

20TH ANNIVERSARY: 20 IN 20: TEXTILES AND APPAREL

In the 20 years since we began publishing *WSA* there have been many landmark moments in the field of innovation in outdoor and sports products. In the second of two articles, we look at 20 important developments in the last 20 years in textiles and apparel for athletic and sports. There is no order of preference and nor is the timeline important. These are simply stories centred around fibre, yarn, fabric and finished product developments that created headlines in *WSA* and beyond and helped define the shape of the performance apparel industry today.

20 in 20: Textiles and apparel

Merino wool

New Zealand outdoor clothing brand Icebreaker has used merino wool in its products since the company was founded around the same time as *WSA*. Icebreaker came about when founder and former chief executive, Jeremy Moon, a great lover of the outdoors in New Zealand and beyond, met a wool farmer who handed him an insulating T-shirt the farmer had created for himself. Jeremy Moon's immediate reaction was that the T-shirt felt like it was made of cashmere, a shock to him as his previous experience of wool apparel was that it irritated the skin. He then began experimenting with the fabric and realised its potential. As merino is naturally breathable, light, odour-resistant, keeps the wearer warm when it's cold and cool when it's hot, sports and outdoor brands that has embraced the fibre including Bergans, RÖJK, Patagonia, Montane, Woolrich and many others.

Icebreaker has developed its offering around the benefits of merino wool.

 Icebreaker

X-Static

An early adopter of silver in textiles as an anti-microbial solution, Noble Biomaterials developed X-Static in 1997. The technology, which works by permanently bonding silver ions to the surface of fibres to create yarns that "work continuously" to eliminate bacteria, is still going strong. Medical applications have become very important for it, but as recently as *Techtextil* 2015, Noble Biomaterials said sports apparel will continue to be a key area for X-Static and that eliminating odour from sports clothing is "one of the basic benefits" of the technology. And because effective anti-odour functionality makes it easier to indulge in the contemporary fashion for wearing the same clothes to the gym and to the juice bar afterwards, Noble Biomaterials is entitled to feel X-Static was ahead of its time.

Common Threads

Outdoor brand Patagonia and Japanese fibre manufacturer Teijin joined forces in 2005 to launch a recycling programme to give a new lease of life to used garments. Under the



programme, consumers are invited to return their used garments to Patagonia, which sends them back to Japan to be chemically recycled. This virtuous circle was first introduced for Patagonia's proprietary polyester (with hydrophilic finish) Capilene baselayer collection but has been expanded to include fleece wear (if it's 100% polyester) and will ultimately be extended to include all Patagonia apparel.

Soft-shell jackets

The soft-shell jacket is a twenty-first century invention, developed by Annecy-based mountain apparel brand Millet, using Gore's WindStopper fabric and Polartec's Windbloc ACT (Air Control Technology). Industry observers have described this development as something of a turning point in the outdoor apparel industry because until then, the battle against the elements had focused more on preventing water from coming in from the outside than on allowing water vapour to escape from the inside. After this, breathability became much more of a priority.

Celliant

A hollow fibre filled with a polymer that activates blood flow and, its producers claim, improve an athlete's performance strength and endurance by improving blood-flow and the supply of oxygen to the brain, the product, first called simply Holofiber, has been known for some time as Celliant. The key is the effect of certain wavelengths of light on the body. The product's polymer fibre contains a patented mix of "optically active" micro-particles that scatter and reflect back to the body visible and near-infrared light. Clinical studies in recent years have also supported claims that Celliant can also provide pain relief.

Schoeller 3XDRY

An inveterate innovator, Swiss textile technology company Schoeller came up with 3XDRY to offer garment manufacturers water- and stain-repellency on the exterior of the fabrics of their choice and water absorbency on the inside. Clothes finished with 3XDRY can, therefore, keep the body dry, minimise perspiration marks and stimulate a cooling effect, Schoeller has stated. The technology also supports the skin's ability to breathe. Another main claim is that garments made with 3XDRY will dry six times faster than untreated apparel.

Cocona

US company Trap Tek introduced Cocona, a polyester fibre containing activated carbon derived from coconut shells, in 2006. The carbon particles improve moisture management, reduce odours and block UV radiation, but also



tinge the fibre a dark brown, which can be used in blends to create a feathered effect. In 2012, the company secured \$15 million to help it expand capacity and grow. It has since launched a range of merino fabrics, blending merino's softness and light weight with the company's drying technology, and an insulation system for outerwear, gloves and sleeping bags. The material was rebranded 37.5 in 2013 to reflect the ideal "37.5 zone" of 37.5% relative humidity and 37.5°C core body temperature.

