

With the development of cold-climate endurance sports such as sky-running and ski-touring, high-tech compression and first layer apparel brands are introducing new features - knitted, woven or bonded - to their garments.

Compression wear targets new functions

A highly innovative area for textiles and composite materials, compression apparel is benefiting from research in new fibres, fabric constructions and finishes. This dynamic market targets elite athletes as well as amateur sports enthusiasts.

Compression apparel is usually based on gradient knitting, in which a higher level of pressure is applied at the extremities in order to pump blood back to the heart faster. The properties associated with compression include activated blood flow, delayed emission of lactic acid and speedier recovery times. With the development of bonded or double-layered fabrics strategically placed on the garment, this market segment has moved on to offer properties that claim to support the articulations and promote better posture.

CW-X, the sports brand of the Japanese lingerie company Wacoal, has worked with multiple materials since it first launched in 1991. "The idea of compression, paired with support, is not new to CW-X," says Albert Saint Jean, US sales director east, referring to the company's patented Support Web which is said to provide targeted support to specific muscles and joints. In the Endurance Generator Tight, part of the CW-X fall-winter 2013 range, the Support Web

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Salomon's Exo S-Lab trail-running gear is based on advanced body-mapped knits. The brand's calf wraps feature a honeycomb-shaped bonded panel for added support.

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is placed so that it "stabilises the hips and pelvis, reduces impact to the knees and supports large muscle groups like quadriceps and hamstrings," says Mr Saint Jean.

Providing additional support to the pelvic area is also the focus of a new product in the Mizuno Biogear range. The Japanese brand places a panel of what it calls Power Mesh around the lower abdomen to reduce muscle vibrations and align the body. "Biogear does not provide compression, but we do believe improving posture is a way to reduce the risk of injury," says Frédéric Thévenot, textile product manager Mizuno France. Thanks to the Power Mesh panel, BioGear tights are said to increase pelvic stability by 105%, knee stability by 6% and reduce muscle vibrations by 11%, according to tests conducted by the company. Another product developed by the brand focuses on the knee joint: a bonded polyurethane panel placed just above the knee, at the back of the thighs, reinforces the level of support in some Biogear references.

Graphic functions

The application of thermoplastic polyurethane or TPU tapes and films to high-tech first-layer apparel has spread to many brands. Often applied in a graphic Kinesio tape fashion, the elastic panels are used to provide additional support and are said to enhance performance. The TPU panels found on adidas's TechFit range are designed to support certain muscle groups, while the "optimised elasticity of TPU" is said to store and release kinetic energy to boost athletic performance. Meanwhile, taping manufacturers have expanded their ranges to offer new functions as well as new surface effects. The high-tech aspect of carbon-fibre patterned panels is a perennial favourite, most recently used by Nike in a range called HyperWarm.

Bemis marketing manager, Tom Mendl, notes that there is a growing trend toward the use of high recovery films to provide "targeted" compressional reinforcement on garments. He says: "It is an extension of the body-mapping concept. A single fabric cannot always provide

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the necessary support needed for an activity. By engineering the right formulation and laser-cutting the film to the appropriate anatomical shape, the garment's performance can be significantly enhanced." Yasemin Tören, European sales manager for the company, sees brands focusing on matte, textile type finishes. In addition to the popular TL644 reference at Bemis, it will be presenting a new series of high-stretch films and tape at ISPO this year (Munich, February 3-6).

Italian film producer Fait Plast has been experimenting with an 80-micron (or 0.08 mm) thick polyurethane film designed specifically for application on first-layer knit fabrics. The film can be laser-cut and placed to offer support in strategic places, says Stefano Singuaroli, Fait Plast sales manager, adding that a textured version of this high-stretch reference (693 Easy Term tape) has been used for sky running suits.

Fineness is a key issue for those looking to apply tapes to tight-fitting compression wear. A new reference at Sealon measures 0.10mm. The Korean company has also reduced the amount of adhesive necessary to avoid buckling and improve the handle of the finished garment. Sealon also claims that its tapes and films help muscles stay aligned and store and release energy.

In addition to a wide array of patterns and laser-cut designs, Italian taping manufacturer Framis says that its polyurethane film Dream "gently massages the muscle during movement". Another item used in compression apparel, the patented Cyclone tape is said to combine the elastic properties of polyurethane with the non-slip characteristics of silicone.

