

## 8.1 Introduction

In discussing the development of the technology involved in design and manufacturing, we thought it appropriate here to encourage students to consider the range of approaches possible when they are seeking employment. Are the approaches in use by the prospective employer compatible with the applicant's aspirations and personality? Do the culture and methods suit them? For students and young professionals who, in the early stages of their studies, are likely to lack the necessary professional contacts, it is vital to seek out all possible sources of information, and an attempt should be made to visit as many prospects as possible during their student years. It is to the advantage of the organizations and of the students to ensure that students and young professionals learn to rapidly identify the salient characteristics of any organization they visit. In due course, this will allow them to ensure that their own attitudes and priorities are in tune with those of any organizations to which they may consider applying for a post. Equally, it should result in a reduced level of staff turnover for the organizations, who should find that they will receive fewer applications but that those applications will be from individuals who are, to some degree, self-selected.

It can prove difficult to find a means of contacting individuals within the industry who are able and willing to discuss those aspects of their work that would be impossible to teach in colleges. However, many professionals within industry are enthusiastic and willing to discuss their work in detail, and the encouragement of these enthusiasts is usually well worth the effort involved in finding them.

## 8.2 The design implications of fancy yarns

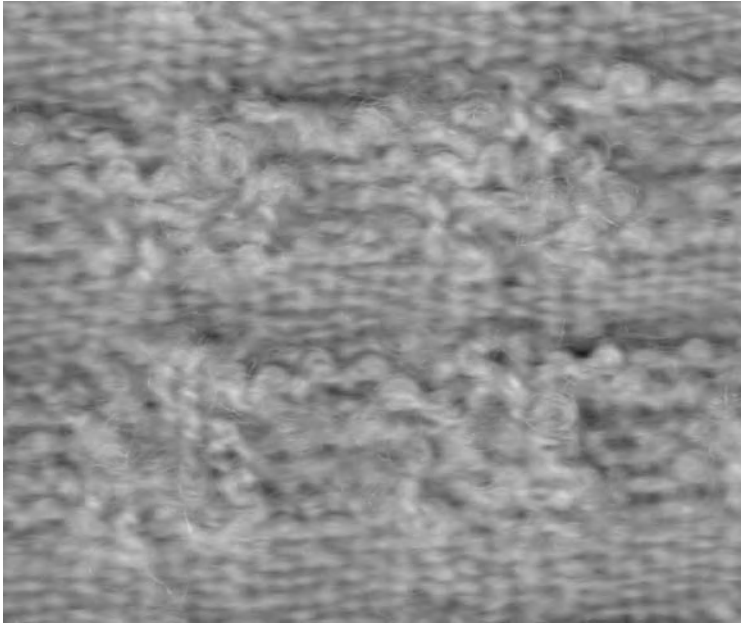
The importance of design and of marketing, which form the beginning and the end of the manufacturing process, cannot be too strongly stressed, for

they inspire all the actions in the other sectors of the production and supply chain.

This is clearly demonstrated by the relatively recent development of the chenille machine, discussed in detail in Chapter 7. This machine has made it possible to create a chenille yarn very rapidly and in large volumes. It is no longer necessary, now, to weave a precursor fabric first. Where once the use of chenille yarns in fashion was rare and short-lived because the yarn was so difficult to buy in sufficient quantity and at a reasonable price, now it is possible to use chenille yarns of various types in a wide range of applications. Not only that, but the chenille yarn is being used in a significant proportion of furnishing fabrics (see Plate 2, Example A). These fabrics are even targeted at the mass market, where once again the rarity of the chenille and the long production process involved made it by far too expensive. Indeed, it seems that the chenille yarn in furnishing fabrics has achieved almost the status of a near-commodity, because the prices per kilogram have fallen significantly since the yarn became popular.

Fancy doubled yarns, whatever their exact nature, are all decorative. They will noticeably enhance the aesthetic effect of a fabric in which they are used, even though the precise effect that will be achieved is often a mystery before the fabric is made, until the designer has gained a certain level of experience – and even then, it will not be possible to describe the exact effect expected to another person.

Although it is certainly possible to use a fancy yarn in a fabric that has a decorative structure, the decision to use a fancy yarn of some sort means that it is no longer necessary to design a decorative structure in order to create a decorative fabric. On the contrary, the use of a decorative structure becomes just one of the several design choices available in addition to the decorative effect of the yarn. The enhanced aesthetic effect will be felt even – or perhaps especially – in cases where the fabric structure is of the simplest. The plain fabric can therefore combine the elegance and simplicity of the plain structure with the decorative effect of the yarn. This may, of itself, create an exuberant effect, although it may equally well produce one of great subtlety. A yarn need not even be used extensively in a fabric to have a remarkable impact on the overall appearance. Carefully planned, the contrast between the plain ‘background’ yarn and the fancy yarn is likely to heighten the impact of the fancy yarn. For example, as shown in the fabric detail in Fig. 8.1, the use of a fine bouclé yarn with a plain yarn in a woollen fabric may be planned to offer a variety of textures – bouclé crossing bouclé, plain crossing bouclé, bouclé crossing plain, and plain crossing plain. This, when the yarns are all of the same colour, produces a very subtle checked effect, which adds distinction to a fabric without calling attention to itself.



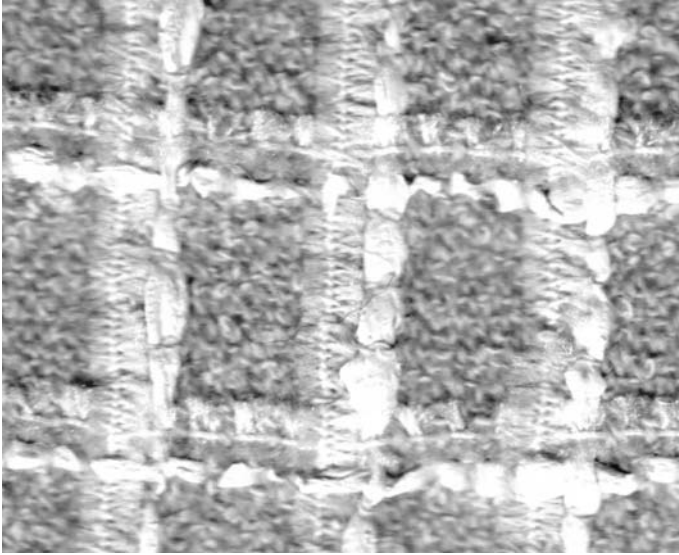
8.1 Plain woven structure enlivened with bouclé yarn.

### 8.3 The use – or not – of luxury fibres

Although luxury fibres are not, of themselves, the subject of this book, at this point it is worth recalling that, although luxury fabrics may often include fancy yarns, and fancy yarns may include luxury fibres, the two do not necessarily belong together. Sometimes, a particular effect is best obtained by using a combination of exotic or luxury fibres, but sometimes these do not provide the effect sought. Fig. 8.2 offers an example of an effect that is certainly not available in ordinary yarns or luxury fibres.

The detail in Fig. 8.2 shows a fabric that includes two fancy yarns. The first is a fringed yarn, which is certainly ‘fancy’, but the second is truly unusual. This yarn, which is sometimes referred to as a ‘chewing-gum’ yarn, consists of a filament core encased in a polymer foam. Although it sounds alarming, the effect in a fabric has its own charm, and the yarn can be used to create an unexpected textural highlight in an otherwise plain fabric.

At the other extreme, there are some exceptional fibres that are best used in plain yarns and plain fabrics, because it is the beauty of the fibre, and its particular characteristics, that produces the beauty of the fabric. The most well-known of these is shahtoosh, a fibre that comes from an endangered Tibetan antelope, the chiru. Unfortunately, it cannot be taken from a live animal, and this fibre is therefore now unacceptable to most consumers: indeed, it is becoming impossible to source even if it had remained accept-



8.2 Woven fabric showing 'chewing gum' yarn.

able, since the high level of poaching has all but wiped out the chiru in most areas.

However, substitutes have been found. True pashmina is almost as fine as shahtoosh, and much more acceptable, being obtained from a domesticated goat (*capra hircus*), and without the necessity for slaughtering the animal first. Top quality cashmere is also exceptional in lightness and warmth, although since cashmere is now available in lower-priced blends and does not benefit from a recognised control system similar to that available for ordinary wool in the Woolmark®, it is necessary to be certain of the probity of the source. Another substitute is the result of the rediscovery of an ancient breed of sheep, now known as 'Escorial' because it is said that King Felipe II of Spain kept a flock at his palace of El Escorial. It is even said that the King restricted the use of the wool of this flock to the royal family. In this he displayed an awareness of fabric somewhat at odds with his parsimonious reputation, since the breed has been discovered to produce a luxurious wool that is very fine, light and crease resistant to a remarkable degree. This wool is now becoming very popular with couturiers, although since the amount of wool available in any one year is very small, the price will remain out of reach for most people.

