



When ballistics meets athletics

With properties ranging from ultra lightweight strength to all around ruggedness and durability, high-tenacity fibres and abrasion-resistant materials traditionally used in ballistic equipment and motorcycle clothing are muscling their way into active sportswear.

Accidents happen. Bad falls and scrapes, too. Many outdoor sports call for the high-powered protection and durability that a new generation of performance fabrics is tackling head on. Joining a market segment in which Cordura and Kevlar have become classic solutions, Dyneema, Garmatex SteelSkin and Armalith are coming on board to protect athletes in extreme situations. Materials made with advanced coatings such as SuperFabric and Schoeller's Ceraspace are also making a comeback.

One of the newest materials to address the need for high abrasion resistance, Steelskin, is a material developed by Garmatex, a manufacturer of performance fibres and fabrics based in Surrey, British Columbia, Canada. The company's textiles address many useful properties for athletes, be it moisture management, odour control, thermal insulation, a cooling effect or abrasion resistance. Its process, known as Fiberithm – a term chosen to liken the technique to that of an algorithm – involves both engineering the filaments during

Banking on the popularity of jeans, Mammut has designed two styles for climbers, the Crag Pants for men and the Zephira Pants for women, both made in robust abrasion-proof Cordura denim.

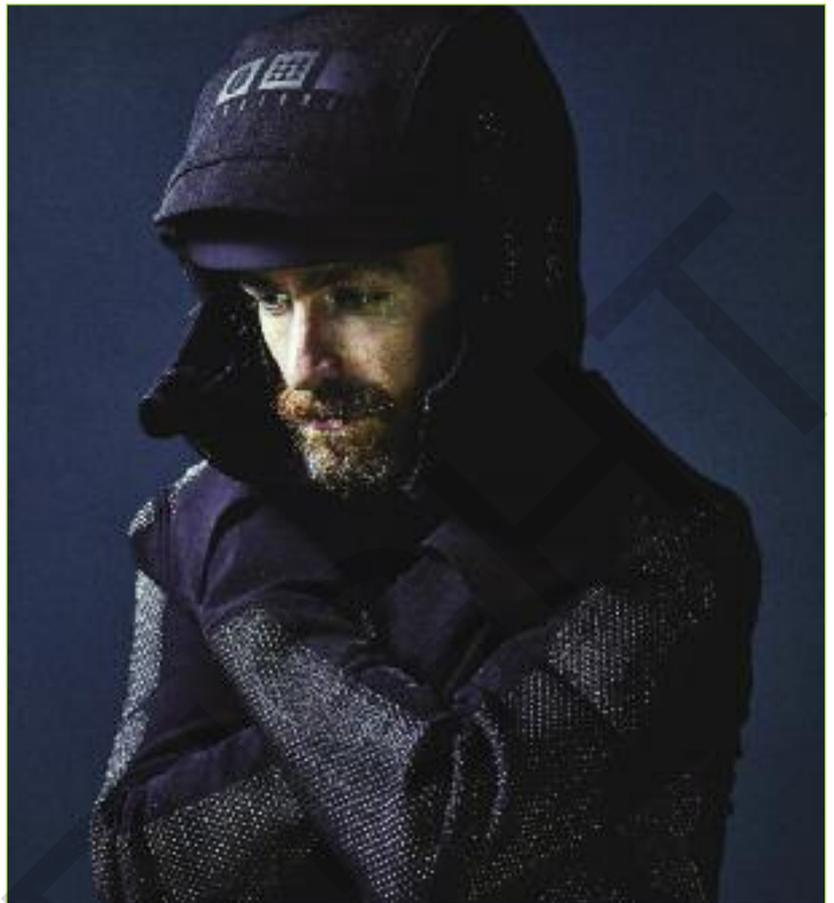
 Rainer Eder / Mammut

extrusion and devising a specific structure for the finished fabric. Garmatex SteelSkin, as the name implies, is made with actual steel fibres, and is available in four different variations, with 4% or 8% steel and as a single layer or bonded to another textile. "We take finely stretched steel strands and wrap our fibre around them," Garmatex president, Darren Berezowski, tells WSA. A SteelSkin fabric bonded to a CoolSkin textile will offer abrasion and cut resistance along with moisture management and antibacterial properties. Majestic, the supplier of on-field uniforms for Major League Baseball, is introducing SteelSkin in sliders that will be worn for the 2017 season. "In tests, athletes slid 50 times and though they may have suffered some soreness, they had no scrapes or cuts, and the fabric showed no signs of wear," says Mr Berezowski.

