ACADEMICIA

ISSN: 2249-7137 Vol. 11, Issue 3, March 2021 Impact Factor: SJIF 2021 = 7.492

ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.00973.3

MATHEMATICAL MODELING OF PHYSICAL PROPERTIES OF TERRY TISSUE PRODUCTS

Axtam Akramovich Qosimov*; Ulugbek Tolanbayevich Abdullayev; Shohida Bakhriddinova Fakhriddin qizi***; Shokirjon Abdurashid oglu Abdulazizov******

*Senior Lecturer,
Department of "Metrology, Standardization and Quality Management",
Namangan Institute of Engineering and Technology,
UZBEKISTAN

**Associate Professor,
Candidate of Technical Sciences,
Vice-Rector for Youth Affairs of Tashkent Institute of Textile and Light Industry,
UZBEKISTAN

***Master Student,
Course of Study "Metrology Standardization and Quality Management *Training",*
Namangan Institute Of Engineering Technology,
UZBEKISTAN

****Master Student,
Course of Study "Metrology Standardization and Quality Management *Training",*
Namangan Institute Of Engineering Technology,
UZBEKISTAN

ABSTRACT

In this paper, the main physical properties of terry towels are air permeability, absorption and drying of vapor, capillary properties of body and back yarns, and the construction of a mathematical model using statistical analysis based on experimental results. In the mathematical modeling of the physical properties of terry products, the method of determining the regression model based on the results of experiments from multivariate planning was used to analyze the effect of changes in Pili length and fiber composition on the physical properties.

KEYWORDS: *Terry, Terry Towel, Pili Length, Fiber, Cotton, Polypropylene, Air Permeability, Water Vapor Permeability, Liquid Transfer Rate.*

INTRODUCTION

The main factor in the production of any product is the use of products that meet the requirements of quality consumption with the correct use of available raw materials. Fur is one of the most widely used textiles in everyday life. Users prefer ready-made gowns and towels to be comfortable and fresh, made of light and soft construction, stay dry with quick absorption of accumulated water and sweat on the body, and be in a hygienic and natural form. Therefore, for water-related cases, terry fabrics are an important need for textiles, and the physical properties of towel fabrics must be unique. In such products, air permeability, water vapor permeability, liquid transfer rate, drying time and water absorption are distinguished among the quality characteristics. In order to identify and predict these features, they were selected and implemented in the Central Non-Composite Experimental Experimental Unit (MNKT), which is widely used in the study of technological processes in the textile industry.

Selection of unwanted parameters

Convenience properties were determined according to the areas of application of terry products and weaving properties were selected and convenience features were considered taking into account the studied literature [1].

Cotton fiber Ne 24/2 (34.5 / 2) linear density yarn for the body and cotton fiber Ne 16/1 (27/1) linear density yarn for the back, as well as staple cotton fiber for the fur (Ne 36/2) Ne 20/2 yarns have been used and we have used polypropylene yarns for Pili yarns in experiments and its effect on product properties has been studied.

In mathematical modeling, the parameters of the product raw material and technological processes are taken as an unwanted property. Air permeability, water vapor permeability and liquid transfer rate of terry products have been identified as important factors determining the following properties.

X_1- fibrous composition of Pili yarns. Changes in the proportion of cotton and polypropylene in the yarn,%;

X_2-is the length of the thread used for the Pili on the surface unit of the piece. The number and heights of the Pili strands in the product vary, so we use the sum of the lengths of the Pili strands per unit area, cm;

X_3-final processing — final processing is mainly the cutting of ring-shaped Pilis, in which the change in the proportion of cut Pilis is taken as factor 3;

The following were identified from the properties of Terry products as parameters that take into account the composition of the raw material, the properties and processing of the yarn:

Y_1-Air permeability (mm / s);

Y_2-Water vapor permeability (g / m at 21 hours);

Y_3-Water absorption rate, capillary in the direction of the body strip (mm / 60 s);

Y_4- Water absorption rate in the direction of the back strip, capillary (mm / 60 s);

ACADEMICIA

ISSN: 2249-7137 Vol. 11, Issue 3, March 2021 Impact Factor: SJIF 2021 = 7.492

In determining the limits of variation of factors, the basic level and range of variation of each factor was selected on the basis of preliminary research and theoretical research, as well as the experience of enterprises. The levels and intervals of change of all factors are given in Table 1.

