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APPLICATION OF SUBLIMATED POWER PLANT PRODUCTS IN AUTOMATED SYSTEM

ПРИМЕНЕНИЕ СУБЛИМАЦИОННОЙ ПЕЧАТИ В АВТОМАТИЗИРОВАННОЙ СИСТЕМЕ ПРИ ПРОЕКТИРОВАНИИ ШВЕЙНЫХ ИЗДЕЛИЙ

A.M. KENZHEBAEVA, A.E. ZHUMANAZAROVA, G.C. SHAIZADANOVA
А.М. КЕНЖЕБАЕВА, А.Е. ЖУМАНАЗАРОВА, Г.С. ШАЙЗАДАНОВА

(Almaty Technological University, Republic of Kazakhstan)
(Алматинский технологический университет, Республика Казахстан)
E-mail: aliya_92.a@mail.ru; kenzhebayeva_a@mail.ru; gulnar_11.78@mail.ru

The proposed article describes the use of sublimation printing in the designing of garments, as well as the operational safety features of the sublimation product.

В предлагаемой статье описываются этапы использования сублимационной печати при проектировании одежды, а также эксплуатационные характеристики безопасности продукта сублимации.

Keywords: sublimation printing, thermal paint, electrification, air permeability, expert evaluation, printer.

Ключевые слова: сублимационная печать, термальная краска, электризуемость, воздухопроницаемость, экспертная оценка, плоттер.

During the current stage of development, woolen clothing is widely used in designing of the product in the production of modern technological equipment and automated systems, as well as printing images on clothing or fabric surfaces with the use of automated systems among consumers. All of these operations are based on special printing equipment, based on sublimation printers.

Sublimation printing is a type of drawing that is one of the most expensive, because for the technical realization of such printing, special equipment is needed (thermopress for transferring images from photos to textiles) and materials (ink, dye and special sublimation paper, from which the image is transferred to clothes) [1].

The purpose of the work is to use sublimation printing in the design of sewing products in the automated system and its operational safety (appraisal).

The object of the research in the work is selected textile material satin stretch of white color (Table 1 – technical characteristics of the material).

Table 1

№	Product name	Fibrous tissue composition	Density, gr/m^2	interweaving
1	Scarf made of "Satin-stretch" fabric, China	polyester-97%, lycra- 3%.	150	twill weave 3/1

CorelDRAW computer software and sublimation printer MIMAKI "JV300-130/160A" were used for the printing of the required image. During the manufacturing process of the appliance, there are used a variety of carriers to dampen the fabric. Sublimation paper or film is used as a carrier. Pictures are first copied to the carrier and then printed on the fabric [1].

Before submitting to the subwoofer, the ornament is processed in the CorelDRAW computer program. Fig. 1 shows the processing stage.

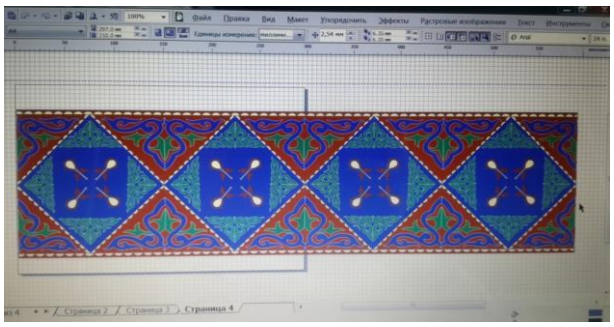

Fig. 1

Processed picture is sent to the sublimation dump MIMAKI "JV300-130 / 160A" through CorelDRAW computer program. Printertypes of required size according to the computer control system are typed on the sublimation paper.

Special sublimation carrier paper can be applied to the fabric and placed in a thermocouple. Thermocouple is aimed to work with large volumes for copying a picture from sublimative paper to fabric. It is made of special Nomex material and its thermo-drum ensures dense printing of the sublimation picture on the fabric. The finished product should be cooled during 10-20min after thermocouple machine (shown in Fig. 2).

Fig. 2

The paper considers the change in operational safety and functional properties of textile materials.

The study consideres a list of indicators that characterizes the quality and operational safety of textile materials:

– air permeability;

– stress of the electrostatic field;

– dyestrength;

– to wash;

– to dry and wet friction.

Evaluation of the resistance of color to friction is carried out according to the degree of coloring of the adjacent fabric according to the scale of gray reference colors. For this, the adjacent tissue before and after the test is placed next to each other on the same plane with orientation in one direction. Comparison is carried out on a gray background.