#### 8.4 Intellectual property in design

As with any other product that depends on the thoughts and inspirations of the people behind the scenes, garments, fabrics and yarns offer certain

challenges to those keen to ensure that intellectual property rights are maintained. We must remember in all our discussions of the application of fancy yarns to the general markets, that we are considering a field in which intellectual property, as it is vested in a garment or fabric design, is perhaps in the most fragile of all its forms. Not so long ago, it was a matter of pride for company producing copies of couturiers' designs to have a garment copied from the catwalk and in the shops within a week, perhaps two weeks at most, of the designer's 'catwalk show' or the launch of their collection, however that was accomplished. Nowadays, this time scale has been somewhat reduced, and a week is the longest period to elapse between seeing the garment and developing the copy.

Fashion designers usually accept this situation with resignation, if scarcely with delight. After all, there are few customers who, knowing the quality of the couture garment, and able to afford such a garment, would then choose to buy a cheap copy from a market stall. Couture customers buy couture garments, not simply because they like the design, the colour or the fabric, but, far more importantly, because they appreciate the finishing touches and the attention to detail shown by the couture houses and their ready-to-wear divisions. Nevertheless, the existence of the copyist does pose a dilemma. Clearly a design that is never shown or produced has value only as an example of the designer's thought processes and design inspiration; it will have no commercial value. Yet, at the same time, one might fear that even poor quality copies of a design will reduce its appeal to the genuine target market. We only have to consider the effect on public perception of over-supply of any other item – its ubiquity reduces its perceived value, and in the case of a fashion trend the item will often become entirely unfashionable. This is a matter that troubles yarn designers as much as it does fashion designers, and so its influence on their behaviour must not be forgotten.

It seems clear that textile markets, like other markets, will be dominated in the coming decades by a combination of factors. These will include an increasing demand for customer choice, and an increasingly rapid technical and technological advance. Just as the modern westerner takes for granted the independence granted by the automobile, and is notably reluctant to deny himself that independence, so we cannot expect that the modern fashion customer will happily revert for long to plain yarns and fabrics when they have become accustomed to a variety of textures and patterns, some of them created by yarns and some created by other methods. The new textures and patterns will, in some cases, be the result of new techniques employed in making yarns and fabrics; some will be the result of new technologies; and some will rely purely upon the inspiration of the designer – all of these depend in some way on the intellectual property of the creators being supported and retained.

The final factor in the changes in the market that we can expect to see lies in a genuine globalisation of the product markets. In this global and highly competitive market, no manufacturer will be able to survive unless they can produce items accepted by their customers as being of the 'right' quality for their own market. Any element in a product that distinguishes it from others, for example the use of fancy yarns or the particular talent of the designer, will enable some of these manufacturers to render their goods exceptional and desirable. This will, therefore, make their marketing strategy less one of surviving in a cut-throat commodity market and more one of supplying an interesting and desirable item at a price that more truly reflects its character. It is this that makes the question of intellectual property one which bears consideration.

## 8.5 Uses for fancy yarns

In the case of fancy yarns, which form our focus of interest, it is possible to say that fancy doubled yarns appear both in apparel (mainly but not exclusively in ladieswear) and in furnishing fabrics. Furthermore, we can say that both woven and knitted fabrics may contain fancy yarns of varying types (see Plates 3 and 4). Although it is now true that some of the more commonly-found fancy yarns, such as chenilles and the finer bouclés, no longer offer the eye-catching appeal they once had merely as a result of their rarity, still, these yarns belong to the more select sections of the market.

At the highest level of the market for apparel, the use of these yarns in weaving or knitting haute couture fabrics will no doubt continue, and may even increase. While this is not a large market, it is of a value out of all proportion to its size, and has an influence by no means to be despised. It is here, therefore, rather than in other sectors of the market, that the impetus for continuing innovation and product development will be found.

Designers concentrating on haute couture are more able and willing to take as much time and trouble as they deem necessary to make sure that everything is exactly as it was designed to be. They also have the advantage that the selling price of an item does not carry the importance that it does at other levels of the market – although the value of the work and the materials is most definitely of very great importance. However, the appearance of a particular yarn or effect at that high-profile position will frequently inspire further product development; for example, the appearance of less expensive copies or of less exaggerated versions of the same effect in other sectors in the market. This is an appearance made possible by the collaborations between designers and technologists who have access to the high-fashion swatches and other inspirations, but who are willing to accept the challenge of providing more reasonably-priced variations on those themes, for the much greater number of people for whom designer originals

are unaffordable. This may be done by reducing the scale of an effect like a slub that changes the profile of the yarn, to make it easier and quicker to produce and to use in weaving or knitting machines, or it may be done by changing the components of a blend to reduce the expenditure in materials. A variety of other alterations may be available, depending upon the precise nature of the audience targeted.

In the production of fabrics for middle market apparel, fancy doubled yarns become fashionable or unfashionable, just like any other design element. It is unfortunate that, owing to the reputed difficulty of manufacturing with fancy doubled yarns, even when they are fashionable they are usually to be found in more expensive items. The control of knitting and weaving machines is becoming more sophisticated, however, and the reputation of difficulty that persists is now less deserved than in the past. It is already the case that many fancy yarns may be used on modern knitting and weaving machines, and the appearance of these yarns need no longer be as restricted as it has been, although clearly some yarns offer greater challenges than others in the production environment.

In order to profit from the new technologies and from the developments in understanding that accompany them, the designers and their technically-minded colleagues need to ensure that they remain up-to-date, and that they are aware of the possibilities made increasingly available by technical advances in these fields. A range of new machines and processes, for example those that create the chenille yarns and chainette yarns and those that are capable of fabric production using fancy doubled yarns at commercial speeds and with low wastage rates, are increasing the availability of garments made using fancy yarns. These advances are supported by continuing developments in creating new yarns and yarn types, at a reasonable price: it is becoming increasingly important to be able to envisage variants upon a particular yarn effect that are optimised for sale at different market levels or for different production methods.

In the area of fabrics for furnishings, we have already seen that the no-longer new chenille yarn has made its way into the marketplace at the level of High Street manufacturers. The furry feel of the yarn creates a warm and 'comfortable' handle in the fabric, while at the same time recalling the luxurious feel of velvet. For these reasons, it seems likely that its popularity will continue. If the quantities are no longer enormous, they may be maintained at a constant and reliable level, which may be more satisfactory for the manufacturers in the long run. We have also seen bouclé yarns appearing in this sector, and the developments allowing slub yarns to be produced on the open end system have enabled this yarn to be produced at a more commercial rate than was previously the case. Indeed, the adjustment allowing a particular manifestation of the open end system, rotor spinning, to produce slub yarns was first developed with the home and contract fur-

nishings market in mind. A variation of the airjet texturing method has permitted 'copies' of many of the standard fancy yarns to be made using that system, and the developments of the basic method for airjet texturing have given these yarns a much greater range of uses than was once possible.

## **8.6 New yarns, new fibres, new ideas**

Designers and marketing departments alike have a particular interest in anything 'new' or 'innovative'. For designers, this is because of the personal attraction of the individually characteristic novelty. This in turn is born of an awareness that the new and innovative will often offer new ideas to the creative person, either in terms of applications of the new idea, or variations on the old, inspired by the new. For marketing departments, it is because the 'new', like the 'foreign', will almost sell itself, at least to a certain sector of the population. Furthermore, any new item will offer the chance of creating new methods of marketing, and certainly an entirely new market where there was none before.

This, however, is not to say that any new item will always be easy to sell. On the contrary, the 'saleability' of any item is based upon a most complex matrix of influences, of which quality, workmanship and design are only a few, and may not necessarily be the most important. The marketing strategies of the supplier or designer, and even the features of a product may, in reality, have only a limited influence on the final decision of the consumer. It is true that the choice of target market, as it is made by the manufacturer, will be of great importance, since little profit is made by those who misjudge their target market. However, the final customer will be influenced by a variety of factors – the trends on display in the magazines or the fashion pages of newspapers, for example. Therefore, given that 'fashion', in its very widest sense, appears to be a matter of cycles, the influences on the customer will follow these cycles, and the customers themselves will accept or reject these influences according to the even more elusive, unpredictable and unquantifiable matter of mood.

Although it is clearly possible to research and test market any item, and to gain some idea of the likely response of the market as a whole, most designers and most marketing specialists will be able to offer examples of occasions when the test marketing and customer research was wrong, when an unexpected item became a craze or when a product that everyone believed in failed to spark an answering chord in the consumer. Although customer response to, and acceptance of, new technologies has become more rapid over the years, this is not a guarantee of success. However, fashion and fabric designers have the consolation that, if they are required to produce a greater number of new products every year than designers of other items for the retail market, the cost of those items is less, and if



production can be maintained close to the territory of sale, the risk of the radically new can be offset by reducing the initial production and being prepared to manufacture more if the item proves to be a success.