TABLE 1. LEVELS AND INTERVALS OF CHANGE OF FACTORS

Name the factors	-1	0	1	Change
X_1- fibrous composition of Pili yarns.	100 % Cotton	50% Cotton and 50% Polypropylene	100 % Polypropylene	50 %
X_2-the length of the Pili thread per unit area of the product	46	53	60	7 cm
X_3-final processing	0	50	100	50 %

The central non-composite experimental working matrix and the results of the experiments are given in the following table 2.

TABLE 2. CENTRAL NON-COMPOSITE EXPERIMENTAL MATRIX

№	Factors			x_1x_2	x_1x_3	x_2x_3	x_1^2	x_2^2	x_3^2	$\bar{Y}_1$	$S_u^2\{Y_1\}$	$\bar{Y}_2$	$S_u^2\{Y_2\}$	$\bar{Y}_3$	$S_u^2\{Y_3\}$	$\bar{Y}_4$	$S_u^2\{Y_4\}$
	x_1	x_2	x_3														
1	+	+	0	+	0	0	+	+	0	421	12,0	549	14,0	26,8	15,2	27,7	11,4
2	+	-	0	-	0	0	+	+	0	474	13,0	580	21,0	25,7	8,0	27,4	8,4
3	-	+	0	-	0	0	+	+	0	483	11,0	1153	18,0	39,9	12,0	42,7	11,0
4	-	-	0	+	0	0	+	+	0	529	15,0	1106	11,2	34,4	14,6	42,3	9,8
5	+	0	+	0	+	0	+	0	+	288	11,2	541	15,0	46,6	16,0	50,0	12,8
6	+	0	-	0	-	0	+	0	+	672	10,5	587	14,6	7,0	17,2	5,0	9,4
7	-	0	+	0	-	0	+	0	+	282	8,0	577	19,0	44,4	9,0	48,2	10,8
8	-	0	-	0	+	0	+	0	+	753	12,4	1682	18,2	29,9	14,0	36,9	8,6
9	0	+	+	0	0	+	0	+	+	301	9,0	567	14,5	48,7	8,0	50,7	14,2
10	0	+	-	0	0	-	0	+	+	713	22,0	1073	22,1	16,0	9,2	31,3	13,1
11	0	-	+	0	0	-	0	+	+	284	10,5	600	16,0	44,3	11,2	49,3	6,8
12	0	-	-	0	0	+	0	+	+	788	15,2	810	16,2	14,0	14,2	36,3	7,5
13	0	0	0	0	0	0	0	0	0	372	12,4	541	17,2	36,5	11,1	39,0	10,7
14	0	0	0	0	0	0	0	0	0	313	16,2	417	16,4	28,7	12,1	28,2	10,8
15	0	0	0	0	0	0	0	0	0	410	14,2	502	16,8	35,2	12,4	31,5	10,7

Based on the results of the experiments, we look for a secondary regression multivariate mathematical model. As a result of this experiment we can obtain the following general regression model:

$$Y_R = b_0 + \sum_{i=1}^{M} b_i x_i + \sum_{\substack{i=j=1 \\ j\neq 1}}^{n} b_{ij}\, x_i x_j + \sum_{i=1}^{M} b_{ii}\, x_i^2$$

or because three factors are involved in our experience, the above expression takes the following form:

$$Y_R = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_{12}x_1x_2 + b_{13}x_1x_3 + b_{23}x_2x_3 + b_{11}x_1^2 + b_{22}x_2^2 + b_{33}x_3^2$$

In the equation $b_0 \ldots b_1 \ldots$ are the regression coefficients of the mathematical model, x_1, x_2, x_3 are the coded values of the factors.

