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Fancy Yarns: Efforts to Methodise, Problems, and New Suggestions

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The present work proposes the analysis of known modes of fancy yarn grouping as well as suggests the methods for the systematisation of all types of fancy yarns. The study presented made it possible to suggest the criteria that are significant for the grouping of the assortment of fancy yarns: method of manufacture and use of fancy yarns, raw material, number and kind of components, material for the effect making, type of the effect. The two latter criteria define every type of fancy yarns assortment and more precisely describe the characteristics that are related to the appearance of such yarn. Suggested systematisation of fancy yarns opens the possibilities for further analysis of useful data of such kind of products.

Keywords: core, effect, binder component, effects, fancy yarns.

INTRODUCTION

Fancy yarns are special products of spinning, twisting, wrapping, texturing, printing, knitting, etc. Fancy yarns are and will always be up-to-date, as there is no alternative to them. The demand for yarns with structural and/or optical effects is due to the special aesthetic and high decorative appeal to the woven, knitted materials, and other textiles as well. Textile materials that are produced using yarns with effects find applications in normal and high fashion clothing. Such yarns are also used for decorative textiles like curtains, carpets, "effect" wallpaper. Decor materials and textile fabrics in the corporate sector, as for example in the trim of a car or textile furnishing of a hotel lobby are becoming more and more important.

Fancy yarns have deliberately introduced irregular characteristics, in either diameter and bulk and/or in color, etc. as well as virtually new structures composed of fibers, yarns or other products that differentiate them from conventionally spun or multifilament yarns [1 – 3]. New looks, structures and raw materials of fancy yarns are constantly in demand.

Components of fancy yarns can be of natural or man made fibers: staple length or continuous filaments but nowadays it appears the especially unusual structures of fancy yarns that are very desirable in designing of new textiles. There are so many different types of fancy yarns. Most of them are produced using spinning or twisting machinery that are modified or specially developed for this purpose. Some types of such yarns are produced from "fancy fiber" or "fancy slivers" used as minor components of yarns made by spinners with normal equipment, still others are made exclusively by filament yarns using adaptations of various processes as well as tape-knit fancy yarns are produced using a range of take-up rations and component yarns on a knitting machine specially designed for fancy yarn manufacture.

In spite of the wide use of fancy yarns the grouping problems of such assortment are almost unsolved. Particularly it is a lack of date necessary to analyze the huge variety of assortment of fancy yarns. Up to now there were only some efforts [3 – 6] to propose the ways for the grouping of fancy yarns and such investigations are in want of validity of the suggestions. The available reference sources and data are scanty, and by no means homogeneous.

The purpose of the study reported in this paper is to try to fill this gap; it presents the analysis of existing ways of fancy yarns' grouping, discusses the new suggested systematization of all types of fancy yarns.

RESULTS AND DISCUSSIONS

Peculiarities of assortment and problems of its grouping

The first fancy yarns types became an established textile novelty considerably earlier but traditional fancy yarns experienced booming development thanks to the mechanical and technological progress. It made it possible to overcome production difficulties that are considerably higher than those of classic flat yarns did [7].

In general case fancy yarns have a multithread structure composed of three components: core, effect, and binder [8 – 10]. The effects like loops, waves, knots, snarls, etc. are formed by the effect yarn which unites with the core. These two components form the effect intermediate product that is fastened by the binder component that fixes effects.

The search for novelties turned into reality new structures of fancy yarns. Their effect intermediate product consists of three yarns [8], four or more ones. In every year and even in every season there is run for something new, for the exclusive and particular yarn with high-fashion multi-colour compound effects. A vital part of the effect systems today is the microprocessor control, which allows problem-free production of any imaginable fancy yarn pattern, and taking care of all control, operating and monitoring functions.

Loop yarn is one of the kinds of fancy yarns with periodic loop effects [1]. The geometry of the effect could be very different: the loops are closed or opened and of regular or irregular shape as well. Frotte yarn is a type of

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loop yarn but it is an important difference that marks out this type of yarn from the group of loop yarns. According to [11], there are two core yarns in the loop yarn, while in the frotte yarn there is only one core yarn, so this structure is rather different.

The spiral fancy yarn is a plied yarn with smooth spiralling of one component around the others. Delivering one or more of its components at a greater speed can produce fancy yarn with spirals, so the shorter length of the component forms the core, while the greater length of the components creates the spirals.