## 8.7 The retail potential of fancy yarns

The writer Alexis de Tocqueville, who visited America in the 1830s, was so interested by what he found there, and felt so strongly that it offered lessons to the countries of the Old World, that he wrote an entire book on the subject. 'Democracy in America'<sup>9</sup> is of interest even now, more than 150 years after it was first published, and not simply as a description of the America of his time. One of the theories he put forward was that the 'consumerism' or 'materialism' that apparently was, even then, a characteristic of American society was contributing in no small way to the wealth of the country as a whole. He felt that the retail activity that resulted from it stimulated the economy in general. He even went so far as to suggest that this consumerism offered a real alternative to revolution in providing the impetus for a nation's progress to democracy. This may not be as far-fetched as it appears at first sight – certainly the emptiness of shops in Eastern Europe seems to have contributed in some way to the downfall of communism and the end of the Cold War.

If we accept de Tocqueville's theory of the stimulatory effect of consumer spending upon the economy, we should perhaps be even more eager to see novel yarns, fabrics and garments being developed. It is already well known that the newest garment is more desirable, and therefore easier to sell, than last season's or last year's. It is a reasonable deduction, therefore, that the continual development of the new and different is what offers the consumer the incentive to spend. This, in turn, suggests that the use of differing yarns and fabrics can offer retailers a powerful tool as they seek to increase sales. Fabrics involving fancy yarns catch the eye and draw the customer to look more closely.

## 8.8 Retailing

The developed world demonstrates most clearly the variety of forces shaping the market, and allows us to trace their effects most easily. The ready availability of labour-saving devices and the rise in leisure pursuits have combined to increase the feeling of invulnerability that seems to be characteristic of consumers in the Western world. This is further encouraged by advertising and publicity campaigns across all media, and seems relatively unshaken even by war or terrorism. The lasting effects of any uncertainty seem relatively slight, as markets bounce back after any shock. In a sense, of course, this is all to the good, firstly because uncertainty tends

to paralyse endeavour in all directions, which does not assist any attempts to return to normal. Secondly, because history throughout the world shows us that it is as important in time of war to maintain as far as possible the infrastructure that will be needed in peacetime, as it is to maintain the effort directly involved in the war. After any war, the real winners are those who are prepared for the peace and are able to benefit from the freedom it offers, as witness the reported chaos in some parts of post-Soviet Eastern Europe.

The ‘conspicuous consumption’ of the developed world, identified in America over a century ago by de Tocqueville, is clearly the main force behind the retail markets. However, the marketing of the fabrics and garments produced to the final customer, who is looking for a sweater, a formal suit, a set of curtains or a cover for an armchair, is at the far end of a chain of marketing events. Although purchase by a customer is the *raison d’être* of the chain, it is still only the last in a series of links. Earlier in the chain, the marketing of their wares by spinners to fabric and garment producers is also of significant importance. In fact, the fabric and garment producers are likely to find themselves the target of several marketing efforts. The fibre suppliers and producers will want to increase their sales – the long-running and successful ‘Woolmark®’ scheme, funded originally by wool producers, shows how marketing and education initiatives can be addressed to several different stages of the production chain, providing each with the information it requires, and how in the end, increased retail sales provide the impetus to continue the effort. The same model has inspired the marketing for Tactel® and Tencel®, which have both been the subject of vigorous marketing efforts targeting not only the spinners or fabric manufacturers, but also the eventual retail customers. The fabric manufacturers will be subjected to further advertising and marketing, as well. The spinners and throwsters will wish to present their goods and their skills, and the machinery manufacturers will wish to explain the benefits offered by their own newest developments.

Although our main focus in Chapters 8 and 9 lies on design and marketing as it relates to and affects the manufacturing and development of fancy yarns, we should not ignore retail marketing entirely, since these yarns contribute materially to the appearance and thus to the saleability of fabrics and garments. There are two aspects to this: marketing to retailers and marketing which targets the final retail customer.

Of these, the first is most easily tackled by the obvious method – that is, by working with the retailer as one would work with a designer. This, of course, presupposes that we are concerned with a retailer or retail chain interested in design, and maintaining a ‘house’ style or a brand. Retailers who do not maintain a ‘house’ style, but simply an outlet for several manufacturers, may be attracted by branded items or by affordable copies of

the goods available from the ‘designer–retailer’. In fancy yarn terms, this often means substituting relatively inexpensive fibres for the expensive ones used by the designer in creating the original yarn. This second type of retailer may also be more susceptible to ‘fashion’ and ‘lifestyle’ ideas, because their own final customer is as well.

We should remember that marketing endeavours, although their visible result is in sales of goods, are more concerned with the customer’s aspirations and ideals, and that it is this point that makes an understanding of their primary customer so vital to every retailer, since it ensures that the goods on offer match the customer’s expectations of them. It is of little value to offer images of luxury and extravagance to customers whose interest is primarily on practicality and value for money. Conversely, the customer interested in luxurious living will make assumptions about the quality of the goods they buy, and the added value inherent in the choice of fibre or material. The retailer who, through inattention, incompetence, or sheer arrogance, fails to remain aware of the values and aspirations of their core customers is unlikely to retain significant market share, whether that retailer has a single retail outlet or a large chain.

The ‘emotional added value’ that marketing endeavours attempt to sell, and that, as we have seen, rests largely on the aspirations and ideals of the target customer, can be achieved in a number of ways. Good design (either in terms of aesthetics, as in the fashion industry, or good engineering design, as in the automotive industry) is one of those ways. In fashion terms, fancy doubled yarns can contribute to this emotional added value because they contribute a distinctive appearance to the fabric or garment, or because they may include unusual or expensive combinations of fibres, which can offer this ‘added value’ simply by their presence.

At differing levels of the market, garments – and indeed other items – are produced and offered to the customer with differing goals in mind. For example, whereas the mass market manufacturer’s aim is to offer goods at a low cost, which are intended to be adequate for most purposes, the boutiques and couturiers have additional interests, based on their awareness of the customer’s needs (a unique or striking garment for public appearances, perhaps) and their discovery of new inspirations or ideas.

## **8.9 Apparel fabrics**

As there are two main viewpoints for considering apparel, both have been employed in this chapter. First, the division into ‘casual’ and ‘formal’ wear is used to give an impression of the place fancy yarns have in general across the whole apparel sector. Second, the division into ladieswear and menswear is used to show at what level of the market the yarns are employed for these very different consumers. Children’s clothing has not

been included – it will occasionally include bouclé and chenille yarns in knitwear, but fancy doubled yarns seem rarely, if ever, to be used in children's garments made using woven fabrics. Finally, we consider the use of fancy yarns in furnishing fabrics, where the growth of the large retailers offering a 'made to order' service has resulted in an ever-broadening choice becoming available to the customer.

### 8.9.1 Casual wear

The heavier gauge, chunky knitted garments that are most often associated with casual or weekend wear are well served by the colourful and textural effects made possible by the use of fancy yarns of any type. Many fancy yarns already find their way into knitwear. In casual knitwear, most frequently the yarns used are chenilles, bouclés or heavy slub yarns. Plain structures are enlivened and enhanced by the extensive use of marl or cable yarns, which give an impression of lively colour by a method somewhat similar in its effect to that used by Seurat and other Pointillist painters. Some of these effects are shown in Plate 4. Where casual clothes are concerned, the market levels are distinguished by the finishing of the garments, together with the choice of fibres, rather than by any significant increase in the complexity or detail of design, although the very high-fashion garments do tend to include more extravagant effects.

### 8.9.2 Formal wear

The striking possibilities of fancy yarns in woven fabrics lend themselves more to dramatic clothes and suits than to less formal uses. This is something that might be addressed by a sufficiently ingenious designer. In ladieswear, extensive use may be made of metallic yarns and flat 'tape' yarns, for evening knitwear as well as for woven apparel; and this is already done at many levels of the market. Plate 3, of woven fabrics and garments, shows a variety of the fabrics available for formal wear, which are colourful and bright when seen in close-up, as they are in the pictures, but which become more muted when seen from a reasonable distance.

However, formal male attire is still relatively rigidly defined and it does not offer much scope for the more commonly made fancy doubled yarns, which are in most cases too heavy for use in a worsted suiting fabric. In some of these suiting materials, subtle variations of effect may be obtained by using unusual weave structures and by including fancy doubled yarns. However, as these are found only at the higher, more expensive levels of the market, it is only the really passionate enthusiast for fancy doubled yarns who makes use of them for himself or his customers. At a certain market level, there is simply a change from the ordinary 'off-the-peg' suit,

to the tailor-made ‘bespoke’ suit. While ‘off-the-peg’ suits will always be in classic fabrics, perhaps twills, hopsacks or plain weaves, some Master Tailors, although not as a rule those referred to as the ‘semi-bespoke chains’, will carry a selection of unusual suitings for those customers who are interested in them. The ‘semi-bespoke chains’ are those that offer a range of sizes and proportions, so that by buying the right size trousers and jacket (available separately), the customer can assemble a well-fitting suit. The manufacturing methods used combine the modern production-line techniques with as much hand-finishing as is feasible while remaining within the planned price range. The availability of fancy weaves or unusual fabrics to the provincial customer is crucially dependent upon whether they choose to visit a tailor or a retail outlet for one of these semi-bespoke manufacturers.

