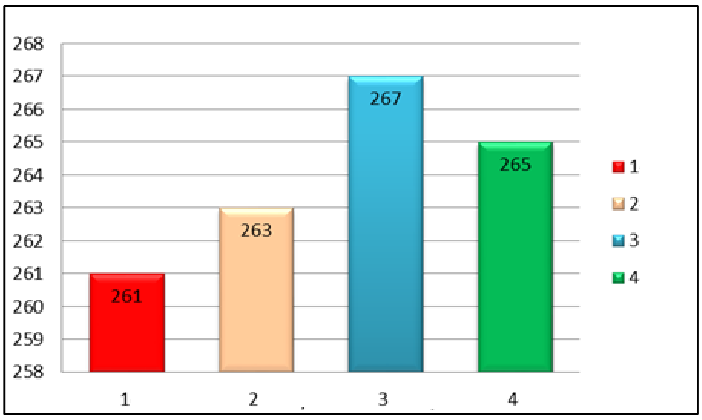

Figure 1. Tissue breaking force (N) per body.

The results of the shear strength of the hair tissue samples obtained by the warp threads can be seen in Figure 1. The shear strength of sample 1-2 is 261-263 (N), and sample 3-4 has a higher value of 267-265 (N), this is because 1-2 samples of wool used in weaving27/1 Nmand on the ground34/2 Nmbecause it is in the hair of samples 3-434/2 Nmand on the ground. For 40/2 Nm, the indicators of samples 3-4 are high. Tensile strength diagram of the obtained hair tissue sample.

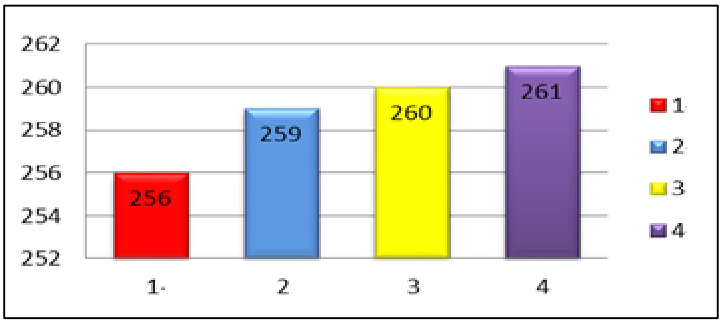

Figure 2. Tissue breaking strength (N) per strand.

The results of the shearing strength of the hair tissue samples along the weft threads can be seen in Figure 2. The value of the 1st sample is 256 (N) and the values of the 2-3-4 samples are almost close to each other. because it is different, the breaking strength is good.
The tensile (mechanical) properties of the obtained hair tissue samples were processed and presented in the form of a diagram.

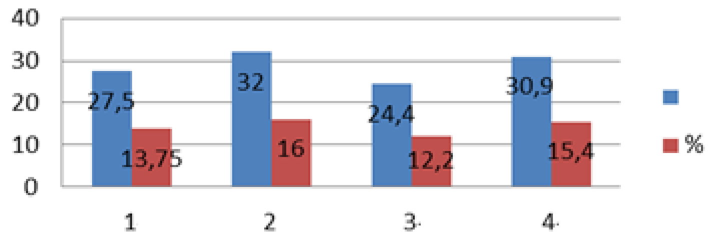

Figure 3. Elongation of the fabric at the break on the body.

Elongation at break of pubic hair tissue samples according to figure 3 can be seen that the results of all samples are almost the same, that is, the results obtained are close to each other, and the results of elongation at break according to tanda are good results.

The tensile (mechanical) properties of the obtained hair tissue samples were processed and presented in the form of a diagram.

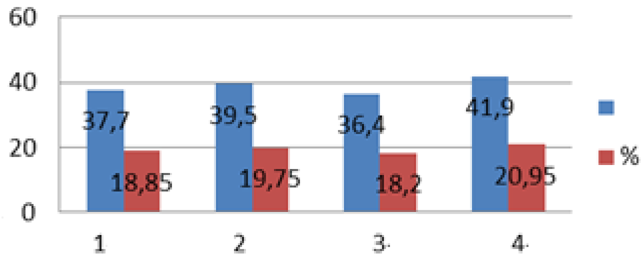

Figure 4. Elongation of the fabric at break according to the rope.

The elongation at the break of the samples according to the 4th figure shows that the elongations at the break of the samples do not differ from each other, but the indicators of samples 1-3 are close, as well as those of samples 2-4.

The deformation (mechanical) properties of the obtained tissue samples were processed and presented in the form of a diagram.

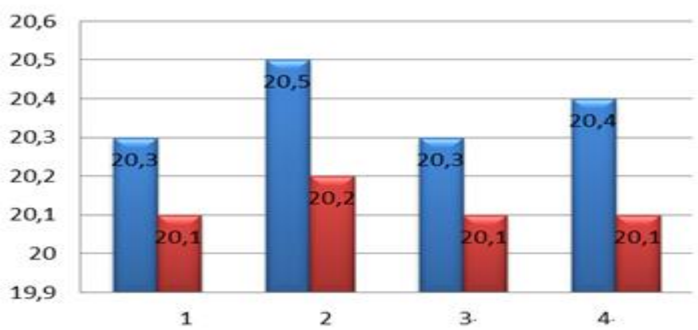

Figure 5. Deformation of the fabric along the warp.