To calculate the regression coefficients, we use the following values of the coefficients. [3]

$g_1 = 0{,}2;$ $g_2 = 0{,}166;$ $g_3 = 0{,}125;$ $g_4 = 0{,}25;$

$g_5 = 0{,}125;$ $g_6 = 0{,}0625;$ $g_7 = 0{,}3125$

1. Y_1-We construct the regression coefficients to construct the air permeability property model.

We determine the regression coefficients:

$$b_0 = \frac{1}{N_ц}\sum_{u=1}^{N_ц}\overline{Y}_{\overline{u}} = \frac{1}{3}(372 + 313 + 410) = 365$$

$$b_i = g_3\sum_{u=1}^{N} x_{iu}\overline{Y}_u$$

$$b_1 = 0{,}125(421 + 474 - 483 - 529 + 288 + 672 - 282 - 753) = -24{,}12$$
$$b_2 = 0{,}125(421 - 474 + 483 - 529 + 301 + 713 - 284 - 788) = -19{,}75$$
$$b_3 = 0{,}125(288 - 672 + 282 - 753 + 301 - 713 + 284 - 788) = -442{,}75$$

$$b_{ij} = g_4\sum_{u=1}^{N} x_{iu}x_{ju}\overline{Y}_u$$

$$b_{12} = 0{,}25(421 - 474 - 483 + 529) = -2$$
$$b_{13} = 0{,}25(288 - 672 - 282 + 753) = 21{,}75$$
$$b_{23} = 0{,}25(301 - 713 - 284 + 788) = 11{,}5$$

$$b_{ii} = g_5\sum_{u=1}^{N} x_{iu}^2\overline{Y}_u + g_6\sum_{i=1}^{M}\sum_{u=1}^{N} x_{iu}^2\overline{Y}_u - g_2\sum_{u=1}^{N}\overline{Y}_u$$

$$\sum x_1^2\overline{Y_1} = 421 + 474 + 483 + 529 + 288 + 672 + 282 + 753 = 3901$$

$$\sum x_2^2\overline{Y_1} = 421 + 474 + 483 + 529 + 301 + 713 + 284 + 788 = 3992$$

$$\sum x_3^2\overline{Y_1} = 288 + 672 + 282 + 753 + 301 + 713 + 284 + 788 = 4081$$

$\sum \overline{Y_1}$ =421+474+483+529+288+672+282+753+301+713+284+788+372+313+410

$= 7082$

ISSN: 2249-7137 Vol. 11, Issue 3, March 2021 Impact Factor: SJIF 2021 = 7.492

$$\sum_{i=1}^{M}\sum x_i^2\overline{Y_1} = 3901 + 3992 + 4081 = 11974$$

$$b_{11} = 0{,}125 \cdot 3901 + 0{,}0625 \cdot 11974 - 0{,}166 \cdot 7082 = 60{,}39$$
$$b_{22} = 0{,}125 \cdot 3992 + 0{,}0625 \cdot 11974 - 0{,}166 \cdot 7082 = 71{,}76$$
$$b_{33} = 0{,}125 \cdot 4081 + 0{,}0625 \cdot 11974 - 0{,}166 \cdot 7082 = 82{,}89$$

We also determine the regression coefficients of the remaining outgoing parameters in the above sequence and write the equations taking into account the determined regression coefficients:

$$Y_1 = 365 - 24{,}12x_1 - 19{,}75x_2 - 442{,}75x_3 - 2x_1x_2 + 21{,}75x_1x_3 + 11{,}5x_2x_3 + 60{,}39x_1^2 + 71.76x_2^2 + 82{,}89x_3^2$$

$$Y_2 = 486{,}67 - 282{,}6x_1 + 30{,}8x_2 - 466{,}75x_3 - 19{,}5x_1x_2 + 264{,}75x_1x_3 - 37x_2x_3 + 201{,}69x_1^2 + 159{,}57x_2^2 + 159{,}44x_3^2$$

$$Y_3 = 33{,}7 - 5{,}3x_1 + 1{,}6x_2 + 29{,}27x_3 - 1{,}1x_1x_2 + 6{,}28x_1x_3 + 0{,}3x_2x_3 - 0{,}3x_1^2 - 0{,}93x_2^2 - 0{,}79x_3^2$$

$$Y_4 = 32{,}9 - 7{,}5x_1 - 0{,}36x_2 + 22{,}17x_3 - 0{,}02x_1x_2 + 8{,}43x_1x_3 + 0{,}8x_2x_3 + 0{,}28x_1^2 + 3{,}72x_2^2 + 3{,}72x_3^2$$

We determine the significance of the regression coefficients.