CoolVisions

FiberVisions' CoolVisions dyeable polypropylene fibres contain an additive that acts as a dye receptor. The process was launched in 2006 but it took until 2008 for garments to be in production. Italian yarn manufacturer Maclodio brought the process to Europe in 2009. "I know people doubted that 100% dyeable polypropylene could become a reality, but it is possible," managing director Daniele Beringheli told us at the time. Brands such as The North Face have since incorporated it into their collections, and in 2012 the company was bought by Bangkok-based polyester and wool fibre producer Indorama Ventures. It has recently launched a blend with merino. Susan Lynn, sales and marketing manager, said: "Polypropylene scores highest of the synthetic fibres for sustainability; its manufacturing process has a reduced impact on the environment, with low emissions and no toxic wastes. Polypropylene is also highly resistant to stains and chemicals, requiring less energy use in home laundering."

Speedo's Fastskin

A controversial entry, but a textile that made an impact. Speedo's Fastskin is made from an ultra-lightweight, water repellent, fast drying

Courage Sports was one of the sports apparel companies that adopted Celliant, incorporating the fibre into products such as its Celliant Polygrid tee-shirts.

 Jesse Ramirez



Speedo Fastskin acted as a buoyancy aid.

 Speedo

fabric from Italian manufacturer Mectex that was ultrasonically welded, giving the impression of having no seams. Special low-drag LZR panels were embedded into the base fabric to create a Hydro Form Compression system, helping to compress the swimmer's body into a more streamlined shape. An incredible 94% of swimming races at the 2008 Beijing Olympics were won by competitors wearing the suit. In total, 23 of the 25 world records were broken, leading international swimming federation FINA to change the rules and ban the suits, saying they offered an unfair advantage. Now, only waist-to-knee suits, known as 'jammers', for men and shoulder-to-knee suits for women are allowed. They must also be made of 'textile' rather than polyurethane or materials that can act as buoyancy aids, and the low-drag panels have been removed.

Newlife

Italian yarn manufacturer Miroglio launched its Newlife product, made from recycled post-consumer waste, in 2008. "We have unlimited access to bottle supplies, with a capacity of over 40,000 tonnes per year," said Stefano Cochis, director of Saluzzo Yarns, the company that now owns Newlife. Research and development for Newlife focuses on finer counts and easy care properties, in addition to the already available thermal, UV protective and odour control functions. "We need to provide functions that

are not easy to come by," he says. The range includes flat, textured, microfibre and hollow section yarns for end uses that include fashion, sportswear, outdoor, workwear and furnishings.

S-Café

Taiwanese textile maker Singtex's innovative S-Café polyester yarn contains coffee grounds, transformed into activated carbon. The coffee increases the fibre's surface, accelerating drying times. The porous structure also boasts UV-reflecting and odour-absorbing properties. Singtex uses spent coffee beans collected from Starbucks around Taiwan and recently launched a rayon fabric in collaboration with Formosa. The companies worked for two years developing Formotex, adding to the Singtex stable, which also includes P4Dry, a fast-drying printlayer. "Coffee grounds are naturally microporous, so they capture the smell," explains J.J. Hsu from Singtex's yarn department. While it has been used in sportswear since its launch in 2009, it is now being used in footwear and fashion. US outdoor brand Timberland has chosen it for a denim line as well as boots, and Asics, New Balance and the North Face are also among customers.

Tencel C

At the start of 2011, Lenzing launched Tencel C, a lyocell fibre enriched with chitosan, a biopolymer extracted from the shells of crustaceans. Widely used in cosmetics, the substance, a polysaccharide, is said to alleviate itchiness, activate cell regeneration and provide skin protection as well as antibacterial action. While chitosan makes up less than 1% of the fibre's content, Tencel C acts like a moisture reservoir to optimise skin moisture, according to Lenzing. The Austrian company has also successfully increased production of Tencel with the launch of a 'jumbo' production facility. As of the end of 2014, annual Tencel production was 220,000 tons, manufactured at its Austrian sites in Lenzing and Heiligenkreuz, in Alabama in the US and in Grimsby, UK. Lenzing has also recently announced a move to take Tencel into footwear applications.

Repreve

To make Unifi's Repreve, fibre is extruded from recycled bottles, textured and subsequently knitted into fabrics. In 2010, the US-based yarn manufacturer company launched its Repreve Recycling Centre in North Carolina and has recently announced capacity will increase from 42 million pounds to 72 million pounds per year. This increase is being driven by demand from new customers as well as from companies such as The North Face, Nike, Volcom and Patagonia. A recent \$5 million



Dow's XLA chlorine-resistant swimwear.



capital expenditure brings the total investment in the recycling centre to \$15 million. The company also plans to increase texturing capacity in the US and Central America "to better serve the growing demand for synthetic yarns in the CAFTA region". "Because of the expected growth of Repreve, we will also continue exploring backward integration opportunities into bottle washing," said CEO Roger Berrier. In 2013, Unifi became the first yarn manufacturer to earn Responsible Source certification from auditing body SCS Global Services, a mark of environmental and social responsibility in production.

