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Introduction to fancy yarn structures, and analysis of fancy yarns

5.1 Introduction

The variety of fancy yarn effects is unlimited, but there are a few general categories which offer some possibilities for classification. The basic structure of a fancy doubled yarn is that it consists of 'core' threads, an 'effect material', and in the more complex cases, a 'binder' which, as the name suggests, ensures that the entire structure holds together. Other forms of fancy effect may be based on colour effects or on variations in the details of the spinning process. In particular, adaptations of the spinning systems used may be developed to create specific effects. For example, one crucial modification to the spinning system lies in the introduction of an individual, variable-speed drive for each feed roller. This then allows changes in roller speed, and thus in the draft, and thus in the build-up of the effect, or the reduction of the effect, at certain points on the yarn.

The colour effects may be introduced as early as the carding stage, if the aim is to create a more subtle, blended colour effect. In other cases this may occur as late as the final dyeing process which is applied to the completed yarn. This, in turn, results in 'cross-dyed' effects, which take advantage of the possibility of combining different feedstocks with different dyeing properties. It is even possible to introduce colour by printing onto comber rovings destined to produce yarns for suitings.

Many of the effects described may be produced using modified ring spindle systems and hollow spindle systems, or by using the combined system. Where the wrap spinning system or the combined system is used, only one passage of the machine may be required. In the case of the modified ring system, however, two passages of the machine will be needed. Further details concerning the mechanisms and machinery involved will be provided in Chapter 7.

Additional fibre effects may be created by the introduction of additional fibre material to the basic fibre prior to, or during, spinning or by varying the feed speed of the fibre material during spinning. These fibre effects can create fairly heavy yarns, and as such they are most often used in knitwear.

However, there is a now a growing market for fancy yarns in furnishing fabrics, some of which also have uses for rather heavy yarns. Another, more traditional, market lies in fabrics for ultra-high fashion ladieswear (for example, the famous Chanel suit) where a simple cut is used, and where the visual effect, rather than longevity and durability, is the essential characteristic. The fabrics produced for this latter market are often widely sett, and thus unsuitable for a closely-fitted or tailored style.

Yarn effects are produced by plying singles yarns with different count, twist, colour, fibre type, length, etc. The potential variation of these effects is infinite, and therefore only the most widely known categories will be introduced here. The definitions and figures in Chapter 6 have been grouped logically rather than alphabetically, in the hope of demonstrating the relationships between the structures. As the emphasis here is on structural fancy yarns, rather than on the different fibres involved, no detailed consideration of fibre choice has been attempted: suffice it to say that most of the fibres available for plain yarns have been used in fancy yarns at one time or another, and that a careful choice of these components may materially enhance the effect produced.

It will become clear that, although there are many types of fancy or novelty yarn, the effects produced share considerable superficial similarities. This is in spite of the wide range of end uses and methods of production and the variety of structures. Far from being a wasteful duplication of effort, this ensures that, when a designer has a particular result in mind, there are almost always several ways to achieve that effect. This in turn means that the choices of feedstock and production method can be altered to produce the desired effect, while at the same time retaining some control over the costs involved.

In the diagrams in Chapter 6, the yarn structures have necessarily been simplified, in order to make it possible for the diagrams to show the important elements of the structure. In particular, in many cases one of the yarns will be shown as a straight bar, partly because the yarns often give that appearance, and partly because the yarn that is shown as a bar, although it is a necessary element of the yarn, is not the most characteristic element of it. In this way it is hoped that the diagrams will provide ‘shortcuts to recognition’ for the yarns being described.

5.2 Analysing yarns

In developing an understanding of yarn structures and types, there is no substitute for handling yarns and analysing their structure and form, however briefly. It is likely to prove a valuable exercise to create a ‘private collection’ of interesting yarns, and the effect they have on fabric appearances. Clearly, the majority of textile testing and analysis falls outside the

scope of this work, and it is not necessary knowledge for the development of a familiarity with fancy yarns. However, some analysis which is possible without much equipment or expense remains worthwhile as a means of gaining empirical knowledge of yarn structures and properties. It is also possible to speculate on the properties of particular yarns, or on the properties that may be useful, although they are as yet undeveloped.

5.2.1 Yarn structures

In order to gain the background knowledge necessary to recreate a yarn convincingly, or simply in order to gain a better understanding of yarn structures in general, it is often rewarding to undertake the analysis of a series of yarns. Much of this analysis does not involve expensive machinery, and indeed, for a first approximation, a simple list of the more easily discovered features is likely to be sufficient. Such a list might well begin with the following items:

- Count
- Fibre or fibres used
- Basic structure (for example, is the yarn a slub, bouclé, spiral . . . ?)
- Number of component threads
- Purpose of each component thread.

In the structure of a classical 'fancy doubled' yarn, the purpose of each thread within a yarn is usually easy to determine. For example, binders are usually very fine, are frequently monofilaments, and are wrapped around all the other yarns; they will therefore be the first to be unwrapped from the structure. Core yarns are heavier and there are usually two core yarns of identical structure; any other components will form part of the effect.

It is then possible to investigate the yarn components in greater detail. For example, it is possible to study the percentage of 'overfeeding' employed in a bouclé or other yarn of that type, or the relationships between the component threads in count and twist level. Thereafter, the use of different fibres in different components for differing purposes can be considered, and indeed, any other matters exciting our curiosity or attracting our attention.

While it would not be true to say that such an analysis would allow the creation of an exact copy, it would certainly permit an approximation to be made. This, too, can be seen as an exercise to verify the accuracy of the observations made on the yarn. To produce an exact copy would require the same equipment and identical feedstocks to those used in the original. In particular, the precise nature and characteristics of a fibre effect will be heavily influenced by the relationship between the fibre length and the front drafting zone.

In fact, it is generally the case that yarns will be adapted slightly for differing purposes. For example, a bouclé may be produced using differing proportions of wool or acrylic fibres, or some other synthetic yarn may be substituted, depending upon the ultimate purpose of the yarn and on the cost parameters that apply.

5.2.2 Yarn properties

There is much research yet to be done to discover the physical properties of the different types of yarn, depending on the machinery used to make them. Such research would make it possible to develop and extend the most effective ways of processing these yarns. It might also make it possible to produce a register of yarn structures and components, and of the parameters affecting them, which in turn might itself reduce the extent of the duplication of effort at present involved in assessing yarns. No systematic, exhaustive and generally applicable work has been undertaken in this area since the possible areas of interest and concern vary according to the precise nature of the equipment available within a company and on the priorities of that company's clients. This in turn makes it impossible to suit all companies with a single product. However, it would be possible for a company to build up an internal database, which could be designed to include the information most useful to that company. In particular, the properties that might be of interest to users of fancy yarns include:

- Strength
- Wear resistance (that is, resistance to wear during use, and the effects of that wear on the yarn strength, colour, or other physical properties; and the differential changes on certain yarn components as a result of wear)
- Flexibility
- Comfort (for example, would a garment made using this particular fabric or yarn require a lining, and would it be possible to be comfortable in a chair upholstered using a fabric which includes this yarn?)
- Stretch properties
- Suitability for a particular manufacturing or dyeing process

Other properties that are less generally a cause for concern might be included, depending upon the priorities of a company and its clients, and each database could thus be tailored to the actual requirements of the company.

The next chapter (Chapter 6) offers diagrams of yarn structures and pictures of yarns, which it is hoped will assist in developing some familiarity with the wide variety of fancy yarns now available.