**Improving the Production Technology of National Costume Fabrics from Bicomponent Threads**

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**Abstract.** This article analyzes the production process of national costume fabrics from bicomponent yarns and offers suggestions for its improvement. Issues of improving the functional and aesthetic properties of national fabrics through the use of modern technologies and raw materials were considered. Several proposals are made to study the methods of using bicomponent yarns to improve the quality of traditional Uzbek national textiles (atlas, adras, bekasam, shoyi), their durability, comfort, and adaptability to modern requirements. General information is provided on the definition, importance, physical and mechanical properties, and types (for example, core-shell and side-by-side) of bicomponent yarns (yarns made of two different components). The effectiveness of using bicomponent yarns in national textiles (especially in ring-pile textiles) is analysed. The improvement of the durability, wrinkle properties, and design possibilities of textiles as a result of using bicomponent yarns is considered. It is concluded that bicomponent yarns play an important role in improving the quality of national textiles and adapting them to modern fashion and requirements.

**Keywords:** bicomponent threads, national fabrics, costume fabric, technology, technical textile.

**INTRODUCTION**

Bicomponent yarns are yarns made of two different compositions, each of which has different properties. These yarns are of great importance in industry and textiles, and various technologies and raw materials are used to create them. The physical and mechanical properties of fabrics made from yarns with such a composition are positively evaluated [1-2].

Bicomponent yarns, which are similar in terms of technological, physical and mechanical properties, but different in terms of their structural composition, such as polyester and polyamide, cotton and polyester blends, or polycomponent yarns, are widely used in various industrial sectors, since their properties can be much better than those of simple yarns [3].

The physical and mechanical properties of bicomponent yarns significantly affect a number of technological and quality indicators of textile products obtained from them:

The tenacity or strength of the yarns increases the load-bearing capacity of bicomponent spun yarns.

Elastic property - some bicomponent yarns stretch when stretched and have the ability to return to their original shape.

Chemical stability property - it is resistant to the effects of acids, alkaline media and organic solvents.

The property of resistance to wear and tear - withstands long-term mechanical effects due to special treatment.

Heat resistance property - some bicomponent yarns retain their shape even at high temperatures due to their structural stability.

Hygroscopicity and air permeability - the moisture absorption and air permeability of the yarns in the textile products can be improved.

Optical and aesthetic properties - since it consists of two components, it can have different light transmission properties and be aesthetically glossy.

Textile yarns are classified according to their structure and types as follows [4]:

Core-sheath – one component is located on the inside of the thread, and the other is located on its outside.

Islands-in-the-sea - one component is located inside another in the form of small pieces. Such yarns are produced by passing through the selection stage during the preparation of raw materials for spinning.

Side-by-side – two components are arranged parallel to each other to form a thread.

Concentric or layered – both components are connected in a spiral or layered manner.

The scope of application of mixed yarns is wide, textile industry - in the production of deformable, resistant and light-resistant tissues;

In medicine - surgical threads, bandages and biodegradable threads; In the automotive industry - in the preparation of durable materials for coatings;

In agriculture, it can be seen in the production of UV-resistant threads.

Bicomponent yarns can be made from various polymers, such as Polyester (PET), Polypropylene (PP), Nylon (PA), Polyvinylidene fluoride (PVDF), etc. Their properties and technical advantages depend on the production technology. According to the production technology, bicomponent yarns are produced using a special extrusion method, where two different polymers are used simultaneously. In this process, the location, solubility and mechanical properties of each component are taken into account.

**MATERIALS AND METHODS**

In the extrusion process, two different polymers are extruded through specially shaped filaments. Depending on the market demand, various forms of yarn are produced.

Heat setting is performed to increase the tensile strength of the fabric by treating the yarns (heat setting, twisting, dyeing).

Threads are subjected to a mechanical twisting process. In some cases, special painting technologies are used.

The advantages of bicomponent yarns include mechanical strength - a combination of two materials provides high strength and elasticity.

Eco-efficiency – some models have the option of using recycled materials.

