

# Staple yarns using microfibres

Alan Parker considers the potential of microfibres in the staple sector, and outlines his own research findings on the technology required

The introduction of microfibres has created the opportunity for a whole new range of fabrics to be developed to provide new standards in such diverse areas as drape, handle, moisture absorption, comfort and wind resistance. It is the new fibres, filament yarns and fabric structures which have, up to now, lead the way.

The continuing dominance of the staple fibre industry, in contrast, has certainly not been due to its ability to find new innovative products to launch onto the market. However, it has generally found ways to effectively compete with almost every new challenge provided by filament-yarns.

The pressure from filament products has acted as a stimulus to improve the quality of the staple yarn to offset the new advantages offered and, by blending different fibres and a much wider range of yarn counts, to produce a comprehensive range of aesthetically more attractive products than can be achieved with a filament or nonwoven fabric. It was, for example, ultimately able to reclaim almost all the business lost to warp knitted nylon sheets and shirts and the textured polyester jersey fabrics, as for instance Crimplene.

New yarns and fabrics based on microfibres pose another major challenge to the staple fibre industry in the advantages they offer. Unless it is again able to retrieve lost business the industry is bound to contract and there will be an ever increasing pressure on the machinery makers supplying the industry to reduce prices.

The fundamental technical advantage that a staple fibre fabric offers over a continuous filament product is its ability to be snagged without necessarily causing major damage to the fabric. On microfibres the potential for snagging can be greatly increased and this is one of the key factors which needs to be explored to the full by staple yarns.

Past experience is that the staple sector should not try to imitate what

is being achieved with filament products but to target the key advantages and then to combine them with the unique features that can only be achieved with staple products. Although the use of microfibres does permit more fibres in a yarn cross section for any given count (see table 1), which should improve yarn regularity and spinning performance of finer yarns, I nevertheless see a very restricted market for staple yarns from 100% microfibre.

The key properties that can be best exploited by staple yarns is when these microfibres are used in blends — but with the microfibre on the surface of the yarn. This is in direct contrast to where conventional polyester fibre has been thought to be best placed in composite products of cotton and polyester.

The minimum fibre depth of microfibres is dependant on yarn count in that with coarse yarns (coarser than 20 c.c.) there needs to be a layer of about three fibres for the surface fibres to act as a true sheath, but that only two fibres is normally sufficient for the finer counts. Figure 1 shows a cross section showing how a 40 c.c. yarn comprising 60% of 1.5 denier polyester in the core surrounded by 40% of 0.6 denier polyester as the sheath would be constructed.

The surface of a fine denier polyester sheath yarn is far more uniform and less rough than a 100%, 1.5 denier polyester yarn. Figure 2 shows a blown-up model of the

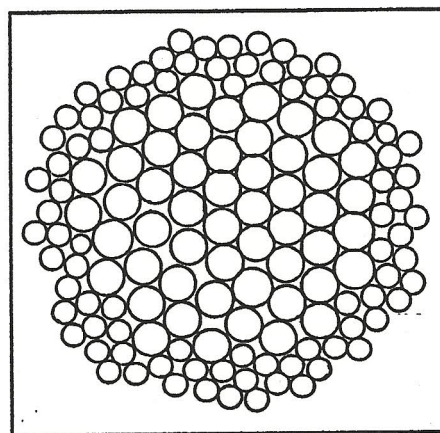


Figure 1. Cross-section of a 40 c.c. yarn comprising 60% of 1.5 denier polyester in the core surrounded by 40% of 0.6 denier polyester sheath.

external surface of a cross section of two 40 c.c. yarns.

Tables 2 and 3 show the respective minimum number of 0.9 and 0.6 denier microfibres that would be required to provide a sheath to adequately enclose a cotton core.

## Spinning Systems

Most of the work undertaken to date has been concerned with the friction spinning unit that Belroy is developing. But, I now believe that many of the concepts can be applied to ring spun products.

The derivatives of the DREF

Table 1

### 100% POLYESTER YARNS

| YARN COUNT   | NUMBER OF FIBRES IN CROSS SECTION |         |         |         |         |
|--------------|-----------------------------------|---------|---------|---------|---------|
|              | 10 c.c.                           | 20 c.c. | 30 c.c. | 40 c.c. | 50 c.c. |
| 100% 1.5 Den | 355                               | 177     | 118     | 89      | 71      |
| 100% 0.9 Den | 592                               | 295     | 197     | 148     | 118     |
| 100% 0.6 Den | 887                               | 442     | 295     | 222     | 178     |

