The autumn 2016 edition of Intertextile Shanghai took place in October. At one of the many events the organisers put on, *WSA* editor, Stephen Tierney, moderated a lively panel discussion on the subject of innovation in performance textiles.

Innovation debate at Intertextile Shanghai

A diverse line-up of speakers took part in a debate about innovation in performance textiles at the most recent edition of Intertextile Shanghai. Participants were Pierluigi Berardi, global marketing director of nylon 6.6 producer Nilit; Andreas Gürtler, global director for activewear and outerwear at cellulosic fibre producer Lenzing; Dennis Tsai, Asia-Pacific director for DuPont's Sorona product; and Simon Whitmarsh-Knight, global marketing leader for activewear and outdoor at fibre producer Invista. All four speakers gave detailed examples of ideas that that their companies have turned into performance textile products and reaffirmed their organisations' commitment to ongoing innovation.

Inherent performance

With innovation as the subject, a large crowd of visitors to the exhibition gathered to listen and ask questions. Everyone, it seems, is on the look-out for new ideas, new stories. Fortunately, the performance textiles industry is prolific in yielding innovations, at polymer, fibre, yarn, fabric and finished product level and is generous in sharing information about them, so there was much to talk about.

Pierluigi Berardi brought to the audience's attention a number of innovations that Nilit had



Chinese badminton gold-medallist Chen Long wearing apparel incorporating Sorona at Rio 2016.

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The panel discussion took place before a large audience at the autumn Intertextile Shanghai event.

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on show in Shanghai. He explained that what makes the company interesting is that it starts from polymerisation. "This means we can add functionality even before producing the yarn and that's very special," he said. Nylon 6.6 has a share in the range of 2% of the global fibre market, Mr Berardi said. Fibres such as nylon 6 or polyester dwarf it. "But nylon 6.6 has a silk-like touch," he continued. "The product itself is made to be inherently UV-resistant and to have anti-odour qualities within the construction of the product without the need for additives. You can then use additives to achieve a completely different type of performance, from cooling to heating to toning and so on. It's washable and really textile-friendly: you can dye nylon 6.6 combined with cotton without the need of any special machine and you can dye it below 98°C."

The first specific product that he brought to the audience's attention was ATS (short for 'air textured soft'), in which a special air jet texturing technology infuses nylon 6.6 yarns with softness. "You can feel the cottony-soft hand immediately," Pierluigi Berardi said, "and the fabric will stay soft after many washes. It's an easy-care and long-lasting product. ATS is a platform and we want to use it to combine with other performance fibres that we have in our portfolio." Examples he showed included a combination of ATS and Nilit Heat, with natural thermal insulation, and Nilit Breeze with cooling, plus UV protection. Nilit Heat, which integrates coffee charcoal into the nylon fibre, absorbs heat from the body and releases it back from the fabric over time.

Beyond its thermoregulating properties, Mr Berardi told the audience about the antibacterial functionality of the ATS-Nilit Heat combination. He said: "We've been able to test this. There is a minimum required for textiles to be defined as antibacterial and we are three times higher than that thanks to the deodorising effect of the coffee charcoal combined with nylon 6.6. We've run many different tests in many different laboratories that certify what I am saying." He added that the best application for the product is in garments worn next to the skin.

The second example he mentioned of the innovation Nilit has carried out using its ATS platform was a combination of air textured soft nylon 6.6 and Nilit Breeze. This combination works "in the opposite direction" to the previous example, Mr Berardi explained, taking temperature out to give a cooling effect. A special additive inside the fibre creates micro-channels to generate ventilation. "It's the cross-section of the fibre that makes a difference," he said. "It's flat and thin, which helps it stay close to the body and take temperature away. Tests have shown that the wearer can feel a difference of one degree Celsius on the skin. Some may say that one degree is not much but when you see the reaction of the wearer you can see the difference immediately."

Blessings from blends

Next to speak was Andreas Gürtler, global director for activewear and outerwear at cellulosic fibre producer Lenzing. His focus was on the Tencel lyocell fibre his company has been producing for more than ten years now. "Tencel has unique properties," Mr Gürtler told the audience in Shanghai, "and we are positioning it now more and more in the active sportswear market." He pointed out the "coral-like structure" in the fibre's cross-section, which allows for "controlled and regular" moisture absorption because a network of fibrils distributes the moisture effectively. Tests have shown this: he mentioned comparison tests using T-shirts made from 100% Tencel comparing favourably to a similar garment made from 100% polyester; the

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Innovation is the key to a long life for activewear brands and for their supply chain yarn and fibre partners. Intertextile Shanghai provided the visitors with the opportunity to keep up-to-date with new developments.

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Tencel T-shirt delivered, on average, a skin temperature of between 0.5 and 1 degree Celsius lower than the polyester, which is enough to enhance an athlete's performance, Andreas Gürtler suggested. In a separate comparison test with a 100% cotton T-shirt in different conditions (relative humidity of 32% and then of 55%), "Tencel always performs better than cotton," he observed.

More recent innovations have involved examining what happens when you blend Tencel with other fibres. A project that began in 2015 examined blends with merino wool and concluded that this combination can offer advantages in terms of cooling, breathability and smoothness, with less friction on the skin. Lenzing's tests this time compared fabrics made from 100% wool, from a 50-50 Tencel-wool blend and from a 70-30 Tencel-wool combination. All three fabrics were exposed to a hot-plate test to compare the heat flow into each over the course of four minutes. The conclusion was that Tencel-merino blends offer a boost in comfort and are cheaper than 100% wool. "When it comes to water absorption," Mr Gürtler continued, "wool predominantly absorbs moisture vapour. But Tencel absorbs moisture vapour and water in liquid form and that leads to better drying properties in a blend of Tencel and merino in sports textiles."

