ASK THE EXPERT: ADDING FUNCTION TO FIBRES

Our question-and-answer series with prominent textile academics continues, with Professor Raechel Laing, director of the Clothing and Textiles Centre at the University of Otago in New Zealand, answering questions on the subject of adding function to fibres.

Right from the start



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Icebreaker

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An expert on the structure and performance of fibres, fabrics, and finished products, and on how these interact with the human body, Professor Raechel Laing is director of the Clothing and Textiles Centre at the University of Otago. The centre was established more than 20 years ago to assist with scientific and technical investigations for industry and the wider community.

Question: What type of odour-reducing ideas at fibre level (silver, triclosan, or cyclodextrins) have you or the members of your team had a chance to research and which appears to you to be the most appropriate for keeping odour at bay in sports and outdoor apparel?

Answer: Our published research on odour has focused on the effects of fibre type and fabric structure on odour development and retention comparing three fibres (cotton, polyester, wool), and three fabric structures (single jersey, 1x1 rib, interlock), with all variables controlled and matched (for example, for yarns, mass per unit area, finishing treatments). This latter point is important because often the claim is fibre-based when the structure into which the fibre is manufactured can differ widely. Structures vary in thickness and many other properties which affect transfer of heat and moisture from or to the human body. Differences in surfaces of fabrics may also affect retention of organisms from the skin surface although we have not investigated this specifically.(1)

Q: For thermoregulating purposes, comp - anies often blend hollow-core and grooved cross-section fibres; how effective do you find this combination in keeping the body cool? What makes it work well, or what reservations do you have about the combination?

A: These and other differences in cross-sections of continuous filaments have been developed over the years for several reasons. It is a way of reducing the weight of fibres and thus of the fabrics into which they are made. Demand for apparel fabrics is that they be lighter. Heavier fabrics and garments, all other factors being identical, are expected to have a greater cost than lighter fabrics or garments. It is also a way of improving the contact between fabric or fibre and the skin surface. Whether effects of specific blends of such fabrics are detectable physiologically by a wearer is unclear.

(1) Reference:
Odor Intensity in Apparel Fabrics and the Link with Bacterial Populations, Textile Research Journal 2007; 77; 449. Available for download at trj.sagepub.com/content/77/7/449.abstract

Q: What novel cross-sections have you come across recently that you feel could introduce new functionalities?

A: A reasonable explanation of this is given by the American Fiber Manufacturers Association. Most synthetic and cellulosic manufactured fibres are created by extrusion, forcing a thick, viscous liquid through the holes of spinneret to form continuous filaments of semi-solid polymer. In melt spinning, the fibre-forming substance is melted for extrusion through the spinneret and then directly solidified by cooling. Melt spun fibres can be extruded from the spinneret in different cross-sectional shapes (round, trilobal, pentagonal, octagonal, and others). Trilobal-shaped fibres reflect more light and give an attractive sparkle to textiles. Pentagon-shaped and hollow fibres, when used in carpets for example, show less soil and dirt. Octagonal-shaped fibres offer glitter-free effects. Hollow fibres trap air, creating insulation and provide loft characteristics similar to those of down.

Q: In your experience, what difference can fibres enhanced with ceramic particles, jade or cool stone, coffee grounds, activated carbon and so on make and what, in your opinion, should clothing brands do to explain their effects?

A: I have no experience with this. However, all claims by manufacturers need to be able to be supported with evidence.

Q: What is the best way to sum up the advantages of adding functionality at fibre stage rather than to fabric or finished products?

A: In general, from a commercial perspective, the further on during the processing sequence that properties specific to end-applications are added, the better (for example, colour) because it means retaining flexibility for as long as possible. However, stability of a treatment or an addition is superior if this takes place early in processing (such as fibre colouration or yarn dyeing). Ensuring stability of a claimed property over the life of a product is important: that is, it needs to be an integral part of the fibre. Any loss of enhancement to the personal (in other words the skin) and wider environment needs to be taken into account, for example with silver.



Professor Raechel Laing, director of the Clothing and Textiles Centre at the University of Otago in New Zealand.

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