Moving seams

The mindset is changing: there was a time when designers automatically created patterns with seams in the same places, but no longer. Technology has broadened the horizons of designers and pattern cutters. The fresh positioning of seams first came to the public's attention in the futuristic shapes of the body suits and swimwear worn by Olympic athletes. Seams were moved, usually away from the front of the body, in order to create better aerodynamics. Even the shape of seams and the style of stitching were altered as a result of wind tunnel tests in the hope that yet another fraction of a second would be shaved off a competitor's time. Now even the need for stitching is being challenged, with suitable textiles being welded instead.

While fresh lines of thought are being pursued by companies such as Framis in Italy - its hot air machines weld at speeds of 15 metres a minute and its recently introduced Piumatek technology can produce garments in any size and shape in a huge range of applications covering the performance optimisation of swimwear, sportswear and underwear (the applications could outshine other seamless techniques) - the industry continues to adapt the seamless knitting technology developed for pantyhose into broader product areas, especially in next-to-body clothing such as underwear and swimwear.

Look, no seams

Certainly, seamless knitting is very different from traditional methods. The machines are both simple and complex at one and the same time - the basic simplicity is complicated by the many extra function-specific attachments which must be set to very precise parameters in order to work efficiently.

The yarns for the seamless machines are the same used for traditional circular knitting: they must have a S and a Z torsion to produce a plain tube as the two torsions balance the feeds, but there is a distinction between natural and synthetic yarns. Synthetic yarns are fine enough for straightforward for use on seamless machines. Fabric elasticity is not a problem because they can be combined with elastomeric yarns, and certainly better results can be achieved using such a mixture.

Stand-alone use of synthetic yarns is feasible providing that the coefficient of inherent elasticity is sufficient to maintain the diameter of the finished piece. A current problem is the limited number of diameters available that in turn artificially limits the number of sizes that can be produced. Adding elastane yarns provides additional flexibility in this context.

So much for the synthetics but the natural yarns, on the other hand, have the problem of their gauges. Only the thinnest yarns can be used because of machine limitations and the fact that there are only a few spinning-mills producing the right yarn gauges. The mills have only recently entered into production of these thinner yarns so, for the present, there are only a few types of natural yarn in use.

Natural yarns have another problem: they are generally rigid and insufficiently elastic which means that they must be used in combination with an elastane.

No doubt, as the companies making them put more effort into the development of seamless knitting machines, problems associated with yarns and diameters will be overcome. Three of the Italian companies linked with the sector are Santoni, Sangiacomo and Orizio.

Advances in the sector will need to be machinery led. At present it is estimated that only 20-30% of machine capacity is being used and it will require further technical advances in order for the manufacturing industry to be able to take advantage of the full capacity. Santoni is developing the capability of working with double jersey and so will generate different structure and pattern possibilities as well as increasing yarn selection. It is also developing a broader range of diameters, which will allow for the production of polo shirts as well as the underwear and aquawear. With each new development, more markets will open up to seamless technology.



The first seamless product engineered for comfort in motorcycling. The combination of Nylstar's Meryl Spring and Meryl Skinlife work together to provide fast drying, wicking and odour control.

Consumer benefits

The implications of such development are important. Consumers will come to appreciate the benefits of comfort and fit of garments, made with seamless technology and in such a market scenario traditional knitters can expect to lose market share.

There are other benefits too. Seamless production is more cost efficient when designs call for stripes or other patterned fabrics, the use of logos or other devices on the whole of the garment or just a specific area; it is marginally more expensive than the production of plain fabric.

At present there are limitations but it should be noted that the introduction of seamless machines has not been to replace traditional systems but rather to complement them, so that the industry can produce a broader range of products.

One of the principal benefits of seamless knitting is wear comfort. Another is fit which is much closer than in a traditional garment, particularly in fitness and sportswear. But it also creates the possibility of making a garment with special and various yarns in different parts of the garment if needed: so, for instance, one can place cotton in one particular area and polyamide in others.

It has also made possible the production of garments which have been modelled with ribs, nets, and other yarn variations: all this improves the technical components of the garment and is not just a matter of increasing fashionable acceptability.

Another result has been the development of innovative garments which could not be previously produced. For instance, a traditional track-suit for cycling which would require 10 pieces to create the desired effect on muscles can now be produced with seamless technology using a single fabric tube, with seams in the inside thigh.

At present, the areas of sports activewear that benefit most from seamless technology lie in those garments which have direct body contact, where traditional seams cause discomfort. This applies to sports underwear as well as thermal wear. But it is the ability to model the fabric to provide extra compression or relaxation in specific areas, which is of greatest interest.

Industry benefits

Consumer reaction has been mainly positive among sportsmen and women but there appears to be some way to go in educating consumers about the real technical characteristics of seamless; seamless doesn't mean only "without seams" - at this stage in its development, it also means seamless research into new yarns, machines, and product analysis to meet consumer expectations and needs.

One of the companies at the forefront of the sector is the Italian firm of ILTE, among the first to adopt the technology when it was introduced some four years ago. From the outset it has specialised in elasticised products, starting from an under-vest and moving through to the production of elasticised jeans. It appreciated that the concept had greater application than merely the production of underwear. In mid-2001, the company invested in two Santoni machines simply for use by its R&D department and began collaborating with yarn producers such as Fulgar, Nylstar, Almatex, DuPont and Je.Be. International in order to get the right yarns to develop new products on full-scale machines.



Dorlastan Trendvision Bodyfashion seamless designs for 2003.

The results have been impressive: it has made a polo shirt with the neck being made directly on the machine, doing away with the traditional need to stitch the neck to the shirt. The neck area can be made with the same yarn as the shirt or with a different yarn or in a different colour or with a logo or other pattern detail. It has also produced a very technical cycling line for competition riding. Made from a single tube, and using Tactel, it provides compression in just the right areas.

ILTE has also found a way of drawing the tube without leaving inside yarns 'floating', so that you see only a clean pattern where the coloured yarn, for example, has been worked together with the other yarn.

Seamless knitting technology is only in its infancy. Undoubtedly we shall be returning to this subject in more detail as development progresses and more applications become possible.

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