### 8.9.3 Ladieswear

Ladieswear can be fairly easily divided into different levels, which can be indicated by the expense of the garments and the name of the designer. In effect, therefore, the name of the designer or manufacturer offers a code word that defines the market sector for those who are interested. This holds true even with the recent developments of ‘designer’ ranges among the High Street fashion chains. Special effects of all types are enjoyed first by customers of haute couture and of ‘boutique’ outlets, where the influence of the ‘price point’ is less overwhelming. In considering retail, the price point is the breakpoint in price at which the retail customer will change their assessment of a product, perhaps from ‘good value’ to ‘too expensive’ or (in the other direction) to ‘cheap and poor quality’.

#### *Haute couture*

At the haute couture level, only very low volumes are sold, and the effects are often flamboyant and colourful. Frequently, a variety of exotic materials or fibres will be used to create the desired effect, so that the value of the items will be large in spite of the small numbers involved. Indeed, it is particularly characteristic of the couture garment employing fancy yarns that several different types of fancy yarn may be used in the fabric. The designer ‘names’ define the sector – Chanel, Jean Muir, Vivienne Westwood to name only a few. Customers here tend to be well-known women, much in the public eye. It is as a consequence of their high number of much publicised and photographed public engagements that they need to be assured of distinctive, becoming attire that they can be confident will be unique to themselves. The couture garment often responds well to photography, since what appears flamboyant and perhaps even overpowering at close quarters becomes merely striking at a distance.

*Boutique fashion*

The 'boutique' level is also expensive, but it is still significantly lower in price than true haute couture. Again, designer or manufacturer/designer names are predominant (Clements Ribeiro, Jasper Conran). However, it is the owners and managers of the boutiques who wield the greatest influence on their customers, since not only do they choose what they will stock, but many customers will often seek their advice and rely on their recommendations. The boutique is perhaps the original basis for the 'personal shopper'. Boutique owners are not without influence on the designers, as well, since they are in a uniquely strong position to pick out and develop new design talent, a freedom that is not available to buyers for the High Street stores. They can also encourage more established ones, often providing them with information about the current concerns and interests favoured by their customers – information that it would be very difficult to acquire by any other means, and that can offer the designers a useful insight into the lifestyle experienced by their customers, as opposed to the one they imagined for them.

The customers of the boutiques are in most cases working professional women, often in the more 'creative' professions. They do not shop exclusively in boutiques, but for special occasions they want a more individual style than is available in the High Street fashion stores. Production for the boutiques tends to be in small quantities, with only a limited number of any particular style available to each potential outlet. Fancy yarns will be used slightly more sparingly in garments at this level, and there will be fewer such yarns used in any single item. While there is no absolute guarantee of exclusivity, the likelihood of encountering another woman in the same dress or hat is really very small indeed.

*Quality chains*

In the intermediate level, between the 'boutique' and the 'mass market', there lies another, rather less well understood level, occupied by small, relatively exclusive chains. The reason this level may be less well understood, and even perhaps, less researched, is because these 'quality chains' are often seen simply as part of the general High Street range. Here, the brand name – usually the name of the store – is the defining element. However, the outlets are often small and vaguely reminiscent of a boutique. Certainly they do not have the crammed racks and narrow aisles of some other sections of the High Street. In these cases, there will be relatively few outlets, including concessions in department stores, and, again, they will not expect to sell many examples of the same item. A small quantity of luxury fibres and processes will find their way into the products sold in these places,

but the customer does not have the absolute guarantee of exclusivity of haute couture or even the qualified guarantee of exclusivity that they may get in the boutiques. At this level, fancy yarns are most often found in knitwear, and occasionally fine bouclés or slubs will be seen in woven fabrics.

### *Mass market*

Fancy yarns may also be used in mass market garments; as witness the occasional fashion for chenille in knitwear. The techniques used in these garments often include colour effects, as well as simple structural effects, and the range of fibres used is more restricted than in the other sectors of the market. In woven mass market apparel, at least of recent years, fancy yarns have scarcely appeared at all, although some of the finer bouclés have made an occasional appearance. This scarcity is perhaps a reflection of the greater difficulty involved in weaving at economical rates using fancy yarns, or it may simply relate to the greater popularity of printed fabrics in these markets. At this level, meeting others in the same garb is not expected to matter, and the decorative element makes little pretence of either delicacy or subtlety, although at the same time it does not display the exuberance of a haute couture effect.

However, as the major brands have all been developing links with major designers, the High Street is no longer a 'style free zone'. This alliance of High Street and high fashion is one that benefits all concerned. As a result of the association, many of the designers have a stronger financial underpinning than might otherwise have been the case, and are able to develop a greater understanding of all aspects of business, which will stand them in good stead as they develop their own 'signature' ranges. The High Street stores have been able to receive inspiration and ideas from designers unfettered by price-points, and then have the incentive to demonstrate what they can achieve in developing the ideas the designers have offered in such a way as to fall within the target prices. In addition to that, they win an association with style and fashion that was once (not very long ago) unimaginable. Finally, the customer gains a much wider choice of garments, and access to fashionable clothes and accessories at an affordable price, in the whole range of sizes.

## 8.9.4 Menswear

When discussing menswear, we need to accept that the market divisions that become clear so easily when considering ladieswear sit uncomfortably with the menswear markets. This is true even though couturiers do create menswear ranges, and even though there are shops catering for the whole range of prices. It is really quite recent, in historical terms, that Western

European men, for example, stopped following fashion at least as closely as their wives, and in those times a truly fashionable man was as much at ease discussing laces and the cut of a jacket as he was when practising with the small-sword.

### *Haute couture*

As a result of this change in the general masculine attitude to menswear, the equivalent of haute couture nowadays lies not so much in the drama or ‘statement’ of the couturier, as in the unobtrusive perfection and clean lines of a beautifully tailored suit – that legacy of Beau Brummel which is still accepted as formal wear where Western European habits prevail. Here, the influence of the bespoke tailors of Saville Row, the shoes at Lobb’s and the shirts of Jermyn Street stretch far and wide, especially as so many of their customers are not resident in the United Kingdom. The Italian tailors are also renowned, and in particular the fabrics they choose are much admired, but, whether it comes from London or Milan, the basic shape of the suit is the same.

Nonetheless, bespoke tailoring, constructed as it is on a substantial internal body, has a cost vastly different to that of any of the mass production techniques, each designed with speed and ease of production in mind. ‘Superfine’ fancy doubled yarns may be used in particularly high-quality suitings, but in fact at present a very small volume is involved. Some Italian worsted suitings use superfine marls and knops to inject life and colour into an otherwise plain fabric. These are now so fine that no significant change in level can be felt between the plain fabric and the knop, but the flash of colour produces an intermittent pinstripe effect, which adds interest to the fabric. Other yarns that are used may include marls or ombré dyed yarns to give intermittent stripes, or extra fine knop yarns to give the same effect. Country tweeds may include loop or bouclé yarns (an example is included on Plate 3, Woven apparel fabrics), but again these appear only rarely.

### *Boutique fashion*

The ‘boutique’, as such, does not exist for the male market, or at least not in the concrete form that a retail outlet would require. Some of Jermyn Street’s shirtmakers do produce a range in standard sizes, to be bought by mail order or off-the-shelf. However, the general dislike of ‘shopping’ for which the male section of the population is (rightly or wrongly) thought to be notorious means that the expected demand for shops arranged to allow leisurely discussions of the merits of one item over another is limited, to say the least. As we have already stated, it is possible to make semi-bespoke



suits by using a combination of tailoring and manufacturing methods, but again the outlets are relatively few. In making these hybrid suits, as many of the hand processes and finishing techniques are retained as is feasible within the price targets intended for the garments, but the suits are made to standard sizes. In addition, the fabrics are standardised, plain and simple, certainly not ‘fancy’ in any way.

### *Quality chains*

Quality chains are aimed generally at the younger man, and in consequence rest heavily on informal weekend clothes, for example chunky and heavy knitwear, and strongly woven casual trousers. Where they include formal attire, the suits tend to have a slightly exaggerated cut, and the display will include many of the colourful ties and braces that are intended to express the individuality of the wearer. The garments are reasonably well made, but as fashion garments they are not expected to have the durability of the ‘bespoke’ class of garment, nor is it desired. In these stores, fancy yarns may be found in knitwear, but not in woven fabrics.

### *Mass market*

Again, fancy yarns of several types can be found in casual mass market knitwear, but will not be seen in woven fabrics. The yarns will include marls and ombré dyes, and perhaps heavy chenilles or slub yarns. The garments are intended to be durable and comfortable, and the sketchiest of bows is made in the direction of ‘fashion’.

