

ISSN 2181-8622

**Manufacturing technology problems**



# **Scientific and Technical Journal Namangan Institute of Engineering and Technology**

INDEX  COPERNICUS  
INTERNATIONAL

**Volume 8  
Issue 3  
2023**



UDC 687.016.5

## METHOD DEVELOPMENT OF APPLYING SHRINKAGE VALUES INTO BASE PATTERN OF MEN'S GARMENT DYED SHIRT

**NABIDJANOVA NARGIZA**Professor of Namangan Institute of Engineering and Technology  
Phone.: (+99893) 671 01-14**SIDIKJANOV JAFAR**Doctoral student of Namangan Institute of Engineering and Technology  
E-mail.: [jafar.sidikjanov@bk.ru](mailto:jafar.sidikjanov@bk.ru), phone.: (+99890) 214 88-14

**Abstract:** One of the major challenges faced when designing garments in garment dyeing is the significant shrinkage of cotton fabric in both length and width during the dyeing process. In previous researches, shrinkage values of various cotton fabrics were determined, drawing a base pattern for designing a men's shirt produced by garment dyeing, and a method of calculating the shrinkage values of the selected cotton fabric was researched, and in this article, the scheme defining main feature points on Cartesian coordinate system and drawing of the shirt new pattern based on shrinking values was developed.

**Keywords:** Pattern, method, shirt, garment dyeing, shrinkage, coordinate system, constructive points, pattern blocks, sleeve.

**Introduction.** In the modern garment industry, three traditional methods of pattern constructing are generally used for shirt making: 1) the proportional method, which uses several body measurements (BM) to calculate all pattern indexes through linear regression equations; 2) short measuring or metric method that uses a direct BM set for pattern drawing, 3) combined method of the above proportional and direct measure methods [1]. Based on these three methods, some new parametric models are also proposed to automatically construct patterns.

Based on a large-scale population census, the proportional method allows to build an integrated base pattern with regression calculation equations that calculate the necessary pattern indexes of other segments based on only a few body measurements (for example, chest girth CG, back length BL). This style is widely used for ready-to-wear clothing in the world. [2-4]. The advantages and disadvantages of these methods are obvious. On the one hand, it requires very few body measurements, which saves a lot of time and effort. On the other hand,

correlations between CG and other dimensions cannot be explained by the current results; and the method requires some experience from the patternmaker. These drawbacks lead to the incomplete fit of the final product.

The direct measure method uses construction parameters directly based on standard or individual body measurements without equations. It can be applied to both ready-to-wear and made to measure clothing. These parameters are usually calculated by adding adjustable constants to the BM value. This method also has advantages and disadvantages. It involves a time-consuming and complicated body measurement process and requires high precision of BM. However, once the BM is well measured, the pattern achieves a good fit. These patterns can fit the figure better than a proportional pattern. However, the fit problems have not been completely eliminated.

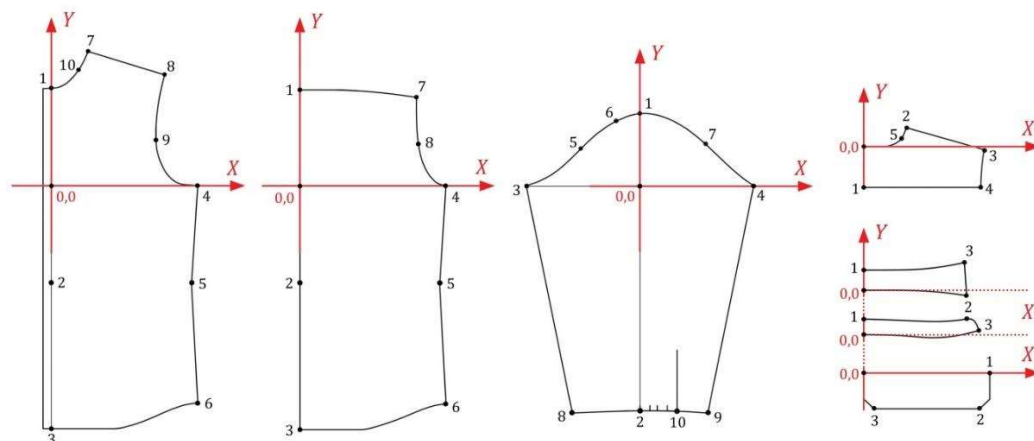
The combined method, as its name notifies, involves the use of both methods - proportional and short measure by using both regression equations and several complementary body measurements

together. The base pattern of a shirt can be drawn using any of the above methods, depending on whether the garment is produced for mass or individual consumers.