Deformation of the obtained samples according to the beam. As can be seen from Figure 5, the elongation and deformation parameters of samples 1-3 are the same and the return is also the same.

The deformation (mechanical) properties of the obtained tissue samples were processed and presented in the form of a diagram.

Table 1.

Fabric properties	Example 1 Increase. 34/2 Nm in body 27/1 Nm in Tuk Tan (folk spinning)			Example 2 Increase. 34/2 Nm in body 27/1 Nm in Tuk Tan (pneumomechanical spinning)			Example 3 Increase. 34/2 Nm in body 40/2 Nm in Tuk Tan (folk spinning)			Example 4 Increase. 34/2 Nm in body 40/2 Nm in Tuk Tan (pneumomechanical spinning)		
	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation
Fabric surface density (M2)	327.4	0.74027	0.226355	413.2	0.5787918	0.140075471	442.2	0.01349	0.01284	350	0.13594	0.26485
Fabric thickness (mm)	0.367	0.52345	1.5653	0.166	0.000791	0.476247	0.508	0.10315	0.072316	0.244	0.1024	0.16421

Table 2. Mechanical properties of the obtained hair tissue samples

Fabric properties	Example 1 Increase. 34/2 Nm in body 27/1 Nm in Tuk Tan (folk spinning)			Example 2 Increase. 34/2 Nm in body 27/1 Nm in Tuk Tan (pneumomechanical spinning)			Example 3 Increase. 34/2 Nm in body 40/2 Nm in Tuk Tan (folk spinning)			Example 4 Increase. 34/2 Nm in body 40/2 Nm in Tuk Tan (pneumomechanical spinning)		
	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation	Average value	dispersion	coefficient of variation
Abrasion resistance	1100 0	0.287 572	0.00647935	12000	0.25196	0.001644	11500	0.29013	0.19346	13500	0.246316	0.19543
Fabric breaking strength (N) According to Tanda According to vodka	261 256	0.790 56942 0.812 65	0.30290016 0.59316	263 259	1.32287566 0.72156	0.50299455 0.39152	267 260	1.05451411 1.01327	0.3949491 0.49263	265 261	0.31926 0.59252	0.721642 0.51375
on the fabric Elongation at break: mm- %-	37.7 18.85	0.114 018 0.010 899	0.3024338 0.057797	39.5 19.75	0.19312 0.12113	0.151311 0.06132	36.4 18.2	0.16481 0.073131	0.02341 0.13125	41.9 20.9	0.19321 0.13853	0.07213 0.01831
Elongation of the fabric at break on the tan: mm- %-	27.5 13.75	0.072 916 0.051 912	0.65688992 0.08371538	32 16	0.09132 0.01547	0.00123 0.001225	24.4 12.2	0.13153 0.13002	0.001731 0.10304	30.9 15.4	0.01348 0.1302	0.02133 0.00131
The deformation of the fabric is according to the yarn stretch - return-	20.3 20.1	0.192 3 0.432 1	0.13546 0.3246	20.5 20.2	0.1031 0.0132	0.048432 0.13431	20.3 20.1	0.18313 0.130511	0.16517 0.001315	20.4 20.1	0.1921001 0.19136	0.013253 0.016265
Fabric deformation according to tanda stretch - return-	20.7 20.2	0.013 54 0.100 64	0.02349 0.120015	20.2 20.1	0.131521 0.132591	0.0016667 0.001336	20.5 20.3	0.761113 0.613132	0.35463 0.013536	20.2 20.1	0.09313 0.03163	0.01492 0.01326

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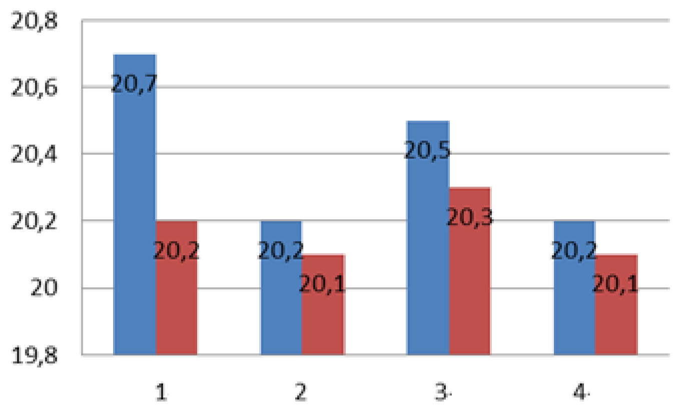

Figure 3.8. Deformation of the fabric on the body.

Figure 3.2.6 shows that the deformation of the obtained samples by body shows that the results of the elongation return indicators are close to each other and the results are good.

Conclusion

When we analyzed the tensile strength of the hair tissue samples obtained by the warp threads, samples 3-4 have a high value of 267-265 (N), which is the reason for the use of high-thickness warp threads in these samples.

Similarly, in the analysis of the results of the shear strength of the pile fabric samples, it can be seen that sample 4 has a value of 261 (N), which is higher than the other values. It can be concluded that the surface density of the fabric is different compared to the rest of the samples.

In our experiment, it was observed that the coarseness of the yarn in the fourth tissue sample and the fact that this yarn was spun from pneumatic spinning machines affected its mechanical properties.

So, it was determined that there is an effect on the mechanical properties of towel fabrics woven from yarns of different linear densities and different spinning methods.

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