## **8.10 Furnishing fabrics**

Upholstery and home furnishings have offered a relatively new field to spinners of fancy yarns. The recent trend for old, ‘worn’, and comfortable-looking furnishing fabrics is one that favours the use of their products, because the inherently uneven surface of a fancy yarn is enhanced when it is woven or knitted into a fabric, giving that fabric, in its turn, an uneven surface. This uneven fabric surface gives the appearance of age and wear, even when the item is brand new, partly because of the manner in which light is reflected, and partly because it results in a more textured feel and handle. Chenille yarns are also beginning to be used extensively with a multicoloured warp to create picture panels, after the fashion of the colour-woven tapestry fabrics once popular in accessories. This offers the alteration in texture afforded by the differing textures of the chenille background and the warp-face pattern, and the alternation in colour that is used to create the picture. For this reason, chenille yarns, although first popular in

knitwear, are now used to a very significant degree in furnishings at many levels of that business. They are accompanied by bouclés and (to a lesser degree) slub yarns, neither of which contribute quite the warm, plush feel of a chenille. In Plate 2, the use of fancy yarns in furnishing, both as curtains and as throws, is shown in photographs. This plate also includes two detailed pictures of upholstery fabrics, both of them jacquard designs, but one using a chenille and the other a slub as the effect.

It has been said that once an effect becomes popular in furnishings, it is almost certain to continue in production, for two reasons. Firstly, because 'fashion' moves very much more slowly in furnishing than in apparel, which makes all trends continue for a longer period. Secondly, upholstered furniture and curtains or other window treatments involve a far greater quantity of material than would be required for a garment. Thus, what an upholsterer would see as a trivially small quantity of fabric would be considered a very respectable order by a garment manufacturer. Furthermore, as the High Street furnishing stores have raised the competitive stakes, the increased popularity of offering a second set of covers for each item of furniture has effectively doubled the fabric requirement of any ordinary suite.

In addition to the expected drapes and upholstery – which are expected to have a certain durability – fancy yarns can be used more lavishly in accessories such as cushions and throws. These items, which are intended to produce a temporary change in the appearance of a room, do not have the same high wear-resistance requirements, and therefore the 'feel' of the fabric, rather than its wear-resistance, can be rated more highly than when an upholstery fabric is planned. Furthermore, chenille yarn has found an unexpected application in making tassels for curtain tie-backs and key-holders.

It is true that greater caution needs to be exercised in choosing yarns for furnishings because fancy doubled yarns are, by their very nature, designed more for drama and novel effects than for the durability which is after all, a prime requirement of furnishing fabrics. However, many yarns have been found suitable, and this number is increasing. The development of understanding and of skill, which has been extended with every year that a yarn is made, has allowed spinners and fabric manufacturers together to develop yarns that achieve ever better wear-resistance. They have a considerable incentive, for the softer, 'broken' surface of a fabric in which a bouclé or chenille has been used provides an impression of comfort and resilience not so easily obtained when using plain yarns. Furthermore, the chenille, in particular, offers a similar feeling to that of velvet, although because it offers a 'broken' surface, scattering the light, it is less optically obtrusive. This is becoming an important point, as houses become smaller, and the impression of space becomes more valuable.

Fancy yarns may also be used in loosely-woven fabrics which are then backed with lining paper and hung like normal wallpaper. This produces an interesting effect, putting an extra dimension into the wallcoverings. They are more easily assembled, and more easily used by a decorator than the method still popular in France, whereby fabrics are woven especially for the purpose of hanging on walls. The latter fabric is woven on extra-wide looms and is attached to the wall in such a way that the selvages run parallel to the floor and the ceiling. In this way it becomes a simple matter to cut out holes for doors, windows and electric sockets or other built-in fittings. The edges are trimmed with braid, and a thin layer of wadding is often attached to the wall underneath the fabric, providing protection and admirably concealing any unevenness in the surface of the wall.

When we consider the variety of uses already open to fancy yarns, it seems that more than any truly novel idea, what is needed is encouragement and assistance for designers in seeking to use the yarns that are already available from the spinners more frequently in men's suitings for example, or in worsted upholstery fabrics. It might also be fruitful to extend research to develop a new range of fancy yarn structures that are more suitable for such end-uses.

## **8.11 Designing the yarns**

In designing fancy doubled yarns, or indeed fancy yarns of any description, there are two distinct approaches. In the first, the 'design' element is likely to be concentrated upon achieving visual and tactile subjective attraction in high fashion attire. This will usually involve combining many different plain and fancy yarns, to produce an exciting visual effect mingling colour, texture and structure to achieve the desired appearance. In the second, which is more generally seen in the mass market sector, the textural effect of a single fancy yarn is likely to be more dominating. This is partly because in the mass market, it is more usual to find only one fancy yarn type used in any particular garment (the popular chenille sweater, for instance), although it may sometimes be combined with a couple of plain yarns to provide a smooth background throwing textures and colours into relief. It is also because increasing the number or type of fancy yarns will increase the cost of a garment beyond what the customer may be expected to spend.

A variety of subtle appearances may be achieved, and new design potentials may be explored at all levels of the market, by the artful combination of several factors. These may include the interactions of varying fibre types and staple lengths, which react differently to the processes involved in ordinary spinning, as well as to the dyeing and finishing processes used. For example, it is known that an irregular slub effect can be made by feeding a

blend of fibres of different staple lengths, which will pass through the drafting area at differing rates resulting in an irregular draft ratio. These and other factors can combine to alter the variety of tones available through cross-dyeing, or to alter the bulkiness, handle and visual changes expected in processing the yarn. In a sense, these are simply extensions of a well-known technique for producing what are termed 'heathered' yarns. This involves the use of mixtures of differently coloured wool at an early stage in blending the tops, and has a long history in the production of plain woollen yarns for knitting or weaving. It is becoming clear, now, that variations on this technique can also be used to add a further dimension to the fancy yarns produced using fibre effects. Many fibre-based bouclé yarns have been made that combine several striking colours, yet produce a subtly varied fabric. Plate 4, on knitted garments and fabrics, shows some of the effects that can be achieved.

A wide range of variations on a particular yarn design may be produced by changing the colour used in the core, effect or binder yarns, by changing the count of the core, effect or binder, or by changing the twist level in one of the feed yarns. Indeed, some of these changes may create such an alteration that it becomes relevant to ask whether a new yarn has been created. As we discussed in the description of yarn structures in Chapters 5 and 6, the same basic formula – two core yarns fed at a constant rate, with an effect material fed at a higher rate and a binding yarn applied to ensure cohesion – can be altered to produce different fancy yarns, merely by changing the amount by which the effect material is overfed and its level of twist. A twist-lively effect yarn will tend to produce a 'snarl' effect, while a lower twist level may produce a loop yarn (if the yarn is sufficiently stiff) or simply a heavily exaggerated bouclé.

These alterations to the basic design will not only produce different effects in and of themselves, but by adding to them the choice of fibre type or characteristics, they can be extended to offer possibilities that can be exploited by cross-dyeing or overdyeing effects. In these cases, it is easy to see that as different fibres accept certain dyes and dyeing methods to different degrees – or even not at all – it is possible to design a folded yarn that can be dyed progressively to create a deeper colour as each element is dyed. This has the advantage that, although from a distance the colour will appear plain, it will not appear 'flat' or dull.

Frequently, a particular desired effect may be gained in one of several different ways, the actual method being chosen according to a matrix of the constraints on the end product and any other factors the spinner or the designer specifying the yarn may wish to add. These may include the budgetary constraints or performance constraints, the equipment and possibilities available to the spinner, and the practical requirements of the intended end use.

It should therefore be clear that, in the case of fancy yarns perhaps more than in many other textile fields, there are two separate but completely interdependent elements in the design process. Firstly, there is the purely 'design' element, where an effect is first envisioned and the design specified. Secondly, there is the 'technical and commercial design' element, which combines the original idea with the production and price constraints that need to be considered.

It is this dual-stage process, combining design with technical knowledge, that makes possible all the vivid, dramatic effects we see. By working in this way, with designers working either as their own technical specialist, or with the aid of a skilled technical specialist, it is possible to avoid seeing design innovation inhibited by production constraints during the early stages of the design process. If the designer is willing to accept that some compromises may need to be made, perhaps in the size of the effect, or indeed that a completely new production route may need to be devised in order to bring the effect (or an approximation thereof) within the cost bracket required by the final customer, it follows that at the beginning of the process the imagination may be allowed free rein.

To offer an example, an ombré effect may be achieved through the continuously varying, alternating feed of two or more different coloured slivers; or it may be achieved through the use of a single sliver, already dyed to give the changing colours. In the nineteen-fifties, a variant of this latter effect was used to provide yarns for menswear, when a roller was used to print dyes onto a row of comber slivers. In the first case, it is clear that greater flexibility is required at the spinning frame, with two or more different delivery paths for the feed slivers, each separately controlled. Obviously, this requires a longer period for setting up the machine, and furthermore the equipment is more expensive. In the second case, a single sliver may be used and therefore a simpler spinning frame or set-up may be used. This, however, will be at the expense of using a more complex (although in the case of this example, well-understood) dyeing process. The two processes will produce somewhat different effects, especially since with the first, more complex process, it is possible not only to produce shorter sections of each colour than by the second, but also if the equipment is electronically controlled it will be possible to vary the sizes of the sections.