**Methods.** This research was carried out on men's garment dyeing shirts intended for mass production and the base pattern of shirt was constructed by M.Müller & Sohn's method [6]. This method offers convenience in constructing the base pattern, as it allows for the use of a few basic body measurements to build the basic pattern of various garments. In this approach, auxiliary measurements are derived using specific ratios of the main measurements, along with certain fixed values [7]. By utilizing this technique, pattern construction becomes faster, requiring fewer body measurements and formulas. As a result, the design processes become more efficient, enhancing overall productivity. In order to design the drawing of the base pattern of the men's shirt, the necessary body measurements were determined according to the typical figure size 176-100-40 and the ease allowances were selected. According to abovementioned method, the base pattern of the shirt was made and shrinkage values calculated by new developed formula. The shrinkage percentage of chosen fabric is 9,4 % in warp and 8,5 % in weft direction [8].

**Results and Discussions.** The main designing problem that needs to be solved in the method of garment dyeing is that the dimensions of the clothes after dyeing are reduced due to the shrinking and the final measurements do not correspond to the state of the initial base pattern [9-10]. There has been no previous researches on the design of men's shirts produced by garment dyeing. Applying shrinking ratios directly to garment design requires a lot of practice and calculation, and is also prone to fault. In some books [11-13], it is shown that changes to the pattern due to the change in dimensions due to the deformation or shrinkage during ironing of knitted fabrics are introduced at the last stage, when the basic drawing is ready.

First, shirt base pattern was drawn by Gemini CAD software based on the standard size, and the main constructive points of the final drawing were determined. According to each detailed coordinate system, the coordinate values of the points remaining from the 0.0 point were determined, and the new coordinates were calculated with the shrinkage value added according to the formula determined in the previous study, here in warp direction located y-axis, the x-axis corresponds to weft. Figure 1 below shows the location of the shirt pattern blocks on the coordinate system and the scheme of marking the main feature points.



**Figure 1. Model of re-design the shirt base pattern on Cartesian coordinate system by adding the shrinkage values**

Like all CAD systems, Gemini system defines pattern points using a Cartesian coordinate system, with grid origin 0,0 as the base point doing set origin function. It is expressed with a positive or negative sign, depending on whether the points are

located on the right or left, above or below the origin point. The values of each point on the x and y coordinate axes are organized based on table 1, and the shirt pattern construction with new shrinking ratios was created.

**Table 1**
**Coordinates of normal base and shrinkage values added patterns**

№	Pattern block	Basic constructive points											
		1		2		3		...	9		10		
		x	y	x	y	x	y	...	x	y	x	y	
1	Front	B	0,0	17,8	0,0	-19,0	0,0	-48,0	...	20,5	7,0	5,23	21,2 5
	G	0,0	19,6 3	0,0	20,9 5	0,0	52,9 4	...	22,3 9	7,72	5,71	23,4 3	
2	Back	B	0,0	18,0	0,0	-19,0	0,0	-48,0	...	-	-	-	-
	G	0,0	19,8 5	0,0	20,9 5	0,0	52,9 4	...	-	-	-	-	
3	Yoke	B	0,0	-8,0	8,4	3,9	23,4	-0,63	...	-	-	-	-
	G	0,0	-8,82	9,18	4,3	25,5 6	-0,69	...	-	-	-	-	
4	Sleeve	B	0,0	13,2	0,0	-46,3	-21,9	0,0	...	13,8	-46,8	7,3	-46,4
	G	0,0	14,5 6	0,0	51,0 6	23,9 2	0,0	...	15,0 7	51,6 1	7,97	51,1 7	
5	Collar stand	B	0,0	3,0	20,1	2,8	22,8	0,7	...	-	-	-	-
	G	0,0	3,31	21,9 5	3,09	24,9	0,77	...	-	-	-	-	
6	Collar	B	0,0	4,0	20,1	1,3	19,6	5,2	...	-	-	-	-
	G	0,0	4,41	21,9 5	1,43	21,4 1	5,73	...	-	-	-	-	
7	Cuff	B	25,0	0,0	23,0	-7,0	2,0	-7,0	...	-	-	-	-
	G	27,3	0,0	25,1	-7,7	2,2	-7,7	...	-	-	-	-	

here B – coordinates of base pattern, G – coordinates of shrinkage values added pattern (garment dyeing)