To do this, we determine the variance of the outgoing parameter.

$$S^2\{Y\} = S_m^2\{Y\} = \frac{1}{N_ц - 1}\sum_{u=1}^{N_ц} S^2\{\overline{Y}\}$$

$$S^2\{\overline{Y_1}\} = \frac{1}{3-1} \cdot 42{,}8 = 21{,}4 \qquad S^2\{\overline{Y_2}\} = \frac{1}{3-1} \cdot 50{,}4 = 25{,}2$$

$$S^2\{\overline{Y_3}\} = \frac{1}{3-1} \cdot 35{,}6 = 17{,}8 \qquad S^2\{\overline{Y_4}\} = \frac{1}{3-1} \cdot 32{,}2 = 16{,}1$$

and on this basis we calculate the variance in determining the regression coefficients:

$$S^2\{b_0\} = g_1S^2\{\overline{Y_1}\} = 0{,}2 \cdot 21{,}4 = 4{,}28$$

$$S^2\{b_i\} = g_3S^2\{\overline{Y_1}\} = 0{,}125 \cdot 21{,}4 = 2{,}68$$

$$S^2\{b_{ij}\} = g_4S^2\{\overline{Y_1}\} = 0{,}25 \cdot 21{,}4 = 5{,}35$$

$$S^2\{b_{ii}\} = g_7S^2\{\overline{Y_1}\} = 0{,}3125 \cdot 21{,}4 = 6{,}69$$

We calculate the variance in determining the regression coefficients of the remaining outgoing parameters in the above sequence and write them in Table 3 below.

Table 3. Mean squared deviation values in determining regression coefficients:

Mean square deviation	Y_1	Y_2	Y_3	Y_4
$S\{b_0\}$	2,07	2,25	1,89	1,79
$S\{b_i\}$	1,64	1,76	1,49	1,42
$S\{b_{ij}\}$	2,31	2,51	2,11	2,01
$S\{b_{ii}\}$	2,59	2,8	2,36	2,24

Then, using the following equation, determine the calculated value of the Student Criterion and write Table 4:

$$t_R\{b_i\} = \frac{|b_i|}{S\{b_i\}}$$

Table 4. The calculated value of the defined Student Criterion

The calculated value of the student criterion	Y_1	Y_2	Y_3	Y_4
$t_R\{b_0\}$	176	217	17,7	18,3
$t_R\{b_1\}$	14,8	159	3,56	5,29
$t_R\{b_2\}$	12,1	17,3	1,09	0,26
$t_R\{b_2\}$	271	263	19,6	15,6
$t_R\{b_{12}\}$	0,86	7,77	0,52	0,01
$t_R\{b_{13}\}$	9,4	105,5	2,97	4,2
$t_R\{b_{23}\}$	4,97	14,74	0,14	0,4
$t_R\{b_{11}\}$	23,35	71,87	0,13	0,13
$t_R\{b_{22}\}$	27,75	56,86	0,39	1,66
$t_R\{b_{33}\}$	32,05	56,82	0,33	1,66

Table value of student criterion

$$t_j\left[P_d = 0{,}95; f\{S_{ц}^2\} = 3 - 1 = 2\right] = 2{,}77$$

It is known that if the calculated value of the criterion is less than the table value, that coefficient is not significant and we subtract it from the equation. We rewrite the equation by subtracting the checked values.

$$Y_1 = 365 - 24{,}12x_1 - 19{,}75x_2 - 442{,}75x_3 + 21{,}75x_1x_3 + 11{,}5x_2x_3 + 60{,}39x_1^2 + 71.76x_2^2 + 82{,}89x_3^2$$