Knop yarn contains prominent bunches of its component arranged at regular or irregular intervals. Using rollers capable of being operated independently usually makes this fancy yarn: core component – intermittent delivery and effect component – continuous delivery. So the effect component joins the core and is gathered into bunch or knop by the insertion of twist. The type of yarn is characterised by a thickening of its diameter, called a slub. Such fancy yarn can be manufactured on the woollen, semi-worsted, or worsted spinning system. Spun slub fancy yarn may be produced by an intermittent acceleration of one pair of rollers during spinning.

The special fancy effect of rotor spun slub yarn is characterised by the long slub and this effect is quite different from ring spun slub [12].

Plucked slub fancy yarns are composed of two core yarns and periodic short lengths of materials that have been plucked from the roving.

The puff fancy yarn has an intermediate appearance between that of a slub yarn and knop yarn. The effect is extremely soft, just like a very supple slub. The formation of such effect is achieved because of special grooves in the feed rollers, so the fibres nipped by the draft rollers can easily include the other fibres. This allows forming extremely soft thickening [7].

Snarl yarn is produced using twist-lively component. In such component the snarl formation occurs at a temporary decrease in tension or is due to a yarn's slack. The shape of the effect depends on the twist level of the yarn and other characteristics as well [13].

Some types of traditional fancy yarns are presented in Fig. 1.

There are many types of fancy yarns with optical effects. Such effects are colour and lustre/matness. Fibres of different colour are mixed at blow room or carding, or drawing stage. There are units that help to distribute multicoloured knops of felted fibre and to produce short colour effects – distinct and prominence or slight and flat points on the surface of spun fancy yarn. There are special equipment that make colour effects in the sliver. Components of different colour can form a multicolour effect, which is further drafted during the following spinning operations.

Formation of colour effects can be achieved by means of printing or special dyeing of sliver, rowing, and yarn. Mouline yarn is made from two or more components coloured in different colours and plied together.

Colour effects frequently combine with the structural ones. Such fancy yarns are very decorative and attractive.

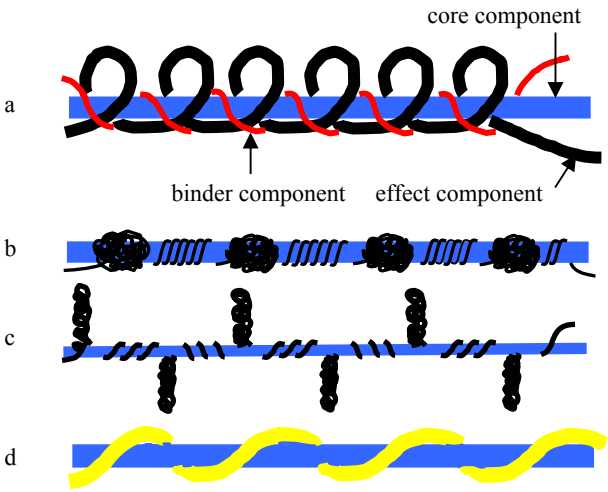

Fig. 1. Some types of traditional fancy yarns with various effects: a – common view of loop fancy yarn, b, c, d – knot, snarl, wave effects (in b – d the binder component isn't shown)

The technology of differential dying of the yarns or semi-manufactured product of spinning is effective and simple in design. Colouring and decorating the product using differential dyeing or cross dyeing techniques essentially promote the fibre properties as design effects in themselves without any other additional components.

Textile designers when creating new styles and fashionable textiles prefer differing from traditional fancy yarn structures the tape yarns or ladder-knit yarns. Such fancy yarns create extraordinary effects in the fabric made, thus augmenting their decorative value. Ladder-knit fancy yarn can be produced on a small-diameter circular knitting machine with three guides feeding each knitting head [14]. Some knitted fancy yarns have effect component – short or long lengths of yarn, bunches of roving, etc. and colour effects as well. Examples of not traditional fancy yarns' structure are presented in Fig. 2.