This 'two-stage' approach to yarn and fabric design makes it feasible to bring many more effects (and more complex effects) to a wider audience, without at the same time restricting the designer's freedom in the initial stages. In addition, this approach has the advantage of giving the technologist a more involved and involving role than is afforded by the simple diagnosis and rectification of failures. However, if it is to be successful, full co-operation and dialogue between the designer and the technical department is required. This is not by any means impossible to achieve – in the

majority of companies it is already a reality – but as these specialists often both work and think in radically different ways, using different methods to identify problems and find solutions, it certainly requires that considerable efforts should be made to develop a common language.

## **8.12 The design of fancy yarns using computers**

### 8.12.1 The background

The expansion of Information Technology in its wide variety of aspects into every facet of our lives has not passed by the textile industry without having an effect. In the early years of computing, the contribution of the computer was limited to accounting, payroll applications or very simple process control; but electronic controls are now an important aspect of all new systems. In the textile industry, electronically-controlled fabric and garment design, computerised weaving and knitting machines, and the computerised control of dyeing and finishing ranges are all becoming widespread. The increased flexibility, efficiency and control offered to the operator is by far too great to be ignored in times of strong competition. Electronic warehousing systems and links in retail companies extending from the point of sale to the warehouse and beyond that to the suppliers, although challenging to implement with complete success, offer such advantages that most of the larger retailers have either installed such a system or are planning its installation.

In the early days, a design was developed on paper and a computer programme was then created in order to interpret the paper pattern, allowing the computer to control the knitting or weaving machine to reproduce the pattern in fabric form. One immediate result of the evolution of the electronic jacquard machines for woven and knitted fabrics has been in the development of applications that enable the designer to develop the design on a computer which then controls the operation of the machinery. This eliminates the possibility of errors in transferring the design from the paper version. It is possible to undertake basic design work using simple drawing or image-processing packages. However, the true benefits of computer aided design only become apparent through the use of specially developed applications that can then be used to control the fabric manufacturing process, either directly, or indirectly through the production of punched cards (which may still be found in some mills) or floppy disks.

The majority of computer aided design systems already include the facility to develop ‘simulation’ views in which the application computes and displays a picture of the fabric as it is expected to appear. Dependent as they are upon the computer’s internal expression of our understanding of the details of yarn, fabric, and fibre structure and behaviour, these simulations

will become ever more convincing as our understanding improves and the internal computer model of fabric and yarn structures and behaviours becomes more sophisticated. In effect, this 'model' is the collection of rules which, if applied to the design, should provide an approximation of the behaviour and appearance that can be expected from it; as the model becomes more accurate, so too do the simulations it can create. However, at no time should we confuse the model with the reality – they remain subtly different.

A variety of enhancements of these design programmes allow the designer to reproduce the fabric's pattern not only on-screen but also in paper simulations before committing it to fabric sample production. This, in turn, offers the opportunity to reduce significantly the sampling costs, since it is possible to show clients a realistic paper or screen image of a wide range of fabrics, from which they can then choose a much smaller selection for fabric sampling. Although it is difficult at first to become accustomed to the notion of a picture, rather than a fabric, being presented to the client, the advantages in reduced costs can be considerable.

At present, the greatest challenge to the spread of computer-based image and paper samples rather than fabric samples lies in the problem of colour matching. As anyone who has ever used more than one computer is already aware, different monitors and printers will often produce very different results when displaying or reproducing the same image. It is therefore clear that, unless a means can be found to ensure that all those working on a project see the same image, with the same colour balance, the much-vaunted advantages in time and cost conferred by digital collaboration will still not be achieved. However, calibration of the equipment, although not yet easy to achieve, is already possible. As the development of colour calibrated printers and screens continues, it will become reasonable to offer 'true-colour' printing and screen images, allowing colours to be perfectly matched.

This will mean that the fabric samples can be used purely to determine such physical matters as 'handle', to undergo wear tests, or to cast light on the manufacturing hurdles that may lie ahead. The use of computers to answer these questions clearly and incontrovertibly is probably still some distance into the future. In order to compute reliable results in 'virtual wear tests', the computer model of the fabric and yarn structure, and its reaction to the chosen form of wear, will need to be very accurate. It is likely, too, that 'virtual wear tests' will be so computationally intensive that for some time computers capable of performing these tests within a sensible time scale will be extremely expensive. For a while, in any case, the virtual tests will have to run concurrently with actual tests, on a very wide range of fabrics, in order to test the accuracy of the model.

Clearly, therefore, there are a number of applications where computers of varying types, from ordinary desktop computers to embedded systems, offer considerable advantages in the present production environment. However, this is to ignore completely the wide range of additional applications, where computers are used not to control production processes or to automate the purely mechanical aspects of the design process, but where they offer aid to the researcher. As suggested in the discussion of 'virtual wear testing' above, once it is possible to specify and model the behaviour of a yarn or fabric, it will become possible in turn to test the material using a computer simulation, reducing (although never eliminating) the need for laboratory testing. It may also become possible to create an application to compute and then simulate on-screen or in printed form, the general appearance or the striping effects that can be expected from a particular yarn used on a particular loom, using a specified fabric structure.

### 8.12.2 Yarn production

The spinning frames now available are electronically-controlled, whether they are intended to produce plain yarns or fancy yarns. The newly developed electronic control systems offer not only control of the machine as it runs but also, almost as a by-product of that control, a variety of operational data. These data are processed to provide information to the plant manager or operator that includes detailed production or diagnostic information, which may vary from total figures for the entire spinning frame to details of the performance of particular spinning positions. Most importantly, this is available, not after hours of painstaking observation and calculations, but in real time, without interrupting the machine or interfering in any way with the operation of the mill.

As an aid to production control, maintenance scheduling, and performance monitoring, these data are invaluable. However, the software gathering the spinning data does not in any way offer us a useful, usable yarn design software. Yarn structure and behaviour is so complex that, while it is now possible to provide usable fabric simulations, accurate yarn simulations remain difficult to achieve and uncertain in final application. Consequently, we are some way from any general availability of software that provides helpful 'simulation views' and production parameters, in a manner that can be easily generalised for the wide variety of spinning equipment now available.

We must accept, therefore, that development of a convincing, useable simulation of a plain yarn is not, even now, a straightforward task. If this is true of designing plain yarns, then it becomes very clear that in developing software for, say, fancy doubled yarn design and simulation, the inter-



nal models of yarn appearance and behaviour will have to be very detailed indeed to give a true and useful picture. Not only will it be necessary to model the general behaviour of a generic fancy yarn, but the effects on that behaviour of changing the properties of one of the component yarns must be modelled too. The multitudinous complexities and variations in the structures and outward appearances of complex fancy doubled yarns will make the modelling and production of a simulation many times more difficult.

In addition, in order to be of any significant use to both the production and design departments, yarn design software needs at the very least to be able to produce some instructions for machine settings and feedstock. Although some spinning machinery manufacturers are beginning work on software that can be integrated with their own equipment, developing software that is generalised to provide instructions for all spinning machinery is likely to prove still more challenging. Nor is that all, because, preferably, such software should also produce a computer model that can subsequently be loaded into a fabric design program, either for woven or knitted fabrics, in order to show how a particular fabric will appear when the newly designed yarn is used.

Such an application or suite of applications could be an extremely useful addition to the armoury of the fabric and yarn designer, for two reasons. Firstly, at present, only the designer's own years of experience are available to help them envisage the effect of a particular yarn in any fabric. This carries with it the obvious cost implication that the level of sampling and experimentation required by a designer will be significantly higher at the beginning of their career than at the end. Yet it is often the inexperienced designer who will invent new combinations of yarns. Or perhaps, unaware of the production hazards caused by a yarn when it was first developed, and thus lacking the prejudice experienced by other designers, they may resurrect an interesting yarn in a new form and lay the foundations for a new fashion in fabric or yarn design. Secondly, although the designer may be able to envisage the effect, their client may not, so that at present fabric samples are needed whenever the designer of the fabric does not have the final choice of the fabrics or garments to be put into production.

### **8.13 Designing fabrics using fancy yarns and fancy doubled yarns**

As we have already discussed, fancy doubled yarns may be used in a variety of ways. They can produce subtle textural variations in a fabric, using a plain weave and a combination of plain and fancy doubled yarns in a single shade. Alternatively, they can be used to produce a riot of vivid checks and stripes, varying texture and colour both at once. The primary point to bear in mind,

and the greatest challenge in using any fancy yarn, seems to be that a fancy doubled yarn, as a yarn in the hand or on a cone, gives very little hint of its usability in a powered production process, and still less of the effect it will have in a woven or knitted fabric so produced. In truth, this may be the basis for the reputation that fancy yarns have for being 'difficult'.