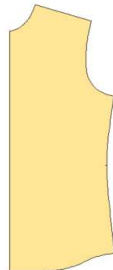

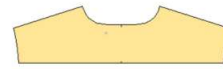
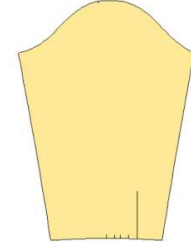

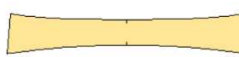

Differences in perimeter and surface between the initial base pattern and the shrinkage values added pattern are directly related to fabric shrinking percent and its direction. For example, since in this situation, shrinking in warp is greater than in the weft direction, the perimeter variation in the front, back and sleeve blocks is

longer as from 9,80 to 9,86 percent, in the pieces such as collar, stand and cuff on the contrary, it was observed that it was 9,26-9,36 percent, but the surface change is almost the same in all the details, which means that the design process can be considered correctly and qualitatively performed.



**Table 2**

**Dimensional changes between base and shrinkage values added pattern blocks**

№	Pattern block	Perimeter, cm		Surface, cm <sup>2</sup>		Change difference, percent (%)	
		Base pattern	Garment dyeing	Base	Garment dyeing	Peri-meter	Surface
1	Front bodice 	192,31	211,34	1832,1	2200,8	9,89	20,12
2	Back bodice 	227,44	249,72	3327,7	4008,4	9,80	20,45
3	Yoke 	111,26	121,82	425,5	511,9	9,49	20,31
4	Sleeve 	175,33	192,62	1967,8	2368,3	9,86	20,35
5	Collar stand 	93,92	102,62	135,4	162,8	9,26	20,24
6	Collar 	92,76	101,44	184,4	221,6	9,36	20,17
7	Cuff 	61,66	67,42	171	205,4	9,34	20,12

After the dyeing process, the sizes of the shirts are reduced due to the shrinkage. Therefore, their final size and measurements should correspond to the standard initial sizes without exceeding the permitted deviations. To determine this, the measuring method also has been

developed in accordance with GOST 4103-82. By comparing these measurements with the initial basic pattern, it is possible to improve the construction drawing with shrinkage values.

**Conclusion.** As before emphasized, main designing problem that primary to be

solved in garment dyeing is that the dimensions of the clothes after dyeing are reduced due to the shrinking and the final measurements do not correspond to desired sizes.

This can be caused by several errors, for example, incorrect determination of shrinkage values of the fabric, error in

applying shrinkage parameters to the pattern construction, incorrect location of various details in the warp and weft direction of the sewn garment, or different shrinking of pieces due to their difference. In order to solve that problem above research was implemented.