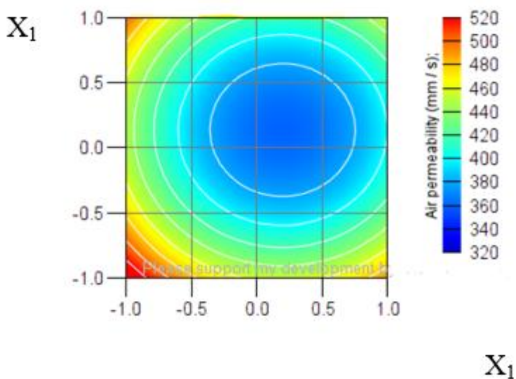
$$Y_2 = 486{,}67 - 282{,}6x_1 + 30{,}8x_2 - 466{,}75x_3 - 19{,}5x_1x_2 + 264{,}75x_1x_3 - 37x_2x_3 + 201{,}69x_1^2 + 159{,}57x_2^2 + 159{,}44x_3^2$$

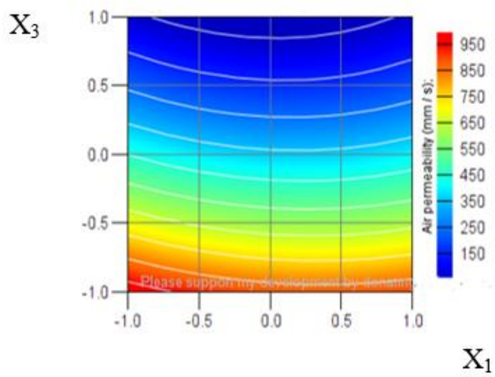
$Y_3 = 33,7 - 5,3x_1 + 29,27x_3 + 6,28x_1x_3$

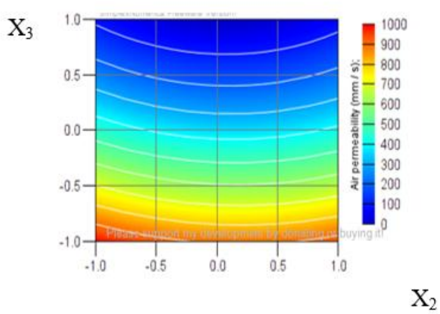
$Y_4 = 32,9 - 7,5x_1 + 22,17x_3 + 8,43x_1x_3$

RESULTS AND DISCUSSION

Since the equation constructed to determine the properties of the output parameter for the study is three-dimensional, one of the input factors in the analysis is assumed to be Xi = 0 (central position), and we construct a two-dimensional graph by dividing the models into 3 equations.

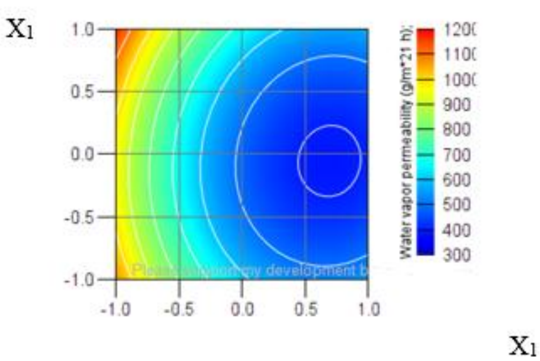


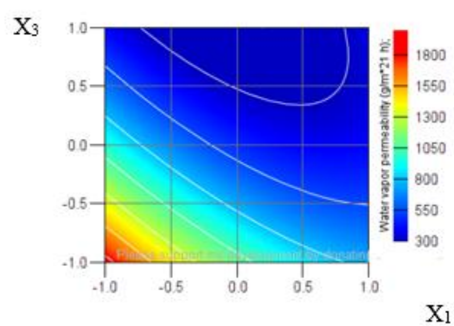


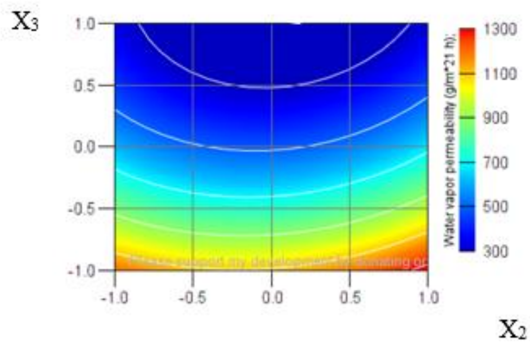


Y_1-Air permeability (mm / s);

As can be seen from the graph above, the air permeability shows the result at the lowest value of the X_3 property, and we see that the values of the X_1 and X_2 factors change over a short range.