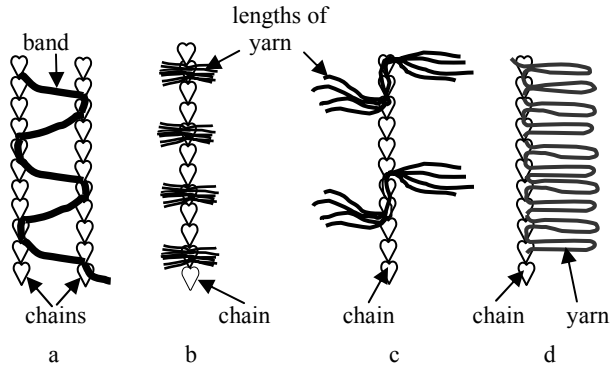

Fig. 2. Some examples of not traditional fancy yarn structures: a – ladder-knit fancy yarn, b – knit fancy yarn with effect – short horizontal lengths of yarn, c – knit fancy yarn with effect – long lengths of yarn ("flag" effect), c – knit fancy yarn with yarn effect

The cords are very decorative knitted fancy yarns. They are widely used in passementerie, knitting, trimmings, etc. Latch needles are employed and yarns of any kind can be processed: thus, it is possible to obtain

chainette cords with many original effects of colour and of yarn couplings as well.

Research papers discussing fancy yarns have predominantly described the assortment, the components and the techniques used. However, there are limited studies about the possibilities to methodise various fancy yarn types [3 – 6].

In [3] the assortment of fancy yarns is grouped into two groups: with overfeed and controlled effects. Each of these two groups has two subgroups: yarn effects and spinning effects. For example, the overfeed yarn effects are loop, onde, snarls, wild knop, wild caterpillar, etc. The controlled yarn effects are knop, caterpillar, reverse caterpillar, and combined effects. Overfeed spinning effects are onde, spun loop, chenille, boucle, etc. Unfortunately, such a method of grouping is restricted and not precise because not all types of the assortment are included. Besides that, there are no motives of ascription and substantiation.

Regular and controlled effects are separated in [5]. As in [3], further the assortment is grouped into fancy yarns with yarn effects and spinning effects as well.

In [6] the classification of fancy yarn profiles capable of production on the hollow spindle fancy-wrap system is discussed. Different kinds of boucle fancy yarns are presented.

There are considerable imperfections in the above mentioned publications:

- not all traditional types of fancy yarns are included,
- new structures of fancy yarns aren't included,
- criteria of grouping aren't clear and homologous,
- majority of fancy yarns' types aren't characterised,
- it's exists the confusion and vague meaning in the appellations of effects and groups of fancy yarns.

Possibilities to methodise fancy yarns and new suggestions

Analysis of the assortment enabled to determine the criteria that are significant for the systematisation of fancy yarn assortment:

- method of manufacture,
- use of fancy yarns and raw material of components,
- number and type of components,
- type of the effect,
- material for effect making.

There are different technologies for fancy yarn manufacture (see Fig. 3). The choice of the method for the most part depends on the desired effects.

According to the direct methods the twisters for the fancy yarn making, special knitting machines, etc. are used. According to the indirect methods of manufacture the fancy yarns are produced during initial stages of yarn processing as in mixing chambers, carding, drawing machines, rover. The fibre, sliver or roving so obtained is then processed on spinning machine and/or twisters, that are standard spinning and twisting frames or their modifications with special units. With indirect methods, modifying the conventional processing technologies like dyeing, raising, etc. produces the yarns as well. Some fancy yarns produced according to indirect methods are obtained by weaving and knitting.

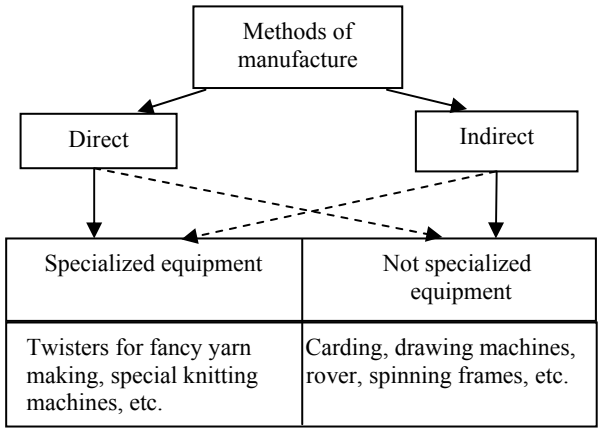

Fig. 3. Diagram to show the methods of manufacture of fancy yarn

In the main, it is possible to group the fancy yarns taking into account their use possibilities and raw material as well. Two groups of textiles – the clothing and decorative ones made from woven, knitted fabrics or non-woven materials are the main consumers of fancy yarns. The fancy yarns can be produced in a big variety of raw material combinations. In the case when only a few yarns compose the fancy yarn the grouping according to the raw material can be acceptable.