The friction of calico, on the surface of the test sample, is produced by moving the table with a handle at a distance of 10 cm 10 times in one and in the opposite directions.

When testing the color to the friction in the wet condition, the painted sample and the calico cut are pre-moistened with distilled water and squeezed on the pad before the mass of the samples is increased by 100%. After the test, the samples are dried in air and the color stability is evaluated on the scales of gray standards [4].

The essence of the air permeability measurement technique consists in measuring the volume of air passing through a given area of the test material per unit of time at a certain vacuum under the point sample [2].

Air permeability in dm^2 / (m^2xc) of each point sample is calculated by the formula:

$$Q = [V_{SR} \cdot 1000] / S, \qquad (1)$$

where V_{SR} is the average air consumption in a single point sample, dm3/S; S - test area, sm^2.

Electrification is determined by the magnitude of the electrostatic field strength, unit of measure - kV/m [3].

Sampling is carried out:

- for fabrics - according to the state standard for fabrics and textile products, acceptance rules and sampling methods;

- for knitted fabrics - according to the state standard for knitted fabrics, acceptance rules and sampling methods.

The strength of the electrostatic field on the surface of the sample ΔE in kV/m is calculated by the formula:

$$\Delta E = E_R - E_p , \qquad (2)$$

where: E_R – is the maximum value of the electrostatic field strength after the roller is applied to the sample; E_p – is the maximum value of the electrostatic field strength at rest.

Before testing, the sample and the roller are kept in a suspended state for at least 24 hours under atmospheric conditions according to the state standard for textile materials (climatic conditions for conditioning and testing of samples and methods of their determination). Tests conduct in the same conditions. The obtained results of the studies are given in Tables 2-3.

Table 2

№	Product name	Air permeability Q, $dm^3/(m^2xc)$	Intensity indicators of electric field, kw / m		
			E_0	E_B	ΔE
before washing					
1	Scarf made of "Satin-stretch" fabric, China	297.1	3.23	8.94	5.71
after 5- wash					
2	Scarf made of "Satin-stretch" fabric, China	297	3.12	7.52	4.4
after 10- wash					
3	Scarf made of "Satin-stretch" fabric, China	296.7	2.98	7.12	4.14

Table 3

№	Product name	Evaluation of color strength, scores to friction	
		dry	wet
1	2	3	4
	Scarf made of "Satin-stretch" fabric, China	5/5	5/4

The kinetics of air permeability measurements and the kinetics of the electrification measurement for finished products are shown in Diagram 1 (indices of air permeability for finished products), 2 (indices of intensity of electrostatic field for finished products).

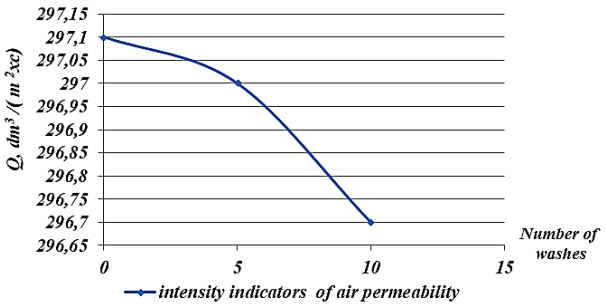

Diagram 1

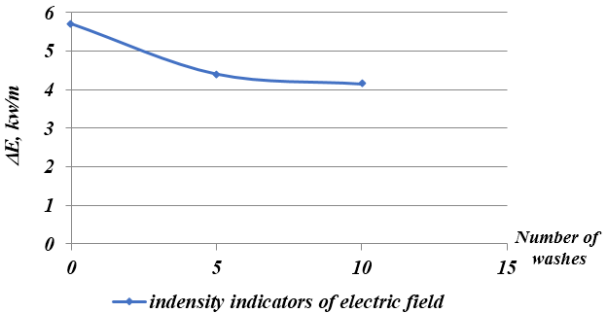

Diagram 2

According to the study results, the following conclusions can be drawn:

1. the fabric electrification depends on the type of fibers and the degree of their fixation in its structure, on the geometric and frictional properties of the fibers, as well as the structure of the filaments and the fubric itself. Therefore, it is recommended to use special antistatic treatment to remove electrostatic charges from hydrophobic fibers.

2. despite the decrease in the air permeability parameters for the samples, the material safety indicators remain in accordance with the requirements of CR CU 017/2011 "On the safety of products of Light Industry".

3. determination of the paint durability to friction was carried out according to SS 9733.27-83- "Testing the paints resistance to dry and wet friction" and based on the results of the study the color stability of the finished products meets the requirements of CR CU

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