Economic efficiency - natural fibers can be combined with expensive chemical fibers to create cheaper and higher-quality materials.

It is widely used in the process of processing - from surgical threads to materials for special sportswear.

These include national costume textiles - these are fabrics used in the preparation of traditional clothes of the local people, which are woven in accordance with national colors, styles and technologies. Such textiles have different styles and characteristics depending on different regions and ethnic groups.

The characteristics of national costume fabrics differ from mass-produced fabrics in the fiber composition of the raw materials, weave patterns, colors, and weaving methods.

The fiber composition of the raw material is characterized by the use of natural fibers - most often silk, cotton, wool, flax, and hemp.

The unique patterns and designs of weaving patterns are part of folk crafts, reflecting the lifestyle of the people living in each region and using local ornaments and flowers.

Traditional colors - colors specific to the psyche of the population living in the regions, are based on national culture and symbolism, and are often chosen using natural dyes.

Depending on the type of production, it may be handmade - some fabrics are woven using traditional methods, on special machines, or even by hand [5-8].

National costume fabrics in Uzbekistan include atlas and adras, fabrics made entirely of silk or a blend of silk and cotton, characterized by unique vertical stripes and colorful patterns. Bekasam fabric is a denser, more tightly woven fabric made of cotton or silk threads.

The production of cooked silk and printed fabrics is mainly produced with national ornaments printed on silk fabrics. Non-woven fabrics containing wool are mainly used for making warm clothes and household items for shepherds and villagers.

It can be seen from the international experience, especially in the production of national fabrics of the countries of the Central Asian Commonwealth, brotherPeoples also have their own national costumes and clothing fabrics, for example:

Karatoq (Kazakhstan) - dense fabrics with a mixture of silk and wool;

Silk and Bordeaux (Kyrgyzstan) - fabrics made of silk and cotton;

Hanfu fabrics (China) - thin silk fabrics, a fabric that preserves ancient craft traditions;

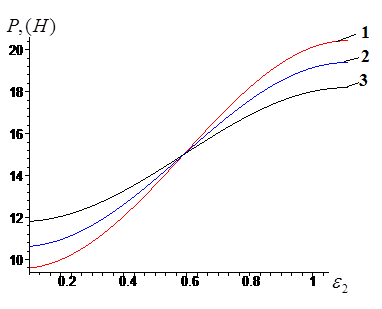
Atlas, adras, bekasam, shoyi (Uzbekistan) - silk fabrics, fabrics that reflect ancient national traditions.

These fabrics are widely used not only for national clothes, but also for interior decoration, handicrafts and modern fashion. Such fabrics are considered national fabrics of peoples who do not choose time and place. The harmony of traditional and modern materials is of great importance in the production of national costume fabrics. The use of bicomponent yarns allows you to improve the elasticity, strength and appearance of fabrics [5].

**RESULTS AND DISCUSSION**

When analyzing the effectiveness of using bicomponent yarns in the production of national fabrics, the fact that a new type of fabric is a competitive, customer-oriented assortment was proven by the first versions of the produced ring-pile fabric. In pile fabrics, the surface (surface appearance) is covered with pile, two ends of the cut yarns and the ground to which these yarns are attached completely or partially cover the fabric. By the method of forming the pile surface, pile fabrics are divided into two groups: pile fabrics formed as a result of pile yarns, or pile fabrics formed on the basis of the ground body surface, or pile fabrics with a base and pile (base pile) or pile fabrics. Ring pile fabrics are distinguished by their new assortment, which is more beautiful and durable. The unlimited possibilities of pattern types expand the scope of application of patterns in production.

For example: for rope threads with a density of 1 cm in length, the tension force created in the loop thread acts at an angle. The change of compressive force according to the relative deformation corresponding to the number of threads in the density of rope threads per 1 cm is presented in the graph (see Fig. 1).