Crashproof clothing

Aptly named Resistance, Swedish cycling equipment brand Poc's new range of mountain bike clothing features protective panels that are either ceramic-coated or made in SuperFabric, materials chosen for their durability and low friction. "When crashing, lower friction means less violence because you more or less glide over the ground, and the higher durability means the garment, be it a pant or glove, won't tear," says head of product development, Oscar Huss. The brand launched the new range to address a gap it identified in the market. "Our mission is to do the best we can to save lives and to reduce the consequences of accidents. We saw that traditional mountain bike apparel doesn't do anything to support this mission and concluded that we could combine fabrics and solutions to provide protection through better designed garments," says Mr Huss.

London-based adventure brand Vollebak has designed an innovative garment concept for extreme athletes. Its Condition Black jacket, a term said to be used by the military to describe a life-or-death situation, is designed to enhance an athlete's chances of survival in extreme cold weather conditions or high-speed accidents. Ceraspace, a ceramic-coated material made by Schoeller, is used to make the jacket's 19 articulated panels. "The three-dimensional ceramic particles are tough enough to scar rock and survive repeated falls at up to 120 kilometres per hour (75mph). When wearers find themselves exposed to the cold and unable to move, the ceramic particles have a very low heat-up value. They're essentially poor at conducting heat. "This means a wearer will lose less body heat when out in the cold," the company tells WSA. Vollebak has created two jackets that are based on special colours and come with a sound track to help extreme athletes train for



expeditions. These will be described more in-depth in a profile in our July-August issue.

Looking to upgrade the performances of citywear, Inventive Citi, a company founded in 2012 in Paris by a former sports writer, makes high-resistance ballistic jackets for motorcyclists. Company founder, Nicolas Bert, chose a patented fabric made in a blend of Kevlar and Dyneema that he spotted at a Milipol trade show. "My goal is to integrate ballistics protection in as subtle a way as possible," he says, focusing specifically on the jacket's tailoring. The young brand also sources fabrics at Limonta, Schoeller and Majocchi to offer protection from both falls and foul weather.

Produced by Dutch company DSM, Dyneema, an ultra-high-molecular-weight polyethylene (UHMWPE), also known as high-modulus polyethylene (HMPE), is in the midst of a major relaunch. DSM has been producing the high-powered material since the 1970s and recently acquired Cubic Tech Corporation, the company that made Cuben nonwoven sails with Dyneema fibres for the 1992 America's Cup. DSM is now seeking to capture the attention of cutting-edge brands and state-of-the-art mills with a global marketing campaign known as The Dyneema Project, "a carefully curated innovations programme for premium brands". This is an unconventional play for a material traditionally associated with industrial applications.

Switching from advertising to extreme adventure conditions, Steve and Nick Tidball, the founders of Vollebak, are pushing the boundaries of clothing design. Among its many features, the Condition Black Jacket has magnetic 'Survival Pockets', glow in the dark instructions and a ceramic outer skin to keep the wearer as comfortable, warm and safe as possible.

 Andy Lo Pö / Vollebak Ltd.



Reebok has placed Kevlar panels on key abrasion zones in its cross-fitness apparel and footwear to enhance their durability, as seen here on Reebok athlete Camille Leblanc-Bazin.



Spanish weaver IBQ has added Dyneema to its roster of high-resistance fabrics that also include Cordura and Kevlar. The high-tech polyethylene is a newer option that is attracting attention, company manager, Francesc Rabasseda Bruguera, tells WSA. "Brands see it as an opportunity to try something new. It has a very different hand feel, it is softer and more slippery, which clients appreciate." Polyethylene, like aramid (Kevlar) cannot be dyed (unless dope-dyed), but this is not a problem, he says, "as clients want to see the high-tech fibre in the fabric". That said, a black-dyed Dyneema yarn should soon be available. IBQ says demand for the fibre is growing in two markets: workwear – "a segment that cares about performance and needs certification" – and outdoor clothing – "where performance is important, but the look even more so," he points out.

Reebok has introduced patches made in Kevlar in its cross-fitness apparel, a novel market for a material more often used in clothing for extreme situations. The sportswear brand bonds Kevlar panels to body areas that suffer the highest friction: the shoulders and forearms of tops and the front of thighs for 'barbell protection'. Shorts and bottoms are made in a two-way stretch Cordura ripstop fabric. The quest for extreme durability goes all the way to socks that have Kevlar-laced terry panels.

Black Yak's ultra lightweight Emergency Jacket, made in Dyneema, is designed to withstand harsh conditions.