### References

1. Yan Jiaqi. Development of e-bespoke men's shirt virtual design with predictable fit. PhD Dissertation of Ivanovo State Polytechnic University, 2021 pp. 52-55
2. Winifred Aldrich. Metric Pattern Cutting for Menswear. Fifth edition, John Wiley and Sons Ltd, 2011 pp. 193-205
3. Helen Joseph-Armstrong. Patternmaking for Fashion Design. Pearson Education Limited 2014
4. Gareth Kershaw. Patternmaking for menswear. Laurence King Publishing 2013
5. Coffin, D.P. The shirtmaking workbook Pattern, Design, and Construction Resources/ D.P. Coffin // Creative Publishing Int, 2015, p. 6
6. Fundamentals menswear. System M. Müller & Sohn | Published by Ebner Media Group GmbH & Co. KG | <https://www.muellerundsohn.com/en/shop/fundamentals-menswear/> 2020, pp.60-73
7. Pattern Making Men's Dress Shirts. System M. Müller & Sohn | Published by Ebner Media Group GmbH & Co. KG | <https://www.muellerundsohn.com/en/shop/> 2022, pp.10-15
8. J.S.Sidikjanov, N.N.Nabidjanova. Analysis the shrinkage of different cotton fabrics in the dyeing process of garment. JournalNX- A Multidisciplinary Peer Reviewed Journal. VOL. 8, ISSUE 6, 2022, p. 142
9. J.S.Sidikjanov. Study fabrics of men's shirts. Science and innovation international scientific journal. Volume 2 Issue 2, 2023, p. 245
10. J.N.Chakraborty, Rudrajit Pal, P.R.Megha. Garment dyeing // Indian Journal of Fibre & Textile Research, Vol. 30, December 2005, pp. 468
11. Кузнецова Л. А., Казакова З. Ф. Карцева А. А. Конструирование трикотажных изделий. «Легкая индустрия» 1972, ст. 102
12. Sh.G.Madjidova, G.D.Ulkanbayeva. Technology of knitwear/ Tikuv-trikotaj buyumlari texnologiyasi // Tashkent. 2018, p. 47
13. Н.М.Конопальцева, П.И.Рогов, Н.А.Крюкова. Конструирование и технология изготовления одежды из различных материалов. «Академия» Москва 2007, ст. 134
14. S. Jang, J. Chang. A Study on a Men's Dress Shirt Pattern by Somatotype for Mass Customization System. Journal of the Korean Society of Clothing and Textiles, Vol. 32, No. 2 (2008) pp. 294-306
15. GOST 30327-2013. Shirts. General specifications /International Standart// Interstate Council For Standardization, Metrology And Certification (Isc), Moscow. 2014, p.6
16. J. Q. Yan, V. E. Kuzmichev. Fit evaluation for virtual men's shirt. ICTTE 2020 IOP Conf. Series: Materials Science and Engineering, pp. 1-6

## CONTENTS

<b>PRIMARY PROCESSING OF COTTON, TEXTILE AND LIGHT INDUSTRY</b>	
<b>J.Sidiqjanov, N.Nabidjanova</b>	
Development of shrinkage calculation for men's shirt base pattern manufactured by the garment dyeing method.....	3
<b>N.Nabidjanova, J.Sidiqjanov</b>	
Method development of applying shrinkage values into base pattern of men's garment dyed shirt.....	10
<b>F.Bozorova, A.Djuraev</b>	
Experimental review of the rubber pad of the new design of the sewing machine.....	15
<b>M.Mirxojayev</b>	
Manufacture of single cotton fabric with new composition, specified bend from yarn gathered from local raw material cotton fiber.....	22
<b>A.Khamitov, B.Akhmedov, J.Ulugmuradov</b>	
A study to determine the change in porosity indicators of the shoe upper hinge in technology processes.....	28
<b>M.Rasulova, K.Khodjaeva</b>	
Study of operating modes in the process of selection and tailoring of package materials in the preparation of men's outerwear.....	34
<b>M.Chorieva</b>	
Analysis of the protective properties of fabrics for special clothing of oil and gas extraction field workers at high temperatures.....	41
<b>G.Gulyaeva, I.Shin, K.Kholikov, M.Mukimov</b>	
Research of knitting structure stability parameters.....	47
<b>GROWING, STORAGE, PROCESSING AND AGRICULTURAL PRODUCTS AND FOOD TECHNOLOGIES</b>	
<b>A.Mukhammadiyev, I.Usmonov, Sh.Uktomjonov</b>	
Electrotechnological processing of sunflower seeds with ultraviolet light.....	53
<b>A.Yamaletdinova, M.Sattorov</b>	
Application of effective methods in the transportation of high-viscosity oils.....	58
<b>N.Khashimova</b>	
Analysis of the prospectiveness and safety of the use of plant raw materials in the enrichment of flour and bread products	65
<b>CHEMICAL TECHNOLOGIES</b>	
<b>B.Uktamaliyev, M.Kufian, A.Abdukarimov, O.Mamatkarimov</b>	
Temperature dependence of active and reactive impedances of PMMA-EC-LiTf / MGTF <sub>2</sub> solid polymer electrolytes.....	71
<b>M.Ikramov, B.Zakirov</b>	
Innovative completely soluble NPK gel fertilizers based on biopolymers with controlled release of nutrients.....	76
<b>A.Khurमतov, A.Matkarimov</b>	