In yarn design and manufacture, an unfortunate, and at some levels widespread, lack of understanding between technologists and designers is something that still needs to be addressed. In a few organisations this antagonism remains strong, but the challenges that are offered by the production of fancy yarns or fabrics made using fancy yarns are such as to require the cooperation of all. It is based upon the particularly unfortunate misconception that design and technology have different goals and that they are not equally important. The error embodied in this misconception becomes clear, however, when it is realised that an understanding of technical matters is often very strong (although not necessarily detailed) among the better fashion designers, enabling them to take full advantage of the benefits of any technique. Furthermore, the really inventive technologists who make it possible to create new and different yarns, clearly both appreciate and share the designer's passion for creating a particular effect.

The increasing use of computers in production design and production control have reduced the number of staff needed, as in all other departments, and all of those remaining need to have some appreciation of the contribution made by their colleagues. In particular, we should all remember that, with the possible exception of design for printed fabrics, which comes as close as production design ever can to graphic design or art, successful design for textiles of all types requires some understanding of the constraints imposed by the technical limitations of the processes involved. The truly creative and inventive designers and technologists will find, jointly, a stimulating challenge in the development of items that can be produced within production constraints and yet still provide the fashionable or novel effect that is sought.

It is rarely appreciated that seemingly 'negative' factors, such as cost, can have positive effects by forcing both designers and technologists to think about the important elements of their designs in order to achieve the desired result most effectively within the parameters available. In Europe, this preoccupation with cost has been largely the result of the over-competitive climate caused by the improvement in the quality of the cheap imports, which were once simply not of a high enough, or consistent enough, quality to be useable. Now, European producers must concentrate on high value, high margin 'niche' markets or on the higher value to the customer of their support or delivery services.

The best defence lies, of course, in extensive sampling and experimentation in this area of fabric design and production above all others, especially

since it is known already that some yarns that appear straightforward and inoffensive can, in the production environment, offer sufficient challenges to make the most inventive and experienced production manager blench. For example, the known difficulty that knitwear manufacturers sometimes encounter with yarns that were folded before being dyed – that is, the yarn showing varying moisture regain through the cone or cheese – can of course occur whether the resultant yarn is plain or ‘fancy’. Although fancy yarns are often made of dyed components, it is by no means unknown for yarns to be made of undyed components and then dyed to the colour required as an order comes in. It needs little imagination to visualise the additional complications created when a fancy yarn composed of greige components is dyed. Furthermore, although the experienced eye can, in some cases, look at a yarn and be confident that the likely challenges are all envisaged, surprises are always possible, and some very plain looking yarns have proved to be so slippery that weaving with them at all almost requires the manufacturer to revert to hand-insertion – scarcely a profitable production method. Sometimes, such plain yarns can be controlled by doubling them with another yarn; some yarns benefit from being slightly dampened before processing; other methods of control may be devised as the need arises.

Clearly, the production process may present considerable challenges. However, reassuringly, it is often the case that only a small proportion of a fancy yarn is needed to produce a pleasing effect in the fabric. In the case of slit film yarns or metallic yarns, as little as 5% may be used to produce excellent, even dramatic, results. This in turn should suggest that a particular effect is most unlikely to be impaired by the introduction of a supporting or controlling yarn that is included in order to make the whole assembly easier to process. It is therefore relevant to bear in mind that the expensive fancy doubled yarn is only one small component of the fabric and is therefore a very small proportion of the final garment cost.

It is also the case that the fancy yarn need not necessarily be used in a fabric which makes a feature of the yarn itself in the expected manner. For example, an obvious way of using a loop yarn would be by knitting it into a fabric to obtain a surface decorated with the characteristic hoop-like structures, both flat on the surface and at a variety of angles to it. However, a traditional market for mohair and long staple wool loop yarns lies in the production of travel rugs, where the fabric is brushed or teazled to produce a soft, smooth surface. The result does not at all resemble the effect produced by these loop yarns if left unbrushed – nor can this effect, so far, be produced by any other means. It may be that designers and technologists will be able to take this example and then devise new ways of treating other fancy yarns to produce a variety of equally uncharacteristic and therefore unanticipated effects.

### 8.13.1 Economic and practical implications

We are all well aware that, for a variety of reasons, fancy doubled yarns cannot be produced as rapidly as plain yarns and are more costly per kilogram for that reason alone. This is the result of a concatenation of circumstances. Firstly, a fancy doubled yarn is created by combining several yarns to make one – there are usually two core yarns, at least one effect yarn, and a binder. At the very least, therefore, the materials cost for a fancy doubled yarn will be perhaps twice that of an ordinary doubled yarn. Secondly, making a fancy doubled yarn often involves more than one process. This in turn means that, for each process there is an additional cost in the machine set-up time. Even the use of the modern combined spinning machines, although it may reduce these costs, does not eliminate them. The combined equipment is complex to set up, and the machine must run no faster than the slowest process. Thirdly, fancy doubled yarns often include novel or exotic fibres – again, the materials cost will go up. However, in spite of this, it is probably true to say that in most cases a fancy doubled yarn is one for which the production and processing costs far outstrip the materials costs, however expensive the materials may be. Other fancy yarns, produced by methods other than doubling, have their own cost structures, and in those cases the materials and the production costs may be the same, but for most processing thereafter the remarks in the following paragraphs hold true for both.

Fancy doubled yarns require more careful handling in the weaving shed or knitting room, and cannot be processed as rapidly as plain yarns. Therefore, again, several factors combine to increase the costs involved. Because the machines need to be run more slowly – perhaps at 70 or 80 percent of the usual production speed – there is an additional cost in time, and therefore money, for every fabric length manufactured. There tend to be more frequent interruptions (although this depends on the yarn) and thus the cost in machine stoppages is higher. Because it is sometimes necessary to devise new ways of handling particularly temperamental yarns, machine set up and down time will take longer. Finishing processes may need to be run more slowly, as well. Finally, the inspection of fabrics involving fancy yarns is a skilled and tiring job, since the differences in texture can appear to cause changes in colour. Although they are not all relevant for every use of a fancy yarn, these factors increase the production costs of the fabrics produced and consequently the ultimate cost to the consumer.

Apparel fabrics made using fancy doubled yarns are often special orders and short runs, a combination that can be economically achieved by only a relatively small number of weavers or knitters. In studying the challenges offered by this particular branch of manufacturing, the impression has been received that these companies are ones with long histories, and in particu-

lar long histories of innovation and product development. It has also been noted that, although many of them have at times in the past diversified their operations beyond their original core products, many of those now surviving have returned to that original knowledge base, where they retain a hard-won reputation for excellence. In spite of this longevity, far from showing any sign of emotional attachment of obsolete machinery or working practices, these companies have maintained a high level of investment in modern plant and machinery, permitting them to use their mastery of the most recent technological advances to offset the high overheads relating to processing and labour which, if combined with old technology, would make their prices too high for their customers.

All of these remarks hold true for the spinners of fancy yarns as well. In addition, their sales representatives provide a first level of 'customer support' for their clients. They are often interested in and knowledgeable about many areas of the textile industry, and manufacturing in particular, that are only distantly related to their own. They tend to have a thorough understanding of the capabilities of the machines used by their own company, often being perfectly capable of running these machines and assisting the customers to specify yarns they wish to see made using those machines. In addition, their interest in matters related to their work often gives them a better than average grasp of the complexities of the customer's business, which makes it possible for them to tailor their advice to their knowledge of the machines available to their customer, and the qualities of yarn that run well on those machines. These attributes are all necessary in selling fancy yarns to both manufacturers and designers, because these yarns are still to some degree regarded as 'luxuries'.

In the manufacture of furnishing fabrics, still more complications arise when the question of the wear-testing requirements laid down by the retailers is considered. When planning to use any fancy yarn, it must be remembered that its uneven surface will create a 'high point' on the fabric. This high point will then be subject to the brunt of the wearing process. The uneven yarn profile will render the fabric less resistant to snags and rubs than a plain yarn. The combination of these two factors – to some extent, two parts of the same whole – will thus create a series of 'weak points' in the fabric, in comparison to a similar structure made using a plain yarn. These weak points may result in thin patches, holes, or snags, which impair the appearance and performance of the item. As a natural consequence of this, great care needs to be taken to ensure that yarns and fabrics are chosen or designed with constant attention to their intended purpose. This need not result in avoiding the unusual or fancy yarn. Manufacturers are constantly developing their products, discovering ways to create a yarn that produces the desired effect while at the same time being strong and wear or snag resistant.