The number and the type of components virtually change the structure and exterior of the fancy yarn. The number of the components can differ from one to six or more. The components can be not only yarns made from staple fibres or filaments but also the lengths of yarn and/or filament, non-woven material as well as the lever or polymer for the decorative coating of core component.

The discussed criteria: method of manufacture, use of fancy yarn and raw material of components, number and type of components are not suitable for absolutely all cases because some types of the fancy yarn can be manufactured using the different methods but their appearance can be the same. On the other hand, the fancy yarn can be combined from the equal number of the components and the same raw material but their effects can be absolutely different.

The type of the effect and material for effect making most properly characterise the group of fancy yarn ascription. The grouping according to the type of fancy yarn effect and some examples with colour, structure, and compound effects are demonstrated in Fig. 4. The grouping according to the material for effect making is presented in Fig. 5.

The quality of such criteria as the type of fancy yarn effect and the material for effect making is that the fancy yarn character here has only one meaning, all assortment of fancy yarns is included - not only traditional fancy yarns but virtually new structure as well, it disappears the necessity to link the effect type and effect making technology.

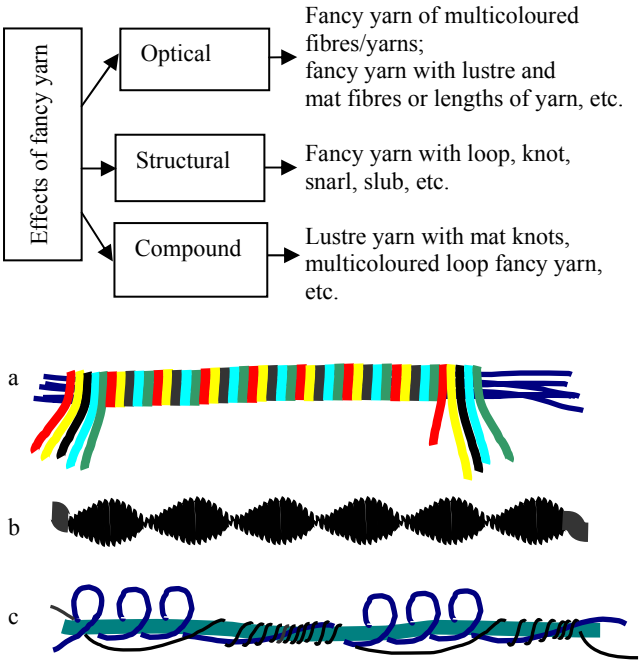

Fig. 4. Grouping of fancy yarns according to the type of the effect and some structures of fancy yarns with effects of: a – colour (brocade yarn), b – structure (slub yarn), c – compound (spiral-loop mouline yarn)

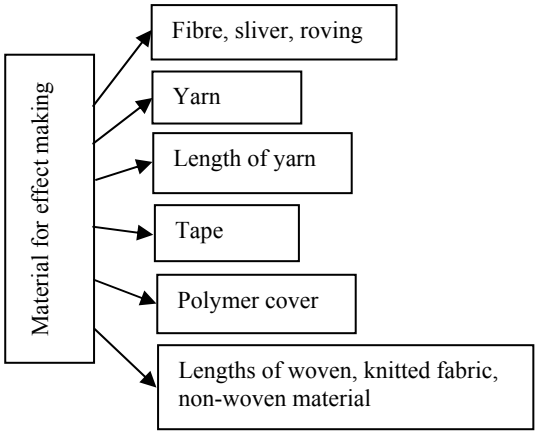

Fig. 5. Grouping of fancy yarns according to the material for effect making

CONCLUSIONS

Usually fancy yarns have a multithread structure composed of three components: core, effect, and binder, but nowadays virtually new fancy yarns like knitted ones as well as with decorative cover effect or lever, non-woven effect component turned into reality. Because of variety of fancy yarns that differ in manufacturing process, character of effect and material, number of the components, etc., the necessity to systematise such a large assortment of yarns arises.

The study presented made it possible to suggest the criteria that are significant for the systematisation of the assortment of the fancy yarns. These criteria are: the method of manufacture and use of fancy yarns, the raw material, the number and type of components, the type of effect of the fancy yarn and the material for effect making. The two latter criteria are the main because the character of the fancy yarn is described precisely; there is no confusion and vague meaning in the appellations of effects and fancy yarns groups; all the assortment of fancy yarns is included – not only traditional yarns but virtually new structures as well.

The suggested systematisation of fancy yarn opens the possibilities for further analysis of such kind of textile materials and it is very needful for the design of new textile products.

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