**FIGURE 1.** The change of compressive force according to the relative deformation corresponding   
to the number of threads in the density of rope threads per 1 cm

From these results, it can be seen that the ability to hold a loop with a density variation of 1 cm corresponding to the number of warp threads depends on the composition of the raw material used. This is because the angles formed in this range are relatively large, and the tension forces are less than the compressive forces, and the density of the warp threads is increased, so the fabric composition is important.

The graphs show that the density of the MB-Uz-01 heavy-pile ring-weave fabric is increased compared to the plain weave, which in turn leads to an increase in the density and volume of the fabric [1]. (Velvet national MB-Uz-01 Complex weave ring-weave heavy-pile fabric No. SAP 02247 2021 0057, No. SAP 02401 2022 0132).

The characteristics and advantages of bicomponent yarns are that they consist of two different fiber compositions, and their combined properties increase the quality of fabrics:

Mechanical strength – such yarns combine the strengths of two different fibers. This, of course, has a positive effect on the strength of the loops in the fabric, increasing the resistance of the fabric to abrasion.

Functionality - the unique softness and stretchability of the fabrics can create comfort for the human body, pleasant feeling on the skin when tested by the organoleptic method.

Economic efficiency - by mixing chemical fibers with properties similar to natural fibers used in the production of national fabrics, it is possible to obtain cheaper and higher-quality fabrics.

Instead, the following technological processes are included in the use of bicomponent yarns in the production of national costume fabrics:

The choice of raw materials is traditional silk, cotton, or linen fibers, mixed with appropriate chemical components.

The yarn manufacturing process - in the formation of bicomponent yarns, the raw material mixture is prepared, spun, rewound, and twisted.

The weaving process is carried out on modern textile equipment, creating textile elements while preserving traditional patterns.

Additional processing - special processing is used to improve the mechanical and aesthetic properties of the fabric (thermofixation, softening, giving effect to gasification - gallantry, etc.).

The use of bicomponent yarns as methods of improving the quality of national fabrics allows to improve the quality of national fabrics:

1. Increased durability - abrasion and rapid wear are reduced due to artificial fibers, and tear resistance is increased.
2. Wrinkleability and comfort - flexibility to the size of clothes is ensured, the property of wrinkling is reduced.
3. Expanding design possibilities - using such yarns, more beautiful and original fabrics are created.
4. Due to the high level of coloristic perfection in Aur textiles, the pattern is unique and appropriately expressive. Depending on the main attention paid to the background or pattern in the fabric, one form flows into another, the pattern transitions from light colors to dark warm colors to cold [3]. During the dyeing process, attention is paid to the warmth and coldness of the colors. This process is carried out skillfully and alternately.

National design and innovation. The formation of national patterns and textures through laser engraving or 3-dimensional computer technology will further enhance the beauty, that is, the luster, of the woolen fabrics. Along with improving the quality of the fabric, it will also increase its popularity and attract more customers.

Integrating traditional silk and adras fabrics with biocomponent yarns for mass production increases their tensile strength and resistance to degradation.

**CONCLUSION**

Mixing bicomponent yarns allows to improve the quality of national ring-feather woolen woolen fabrics and adapt them to modern requirements. Through these methods, national fabrics can be used in a wide range of geography, not only in traditional style, but also in modern fashion.

Several innovative approaches can be proposed to improve the technology of national costume fabric production from bicomponent yarns:

1. Improving the composition of yarns. Using natural and chemical fibers in optimal proportions in the composition of bicomponent yarns. For example, using cotton-polyester or silk-lycra combinations.

2. Improving the structure of the fabric. The introduction of new weaving methods in the process, for example, ring knitting, which ensures that the fabric retains its shape well, enriches the appearance of the surface, and increases the thickness of the fabric. The orientation of the warp or weft yarns to form a ring leads to the use of adaptive weaving machines.

3. Environmental sustainability and energy efficiency. Implementation of low water and energy efficient dyeing and preparation technologies.

Developing low-waste processes in textile production. Dyeing in the production of woven fabrics is fundamentally different from that in other textile industries. This leads to the efficient use of the necessary dyes. Dyeing them only in the right color saves both dye, time, and product cost.

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