The ultralight and super-tough fibre is now appearing in unconventional products, such as Black Yak's Emergency Jacket, an Ispo 2016 award winner. "Weighing 70 grammes in size L, it is the lightest waterproof and windproof jacket on the market," says Maximilian Nortz, Black Yak's managing director for Europe, adding that the jacket is "a potential life-saver" as it can withstand extreme high-altitude conditions. Well-established in the Asia-Pacific region, the ambitious Korean sportswear brand is launching its products in Europe this autumn and aims to stand out from the competition. "Innovation is key in a market that is struggling," says Mr Nortz. The brand is currently field-testing pants made with Dyneema for its spring-summer 2017 collection.

Similar to Black Yak's jacket, a prototype Emergency Jacket made by Final Frontier Design, a New York-based company specialising in spacesuit designs, weighs 2.75 ounces (77 grams). Made with a layer of non-woven Dyneema bonded to Mylar, the jacket is reversible. In addition to its thermal properties, its taped seams will protect the wearer from rain and wind, making it suitable for outdoor activities.





For its second skiwear collection, down specialist Pyrenex is introducing a Cordura stretch ripstop fabric laminated to a waterproof and breathable hydrophilic polyurethane membrane.

Thomas Canel / Pyrenex

A tougher breed of denim

The denim category is one of the drivers of the slew of new, tougher materials found in activewear jeans and motorcycling clothing. Armalith, a patented blend of cotton and high modulus polyethylene, is now produced by Spanish denim maker Royo under licence from its inventor, French entrepreneur Pierre-Henry Servajeau. The beauty of the fabric, says Mr Servajeau, is that it will protect a biker (it is certified UNE EN 13595-2 for motorcycling) and age like a real denim. "Thanks to Royo's know-how, the look and feel of the fabric is exactly like a traditional denim. Royo has even made it stretch, using Lycra T400, for added comfort," he says. The 12-ounce denim reference contains 57% cotton, 33% ultra high weight polyethylene and 10% Lycra and undergoes eight indigo dye baths. It is also available in raw denim and a super dark fabric with a waxed finish that gives it a leather-like look. Mr Servajeau points out that there are 30 million bikers and motor-scooterists in Europe, a number that he says is growing.

Despite his enthusiasm, few brands have signed up to use the material, inspiring Mr Servajeau to create his own brand, Bolid'ster. "Bolid'ster represents my vision of what can be done with the Armalith fabric," he says. To assist future clients, he has set up a complete supply chain, from denim maker to jean manufacturer and launderer, including a supplier of high resistance yarns initially developed for airbags.

Several mills are now making fabrics with DSM's high powered Dyneema polyethylene, of which performance denims are a big part, DSM marketing manager Nina Romano tells WSA. The company has partnered with Italian technical yarn spinner Filtes International, and denim mills Berto (Italy), Cone (USA), Naveena and Artistic Milliners (Pakistan).

Three different levels of performance denims are being developed: 8-10% of Dyneema makes for a very durable pair of jeans, this is the blend used by Levi's when it first introduced the fibre in its collections in 2013. Cotton blends with 22% Dyneema target action sports such as skateboarding and cycling. With 60% Dyneema, a pair of jeans will comply with motorcycle standards and resist a fall for 4.5 seconds; traditional jeans, says Ms Romano, break at just 0.8 seconds.

DuPont-branded aramid Kevlar is also seeing growth in the performance denim segment, says Dr Karl Chang, a research associate for DuPont Protection Solutions. The denim fabrics are available in various qualities, depending on how much abrasion and tear resistance is needed, motorcycling calling for the highest level of protection. "The traditional motorcycle material is leather," says Dr Chang, "but for those

Poc's new mountain bike apparel range Resistance features a ceramic-coated material and SuperFabric, chosen for their combination of high durability and low friction.

Poc



brands looking to offer a different look, Kevlar denim would be a good alternative." It is a spun yarn, like cotton, so it is well suited to denim manufacturing processes, he adds. Dr Chang points out that polyethylene won't support exposure to high temperatures. "It will be fine for abrasion resistance at low speeds, but a high-speed fall would generate a lot of heat." In other words, Kevlar fibres won't melt.