From the graph describing the permeability of water vapor, we can see that the results of the turbine X1 and X3 show the result at the lowest value, and the values of the factors X2 change in the range. We can see the results in the same form as the models of the remaining properties.

CONCLUSION

Models were created using the results of experiments in 15 cases that we analyzed. From these models, Y_1-Air permeability (mm /s) and Y_2-Water vapor permeability (21 hours g/m) were closely related models. we can see that they decrease during the final processing of X3 tissue, and the number of Pilis per X_2-tissue surface unit is a key factor in the corresponding improvement of the values of these two properties.

From the 3-4 models in the body, we can conclude that the rate of water absorption in the direction of the body and back strip, capillary (mm/60 s) X^2 is completely insignificant, but the higher the content of cotton fiber, the better the capillary.

REFERENCES

1. Jitendra P.S, Swedesh V. Woven Terry Fabrics, Woodhead Publishing Series in Textiles Volume Number: 184.

2. Kosimov, A. A., Bakhriddinova, S. F. K., & Abdulazizov, S. A. O. (2020). Classification Of Terry Products Made Of Natural Fiber. *The American Journal of Engineering and Technology*, *2*(11), 133-141. https://doi.org/10.37547/tajet/Volume02Issue11-21

3. Karahan M. Experimental investigation of the effect of fabric construction on dynamic water absorption in terry fabrics. Fibres Text East Eur 2007;15(3):74–80.

4. А.Г. Севастьяновни “Методы и средства исследования механико-технологических процессов текстильной и легкой промышленности”.

5. Atanbayeb Dilmuhammad Каримов Р.К., Mirjamol Mirxojayev Mirkarimovich.,Ahtam Qosimov Akramovich, “Анализы качество хлопкового волокна и приборы на тестировании”, НАУЧНО-ТЕХНИЧЕСКИЙ ЖУРНАЛ ФерПИ, 2019/3, 162-163.

6. Kosimov Ahtam Akramovich Abdullayev Ulugbek To'lanboyevich, Mirjamol Mirxojayev Mirkarimovich, Oqboyev Alisher Rasuljanovich, Анализ производство ткань для дублирин из отходов волокнистых материалов гребнечёсяльного системы, НАУЧНО-ТЕХНИЧЕСКИЙ ЖУРНАЛ ФерПИ, 2018/12, спец. вып. № 3, 42-46.

7. Башриддинова Ш Қосимов Ахтам Акрамович, Мирхожаев М, Оқбоев А, "Методы определения капиллярностьи текстильных тканьей", НАУЧНО-ТЕХНИЧЕСКИЙ ЖУРНАЛ ФерПИ, 2018/12, спец. вып. № 3, 166-169.

8. Башриддинова Ш Қосимов Ахтам Акрамович, Маматханова О, "Тўқимачилик материалларини капиллиярлигини аниқлаш", Наманган Халқаро конференция тўплами 2018 йил, 2018/6, 223.

9. Bozgeyik K. A quantitative investigation about towels. MSc Thesis. Izmir: University of Ege, Institute of Natural and Applied Science, Department of Textile Engineering; 1991.

10. Okboyev A.R. Social Network Marketing and Its Development // International Journal of Research in Management & Business Studies (IJRMBS 2020). Vol. 7 Issue 3 July - Sept. 2020. Impact Factor: SJIF 2016= 7.05.ISSN: 2348-6503 (Online) ISSN: 2348-893X (Print) pp. 38-42.

11. Okboyev A.R., O.J.Ashurkulov Directions for the introduction of an integrated quality management system to increase the competitiveness of light industry enterprises // South Asian Journal of Marketing & Management Research (SAJMMR). Vol.10, Issue 11, November 2020 Impact Factor: SJIF 2020= 7.11. pp. 107-10.