He went on to say that his company has also worked jointly with German testing equipment manufacturer Emtec to produce a new device for testing the softness of fabric. It uses sound: the more noise the test generates, the rougher the surface of the fabric. It has shown that blends of Tencel and wool are also softer than wool on its own. "A Tencel-wool blend feels better, looks better and is better for the skin," he concluded.

Innovation is the key to longevity

Next to address the audience was Dennis Tsai, Asia-Pacific director for DuPont's Sorona product and its global apparel segment leader. He started by saying it was clear to him, working for a company that started doing business in 1802, that innovation is the key to longevity. "Most companies only seem to run for five or ten years," he said. "DuPont is still evolving, still making a contribution to society, and innovation is the key to that." He pointed out that DuPont spent $2 billion on research and development in 2015. Referring to what other speakers at the seminar had talked about and would go on to talk about, he said nylon was a DuPont innovation in 1938, followed by Lycra in 1962. He said he was glad companies such as Nilit and Invista were still growing their businesses based on these innovations and still finding new ways in which to help their customers use them.

Mr Tsai said that as DuPont entered its third century, one of its main priorities was to "do more for the environment", to use less energy and less oil. The Sorona polymer uses a bio-based propanediol (PDO) as a raw material, a PDO that comes from corn sugar. This, too, is a DuPont innovation, one it developed in partnership with sugar manufacturer Tate & Lyle in 2004. The polymer has a zig-zag molecular structure, which gives natural stretch to fabrics that include it in their material mix. "Sorona is one of DuPont's most important innovations of the twenty-first century so far," Mr Tsai told the audience, "and innovation is the future of every company. The textile industry in China has been strong in the last two decades, but now it faces some challenges. Too many companies are trying to make it big while cutting costs and

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cutting their prices. This is a way to lose your focus on your values."

Developments involving Sorona in the last two years or so include stretch-woven fabrics that are proving popular in the denim market, as well as in shirts and jackets. "We didn't want just to bring something green to market if it was without performance," Dennis Tsai said. "We need to have both. Frequently, there's an issue with denim over 'baggy knees'. The stretch-recovery provided by Sorona can resolve this." Another example he offered was the use of Sorona (with recycled polyester) in the medal-ceremony uniform of the Chinese Olympic team at Rio 2016. Possible future innovations will include using Sorona in circle-knit manufacturing to make garments such as stretch-hoodies or (thanks to its warmth-retention, softness and resilience) in insulation applications.

Ask consumers what they need

An interesting question arising from the discussion up to this point was how companies in the performance textiles value chain decide which ideas to back and bring to market and which to give up on. The final speaker on the day, Simon Whitmarsh-Knight, global marketing leader in Europe for activewear and outdoor at fibre producer Invista, had an answer. He began by saying his organisation has used "market-backed research" to drive some of its most recent innovations. He explained: "We invest considerable energy and cash talking to consumers. Invista is a fibre manufacturer, a successful one, but it's still right at the start of the value chain. So it's important for us to go and look for innovation ideas, to look for unmet needs. Consumers are the ones who can tell us what those needs are. In talking to consumers about what they are looking for in this new world of athleisure, in this growing market of activewear, we try to find insight into those unmet needs that we can turn into innovations in fibre and, ultimately, fabric with our mill customers."

This work has involved carrying out more than 5,000 interviews with consumers, Mr Whitmarsh-Knight told the audience at Intertextile Shanghai, and has enabled Invista to place people into six categories. He highlighted two of the six: 'Carpe Diem' (seize the day), which refers to people who get a buzz out of competition and, especially, winning, and 'Fitness Junkie', which is the Invista classification for people who practise sports as part of a healthy lifestyle and for whom it's less about victories and any medals. He explained that when he presents this information to finished product brands, they find it just as helpful as the fibre manufacturer. "It helps us prioritise and focus," he said, "and it helps us identify common needs. Just these two categories are worth $28 billion in retail sales per year between them; it helps us to know that they are not looking for fashion, but for technology, comfort, fit and so on."



The activewear market is global, it's growing and it is attracting widespread attention, but there are still unmet needs and innovation is still required.

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This led Invista to take its Lycra Sport fabric platform "to a new level", he explained, with a particular focus on comfort and performance. Consumers are looking for both these characteristics because, as part of the athleisure trend, they now want to wear activewear garments for longer and in non-sports settings and they want to be comfortable while doing so. Invista's estimation is that consumers will wear 50% of the activewear they buy to exercise or play sport; the other 50% is less for 'ath' and more for 'leisure'.

The company has come up with "a new Lycra Sport fabric story", Simon Whitmarsh-Knight stated, that is based on three indices, linking back to the consumer research. It calls the first index 'power', a reference to wearers feeling the force of varying levels of compression functionality ("still a huge market", he insisted) that mills can engineer into the fabric. Number two is around 'comfort' and the ease-of-wear that a fabric or a garment will offer. The last of the three is 'energy', focusing on the amount of energy a user has to expend to move the garment, giving an extra work-out on top of the exercise the wearer is doing. It's possible then, using this innovation, to show on a graph the 'p', 'c' and 'e' values for any garment to allow the consumer to choose the product that best fits her or his needs. "You will start to see this on fabric headers," Mr Whitmarsh-Knight concluded. "It's based on data, on science and on research, but we can present it in a way that will help consumers choose and help make brands' lives easier."

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