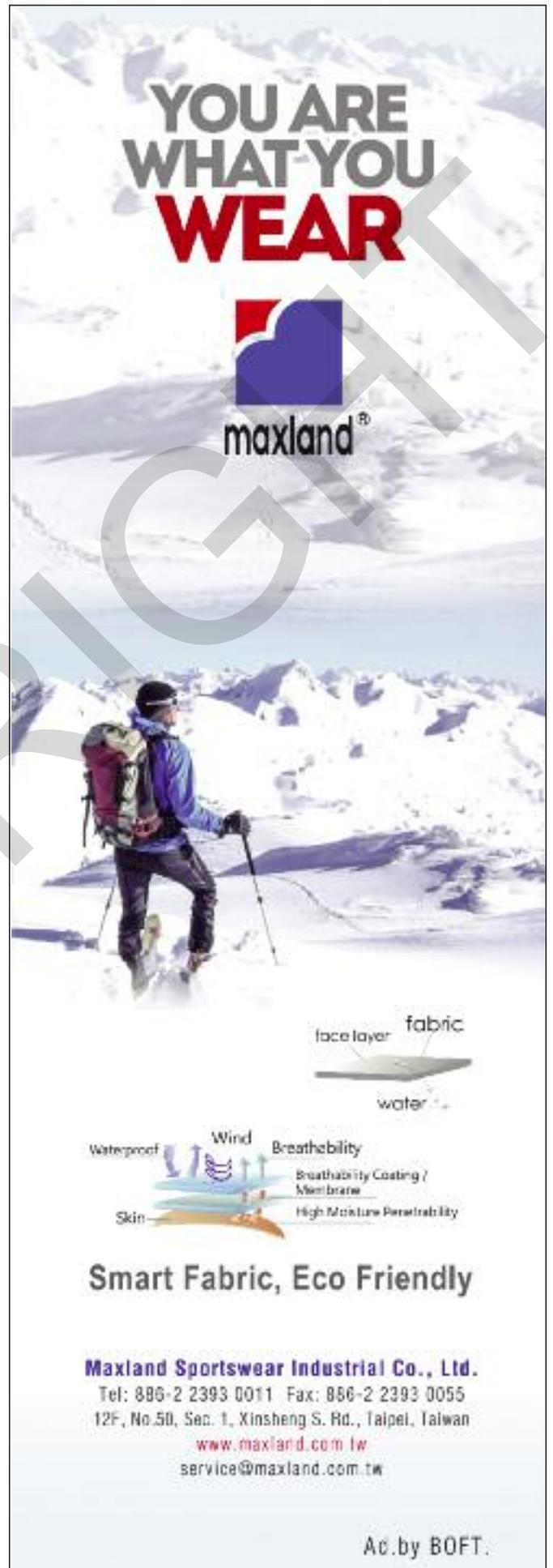
"European and American denim manufacturers are looking for new solutions to counter products made in low-cost countries. The quest for added value is increasingly important," says denim designer Tilmann Wrobel, the creative director and CEO of Monsieur-T, a denim and bottoms design studio. The main appeal of denim is its ability to age beautifully, and this is what has fuelled its enduring popularity. "The material itself, how it ages and wears, counters a dominant trend today for immaterial, device-based experiences," he says, but these opposing tendencies are not necessarily incompatible citing Project Jacquard, a collaborative platform between Google and Levi's for embedding sensors in fabrics, giving the heritage material another possible path to a high-tech future.

Denim is also the main focus of Cordura's current marketing efforts. The category is seen as the "everyday go-to fabric" and as noted above, performance denim is viewed by many as a source of differentiation in a crowded market. The abrasion resistant properties of Invista's Cordura have made it a natural companion fibre to cotton-rich denim, but brands are now asking for additional properties, says Cordura marketing manager, Cindy McNaul. To address these demands, Invista is working with denim mills around the world to develop new functional features, by pairing Cordura with other fibres in the company's portfolio. "Clients are looking for durability combined with elasticity, using Lycra T400; with moisture management for commuter wear, using Coolmax blends; rain protection, with DWR finishes; quick-drying properties, with polypropylene blends; or thermal insulation, with Thermolite blends," says Ms McNaul. Later this year, Cordura will be introducing even stronger denim fabrics as well as "softer" solutions with Tencel and modal blends, she adds.

The added durability that a Cordura blend fabric will provide makes products last longer. This is more than a passing fad says Cindy McNaul. Introducing additional functions, such as high visibility with a polyester Cordura dyed in neon colours, like the three-layer soft shell fabric made by A. Sampaio & Filhos, which is suited for cycling and for workwear, is a plus. "The lighter the weight, the more apprehensive clients are," she says. "Cordura branding gives them more confidence."

One of Cordura's new clients is French down specialist Pyrenex. The outdoor brand is introducing the fabric into its autumn-winter 2016-2017 collection in a move to boost the durability of its skiing and mountaineering ranges. "Cordura has the double advantage of offering true performance for active sports and an urban look that makes it suitable to wear every day in a city environment," says Caroline Grosdidier, marketing manager for the company, which is based in the Landes region. For mountaineering, it chose a 30-denier fabric which offers improved resistance to wear and tear without adding weight. For skiwear, it opted for a stretch Cordura ripstop fabric.

Beyond high-speed daredevil sports in the likes of mountain biking, new categories, such as fitness and skiwear, are helping these abrasion- and tear-resistant materials designed to protect wearers from falls and accidents gain traction. 



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