The primary concerns in the case of fabrics for apparel are different. While in fabrics for upholstery the emphasis is on wear-resistance and fire retardancy, for apparel the whims of fashion ensure that the unusual, and the fashionable, item has a short 'shelf life'. Consequently, the more important concerns are those of dimensional stability and evenness of colour. Durability is of less account (relatively speaking) and is therefore much less stringently checked. In any case, some improvements can be made in the durability of garments by a combination of designing the garment to ensure that wear occurs on sections well able to resist such an assault, and the provision of appropriate internal support, for example the correct choice of interfacing or lining.

It is clear that the challenges involved in manufacturing and processing will play a part in increasing the cost of a fabric that includes fancy yarns. In turn, it thus becomes clear that the items made from such a fabric may be more expensive than those made from a plain fabric. This could be a cause for concern to retailers and wholesalers aware of their profit margins and customer sensibilities. However, only in a few cases does the fancy yarn provide more than a small percentage of the fabric weight, although its contribution to the fabric cost may be disproportionately high.

Fifty years ago, in those times of low production efficiencies, a value or cost margin of 2.5% was not really weighed; everyone was in the same situation. However, as the efficiency gains have increased over the years, we can now assume that a total additional cost of more than 2.5% is likely to be commercially significant – most fancy doubled yarns in a fabric could cost at least 300% more than the base yarn, but the higher labour costs can generally be expected to make a much greater contribution. It is worth recalling that the spinners' shade and sample cards show the effect of their yarns used as 100% of the fabric: at a smaller percentage, the effect will often be significantly different, although it has been found that – in woven fabrics in particular – it is possible to get almost the '100% effect' using very much less than 100% of a fancy doubled yarn. This is one more aspect of the seemingly negative factor of cost promoting research and experimentation that, in due course, produces a positive advantage to the final customer.

However, although the use of the metallic yarns is becoming more common, it seems that the extensive use of fancy doubled yarns in apparel is likely to remain confined to the ultra high fashion section of the consumer markets, unless the labour costs of producing a particular yarn do not exceed a very small proportion of the total garment or furnishing item production costs (less than 1%). The factors relating materials and labour costs in spinning vary continually, and research is always in progress to develop a new range of production methods, which may result either in new yarn types or in new ways of producing familiar yarns. It may be that at

least some of these new yarns or yarn types can be used in a broader section of the market place. The successes experienced with chenille yarns, tape yarns and chainette yarns, all relatively recent appearances at the mass market level, lend support to this supposition.

### 8.13.2 Fibre selection

The most superficial reading of any report on *Expofil* or *Pitti Filati* will show that the garment buyers and designers are faced with an enormous range of choices in yarn and fibre. While many of the yarns on display will plainly be unsuitable for any particular intended purpose, the remaining choice available is still vast, especially when the additional effects resulting from the various finishing processes are included.

When specifying a yarn for garment or other uses, that intended end use will enable the designer to fix (at least, approximately) the yarn count and the properties of strength, elongation and abrasion resistance needed during both processing and wear. These may be taken as more or less unchangeable, because any attempt to process the material through an unsuitable route will lead to far too many failures or damaged pieces for it to be practicable or economical. This in turn will make any items surviving for sale far more expensive than is necessary. Spinners can give their customers a reasonably clear idea of the properties of their yarns, and will undertake some careful testing before offering a yarn for sale. However, the wide range of processing machinery available is such that precise limits for every type of machinery offered are unlikely to be available, and manufacturers will want to perform their own experiments to verify a yarn's suitability for the particular series of processes they have in mind.

From the point of view of the final customer, it is the combination of appearance and tactile sensation that is the most important, and thereafter perhaps the care instructions or, in certain (clearly defined) cases, such properties as absorbency, stain resistance or waterproofing.

Certain technical properties can be seen to be of some benefit. For example, the recent development of antibacterial and antifungal fibres may offer the opportunity of developing new consumer markets. However, if so, they will provide an admirable example of the development of new markets from technical innovation – there was certainly no widespread demand for these products before they were developed. These areas of technical performance are more difficult to manage than the purely fashion area. Although it is possible to gain some information about technical research in progress, it is not easy to forecast which projects will meet with success and which will not. With the speed at which innovation progressed during the latter half of the twentieth century, who knows what unlooked-for developments may have occurred in ten or twenty years time? In addition,

technical research that concentrates on developing such properties as fire retardancy, stain resistance and antibacterial functions is very easily applied to the restricted circumstances and end uses for which it was developed. It becomes far less straightforward to apply these new yarns and fabrics to a wider range of circumstances. What if, for some reason, it seemed advisable to include fire retardant fibres in ordinary apparel, for example children's nightwear? The enormous strength and relative rigidity of the technical fibres, which is acceptable, even important, in their original applications, makes them unsuited to garments where drape, handle and comfort are important.

It is important to remember that the choice of fibres to be used in a fancy doubled yarn for garment making depends upon many things, and that technical performance (however defined) is only one element of a matrix of criteria.

From the point of view of the fabric and garment manufacturers, a further dimension of specialisation arises, based on the physical demands and mechanical characteristics available only to the particular yarn manufacturers and usable by particular fabric manufacturers. This in turn arises from the machinery available to them. In other words, there is no generalised source for all of these materials. It is simply not possible for every spinner to produce every type of fancy yarn, nor for every weaver to use every type of yarn. This is partly for historical reasons, and partly a result of the physical conformation of the fibres involved. For example, short staple spinners have their machines set up with drafting zones and fibre control for the staple length they are used to handling, and the same is true of long staple spinners. Changing such fundamental machine settings is not a task to be undertaken lightly. Although weavers may not seem to be obliged to specialise to the same degree, it is usually the case that each geographical area will have its own spinners and weavers, using in most cases the same fibres.

#### *Fibre and fabric choice as they relate to purchasing behaviour*

When considering women's fashion, the first element in a garment that attracts the customer's attention is not the fibre, nor is it even the yarn. That vital first impression rests on the elusive combination of colour, impact, touch and design that creates an instant response in the customer – 'hanger appeal'. This observation holds true to some degree in furnishing retail as well, since the fabric chosen can have considerable impact on the appeal of a particular item of furniture.

Thus, an item's appeal to the customer may be the result of such components as the manner in which it recalls an image in a magazine or a report on catwalk fashion, or on the customer's awareness of becoming colours and styles. A secondary appeal lies in handle (that is, the way the fabric feels



when held, stroked, or crushed in the hand) and drape, and this is where the selection of fibres, yarns and finishing processes will become most relevant. Rarely, if the garment design is a successful one, will any consideration of practicality prevail in the first instance.

The haute couture garment uses fancy doubled yarns to give the fabrics impact and variety from a distance, so that the garment will attract favourable attention from across the room. An added advantage, at least in modern times, lies in the fact that these garments often respond well to photography. They are rarely intended for the close quarters of the cocktail party, but instead for the distance of a public appearance. At this distance, the exuberant combinations of colour and yarn seen in close up will blend into a subtly varied textural appearance, which looks quite as expensive as it is, and incidentally affords the wearer a hint of authority. In haute couture, perhaps contrary to expectation, the choice of fibre is not restricted to the natural fibres, still less to the 'noble' fibres. On the contrary, an immense variety of synthetics are often used. This is because in haute couture a particular effect or appearance is desired, and each fibre in a blend or yarn in a fabric contributes to that effect. Once we accept that this is so, no fibre can substitute successfully for another for that particular purpose. Fortunately for those who like a similar effect but cannot afford the precise combination of materials, it is often possible to produce an approximation of any particular effect by the substitution of one fibre for another.

In the case of menswear, the situation is somewhat altered. A plain dark suit will have the same degree of 'hanger appeal' regardless of the fabric used, and so some of the influences on decision making will be different. For example, there is what may loosely be termed a 'heredity effect', because in some cases at least, those men who choose the very highest qualities of materials for their suits or shoes or shirts had, in many cases, fathers and grandfathers with the same tastes – and not infrequently the same tailor! In these cases, buying decisions are rarely fashion-based, although the details of cut and finishing may change from one period to another. Instead, they are based on an appreciation of the quality of the workmanship.

When we consider off-the-peg garments, of whatever market level, and regardless of whether the customer is male or female, we know that those who are interested will already know the quality of the fabric and of the garment making of a particular outlet, and will be prepared for the associated price; while those who have no interest will not know and will rely on their supplier – the retailer – to price each quality appropriately.

In the case of furnishing fabrics, abrasion resistance is obviously a key factor, and at the moment it seems that the range of fibres used is relatively restricted. High-quality worsted yarns appear only in the most expensive fabrics, and cotton fabrics are used extensively at all levels. Of the vast range

of synthetics available, only a small selection is used – smaller, perhaps, than might be expected, because of the demands of fire retardancy that are made on fabrics for upholstery and other furnishings. In soft furnishings, curtains and cushions for example, the range is rather greater, especially in ‘impermanent’ items such as throws, which can be used to change the appearance of a room without the time, expense and upheaval involved in buying new furniture, but it is still generally very much smaller than in apparel. Wall-coverings, too, in areas of low traffic at least, may incorporate a wide range of ostensibly ‘impractical’ fibres and yarns.