Dow XLA

At the turn of the century, fibre producer Dow presented XLA for the first time, a stretch polyolefin fibre, promising that the product would offer garment manufacturers stretch performance that would last, even after continuous wear and repeated washing. The fibre is resistant to harsh chemicals, high heat and UV light. These qualities led to XLA being used in a wide variety of applications, from chlorine-resistant swimwear to workwear and, of great interest to the wider apparel world, denim jeans. Although in 2010 Dow decided not to continue its XLA business, the fibre has enjoyed a revival in recent years under a partnership between two Italian companies, nylon 6 producer Aquafil and stretch fabric manufacturer Carvico.

Toray

Japanese textiles giant Toray created a polyamide 6.10 fibre made with 60% castor oil and 40% conventional fossil fuel PA 6, produced in all deniers, like any polyamide fibre, though its cost is 20% to 25% higher than that of a standard nylon. Hybrid engineering is the term the conglomerate uses to describe the biomass-sourced functional fibre made from the castor plant. The plant is robust, growing in dry farming areas and requires significantly less pesticides and herbicides than other crops, claims Toray. The bio sector is a big focus for Toray. It launched Ecodear PET, a polyester fibre produced by polymerising terephthalic acid (TPA) and plant-based mono-ethylene glycol (MEG) made from bio sources such as sugar cane, and the first in the world to adhere to new BIO-PET Criteria set out by the Japanese government. Toray is currently working on a fully plant-based polyester, based on 30% molasses and 70% plant-based paraxylene, which judges at the OutDoor Friedrichshafen trade show in Germany described as a "paradigm shift in the textile industry".

Emana

Emana polyamide 66, from Brazilian chemical and textile developer Rhodia, aids blood circulation and cellular metabolism, improves the elasticity and smoothness of the skin, reduces signs of cellulite and prevents muscle fatigue, according to the manufacturer. Considered a breakthrough in polyamide for textile applications, Emana contains bioactive minerals in its polymer matrix, which transform body heat into energy via long infrared rays. The result of four years of research, the yarn promotes an interaction between clothing and skin, improving micro-circulation and cellular metabolism. "The yarn promotes improved thermo-regulation and performance during exercise, meaning the wearer will be more efficient and suffer less muscle fatigue during sporting activity, without causing any muscle damage," says Elizabeth Haidar, business director at Rhodia. The company recently overcame a legal dispute with Israeli manufacturer Nilit over the use of far infrared ray technology, and its parent company, Solvay, announced a \$15 million investment in equipment. Last year, North Carolina-based

Emana contains bioactive materials that reportedly prevent muscle fatigue.

Tavinho Costa



Premiere Fibers signed an agreement to launch Emana in the US and Canada.

Outlast's PCM

Fibre with phase change materials (PCM) were originally considered by NASA for space suits, but the technology was bought by US company Gateway Technologies, which changed its name to Outlast, and incorporated into its products. Outlast works by absorbing heat from the wearer's body, storing it, and releasing it back to the body, so that a garment will make the wearer feel cooler when it's hot and warmer when it's cool. The company subsequently created an Outlast viscose and polyester, expanding the uses for sports and outdoorwear. Volker Schuster, head of research and development at Outlast Europe, said: "If you take a staple fibre and cut it to make a shell at the core, the PCM you put into that core is going to leak out quite easily. Finding partners who could make the staple fibre with a core-shell in the right way to stop the leaking was difficult. But that was the challenge, and we've done it." Its latest product is made from 30% PCM viscose fibres (a collaboration with Kelheim) and 70% down, and is suitable for apparel as well as bedding.

Lycra Sport

At the end of the last decade, fibre manufacturer Invista introduced its Lycra Sport concept to brands and finished garment manufacturers, saying this new sports-specific label for its famous elastane brand was the result of years of research and development on the part of its network of textile labs. To

qualify to say a garment contains Lycra Sport, the fabric must pass minimum standards related to Lycra fibre content, fabric weight, recovery power, bi-directional elongation, fabric set and fabric shrinkage.

Cordura

Invista's Cordura brand fabrics, known for their durability, have, in recent years, also become available in new constructions that the company claims look and feel much more like natural fibre-based fabrics, while still offering high levels of abrasion, tensile and tear strength. It envisages a wide array of end-uses for these fabrics, including ready-to-wear applications for performance activewear and technical outerwear. Applications will include knit and woven fabrics for casual wear, jeans, trousers, T-shirts, shorts, jackets, rainwear, baselayers, hiking pants and shells. It insists that it is not necessary for outdoor enthusiasts to sacrifice comfort to have long-lasting performance.

Sorona

DuPont launched production of a biosynthetic fibre called Sorona in 2006. It is a polysaccharide or polytrimethylene terephthalate (PTT) fibre, a type of polyester first synthesised and patented in 1941. DuPont did not commercialise the fibre immediately because of the high cost of the key ingredient, propanediol (PDO). A seven-year research programme that began in 1993 concluded with the development of a process to make bio-PDO from corn sugar. Sorona contains 37% renewable materials derived from corn. 



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