Results of experiments of studying the composition and purification of technical waters.....	82
<b>A.Nuritdinov, A.Kamalov, O.Abdulalimov, R.To'raxonov</b>	
Obtaining composite materials based on polycarbonate.....	89
<b>U.Eshbaeva, D.Safaeva, D.Zufarova, B.Baltabaeva</b>	
Ir spectroscopic analysis of biaxially directed polypropylene and polyethylene polymer films.....	95
<b>U.Eshbaeva, A.Nishanov, D.Zufarova</b>	
A new adhesive composition for the manufacture of corrugated cardboard...	100
<b>D.Salikhanova, M.Ismoilova, B.Adashev, M.Muratov</b>	
Analysis of emulsions obtained in ultrasonic homogenizer and magnetic stirrer devices.....	108
<b>S.Ravshanov, J.Mirzaev, S.Abdullayev, J.Obidov</b>	
Comparative analysis of physical-chemical parameters of domestic triticales grain.....	113
<b>M.Urinboeva, A.Ismadiyorov</b>	
Cleaning natural and associated gases from sulfur compounds.....	121
<b>MECHANICS AND ENGINEERING</b>	
<b>U.Kuronbaev, D.Madrakhimov, A.Esanov</b>	
Influence of the clearance between the punch and the matrix on the formation of burr on the insect teeth of the developed saw cutting machine...	124
<b>D.Kholbaev</b>	
Control of cotton pneumotransport facility through scada system.....	131
<b>D.Kholbaev</b>	
Cotton pneumotransport pipeline control through mechatronic (Scada) system.....	136
<b>R.Muradov</b>	
Ways to increase the efficiency of gining machine.....	140
<b>S.Utaev</b>	
Results of the study on changes in the performance indicators of engines when operating in diesel and gas diesel modes.....	144
<b>B.Mirjalolzoda, M.Abduvakhidov, A.Umarov, A.Akbaraliyev</b>	
Improved gin saw cylinder.....	150
<b>ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION</b>	
<b>S.Khudaiberdiev</b>	
Analysis of the most up-to-date server database management systems.....	153
<b>N.Aripov, Sh.Kamaletdinov, I.Abdumalikov</b>	
Using the factor graph to evaluate the quality of output data for shift-daily loading planning.....	159
<b>B.Kholhodjaev, B.Kuralov, K.Daminov</b>	
Block diagram and mathematical model of an invariant system.....	164
<b>A.Yuldashev</b>	
Historical and theoretical foundations of public administration and leadership	173
<b>ECONOMICAL SCIENCES</b>	
<b>A.Isakov</b>	
Strategy and forecasting of effective use of investments in business activity..	177
<b>K.Musakhanov</b>	
Agro-tourism entrepreneurship development model in Namangan region.....	182



---

<b>N.Makhmudova</b>	
Innovative mechanisms of the development of service sectors in small business and private business subjects in developed asian countries.....	<b>190</b>
<b>Kh.Kadirova</b>	
Conceptual foundations of the development of the financial market of Uzbekistan.....	<b>195</b>
<b>G'.Shermatov, Sh.Nazarova</b>	
Specific challenges of small business utilization in health care.....	<b>200</b>
<b>R.Tokhirov, Sh.Nishonkulov</b>	
Econometric analysis of the impact of innovative development of business entities on economic growth on the example of Uzbekistan.....	<b>204</b>
<b>O.Hakimov</b>	
Problematic issues of taking loans from commercial banks.....	<b>213</b>
<b>T.Musredinova</b>	
Development of an economic strategy for promoting products and services to foreign markets.....	<b>219</b>
<b>F.Bayboboeva</b>	
Fundamentals of economic security in small business activities.....	<b>223</b>
<b>A.Ergashev</b>	
Improvement of commercial banks' capital and its economic evaluation methods.....	<b>229</b>
<b>G'.Shermatov</b>	
Improving the methodology of identifying and management of risks affecting the activities of commercial banks.....	<b>236</b>
<b>Sh.Lutpidinov</b>	
Issues of the development of freelance activity under the development of the digital economy.....	<b>242</b>

---