12. Khamraeva, S. A., Yusupova, N. B., Atambaev, D. D. O., & Hasanov, M. H. O. (2020). The Importance Of The Extension Tool In Reducing The Inequality Of Yarn. The American Journal of Engineering and Technology, 2(08), 39-44. https://doi.org/10.37547/tajet/Volume02Issue08-05

13. Atambayev, D. D. O. (2020). Analysis Of Fibrous Wastes Generated During Spinning Of Cotton Fiber In The Re-Spinning System. The American Journal of Engineering and Technology, 2(09), 86-90. https://www.usajournalshub.com/index.php/tajet/article/view/960

14. DilmuhammadDavronbekogliAtambayev, MuhriddinHakimjonogliHasanov, Analysis of Fibrous Waste Generated in the Preparation Departments of Spinning Mills and Cotton Processing. http://www.ijarset.com/volume-7-issue-9.html#

15. Korabayev Sh.A; Matismailov S.L; Yuldashev A.T., Atanbayev D.D. (2020) "Study Of Fiber Movement Outside The Crater Of Pnevmomechanical Spinning Machine", Solid State Technology. Vol. 63 : Iss. 6. Pages 3460-3466. http://www.solidstatetechnology.us/index.php/JSST/article/view/3473

16. AtambaevDilmukhammadDavronbek ogli1, OlimjonovDilshodbekKhasanboyogli ACADEMICIA: An International Multidisciplinary Research Journal , Production of arkok (enlama) hair wool fabrics on modern flexible fabric knitting machine in textile (2294) Last page : (2299) https://www.indianjournals.com/ijor.aspx?target=ijor:aca&volume=10&issue=11&article=367

17. Jamshid, Y. ,Akbarjon, U. and Olimjon, S. (2020) Dynamics of Interaction of a Single Fiber with a Headset of a Sampling Drum. *Engineering*, **12**, 347-355. doi: 10.4236/eng.2020.126027.

18. Mirkhojayev Mirjamol Mirkarimovich; Ahmadjanov Sukhrob Bakhtiyor ogli “The study of physical and mechanical properties of different fabrics for suit gauze” ACADEMICIA An International Multidisciplinary Research Journal (Double Blind Refereed & Peer Reviewed Journal)№2 November 2020 *Pages* 1049-1055. https://saarj.com/wp-content/uploads/ACADEMICIA-NOVEMBER-2020-FULL-JOURNAL.pdf

19. Mirkhojayev Mirjamol Mirkarimovich; Egashov Bahodir Abdumukhtor o`gli.“Analysis of determination of cotton field quality as aresult of changes in technological processe” SAARJ Journal on Banking &InsuranceResearch (SJBIR)№9 November2020.*Pages* 38-44.https://saarj.com/sjbir_current-issue/

20. Mirkhojayev Mirjamol Mirkarimovich; Ergashov Jamshid Fakhridin ogli. “Analysis Of Tanda Yarn Fiber Quality Indicators In Cotton Yarn Hardened Fabric Production” The American Journal Of Engineering And Technology №2 September 2020. *Pages* 82https://usajournalshub.com/index.php/tajet/article/view/959

21. Mirkhojayev Mirjamol Mirkarimovich. “Method Of Assessing The Bending Resistance Of Yarns In Suit Folding Fabrics”. The American Journal Of Engineering And Technology №2 September 2020*Pages* 98-100. https://www.usajournalshub.com/index.php/tajet/article/view/962

22. Mirkhojayev Mirjamol Mirkarimovich; Iskandarov Orifkhon Fozilkhon o`gli “The Study Of The Fineness Of Textile Materials In Small Manufacturing Enterprises” The American Journal Of Engineering And Technology №2 November 2020. *Pages* 174-178https://usajournalshub.com/index.php/tajet/article/view/1533

23. Максудов, Н. Б., Нигматова, Ф. У., Юлдашев, Ж. К., & Абдувалиев, Р. Р. (2018). Анализ деформационных свойств высокоэластичных трикотажных полотен для проектирования спортивной одежды. *Universum: технические науки*, (9 (54)).

24. Yuldashev, J. Q., &Bobojanov, H. T. (2020). Study Of The Influence Of The Parameters Of The Sampling Zone On The Condition Of The Capture Of Fibers By The Drum Teeth. *The American Journal of Engineering and Technology*, *2*(08), 75-78. https://doi.org/10.37547/tajet/Volume02Issue08-11

25. Bobojonov, H. T., Yusupov, A. A., Yuldashev, J. Q., &Sadikov, M. R. (2020). Influence of deformation properties of yarn on the quality of knitted fabric. *Test Engineering and Management*, 29502-29513.