Because TPU is not breathable, it is recommended to apply the tape or panels in a grid or studded motif with open sections that will let the body breathe.

New silicone solutions

Silicone is one of the materials that Italian trimming specialist Marc featured at the most recent Performance Days in Munich in November 2012. The company has invested in high-definition silicone application machines that create fine motifs and lettering. "Our equipment can apply any colour and any design on any elastic ground," says company president, Fabio Aceti. Marc also offers a wide array of elastic and electronic crochet openwork trims, designed to add a graphic and technical edge to active sportswear.

Compressport, a Swiss compression brand founded by a group of physiotherapists and endurance athletes, uses silicone for support. The ankle area of the company's Ultra Silicone calf guard is studded with 220 silicone gel buds that are said to reduce vibrations and support the Achilles tendon during strenuous effort.



New designs for fall 2013 by Japanese brand CW-X feature graphic seaming.

CW-X

Adding a layer of protection

As skin-tight garments provide little protection against falls, there is a move to body-map abrasion-resistant panels on garments. Ski touring suits by Dynafit feature Kevlar buds on the hips and Swiss brand X-Bionic has adopted Schoeller's ceraspace fabric to reinforce a new cycling short known, with brutal frankness, as "Protect Your Ass Bike Gear". Both the Kevlar panel and ceramic coating confer high-abrasion resistance without impeding breathability. In tests conducted by Schoeller, a ceraspace-coated garment withstood several crashes at 120 km/h. The concept was initially developed for motorcycle apparel.

Weaves or knits?

Though knitting is ideally suited to body mapping, woven fabrics are regarded as lighter weight. High stretch woven fabrics are moving from swimwear to trail running. Always looking to shave off a few grammes, French trail running specialist RaidLight has chosen an Aquatech fabric by ESF for its calf and arm wraps. "Our woven high-stretch fabrics are 35% lighter than comparable knits," says Christel Delort, sales manager at ESF.



A section studded with silicone on the Ultra Silicone calf guard by Compressport is said to reduce vibrations and support the Achilles tendon during strenuous effort.

Compressport

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A supplier of Arena's Carbon pro PowerSkin fabric, the Kinetech division of Italian weaver Tessitura Taiana also specialises in stretch woven fabrics. Recent developments by Kinetech include references made in Rhodia's Emana fibre. The polyamide 6.6 with a mineral alloy additive is one of the growing number of products on the market that are said to reflect far infrared energy, which has the potential to boost the effect of compression apparel. "The fabric was tested by an independent lab and results show that it increases blood micro-circulation by 90%. This means the garment helps reduce warm-up and recovery times," says Matteo Taiana, director of research and development and a long-distance runner himself.

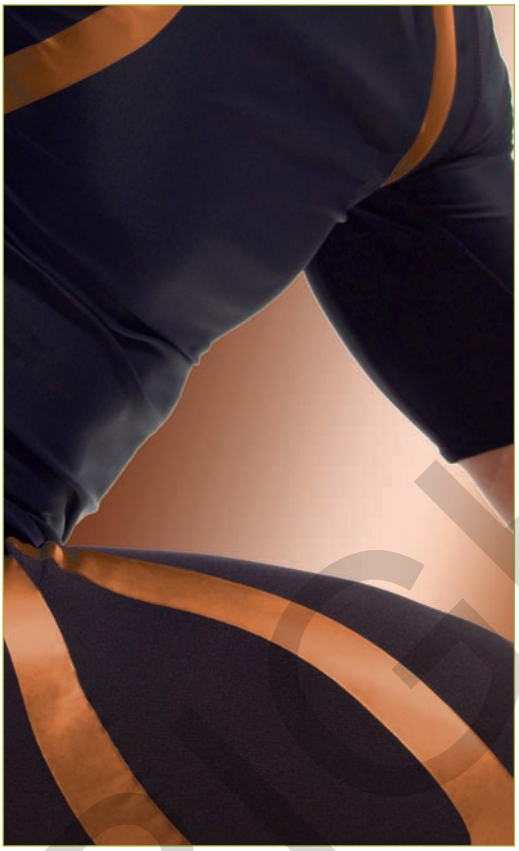
Understandably interested in taking advantage of the expanding compression market, Invista asked an independent research company in the UK, Progressive Sports Technologies, to test Lycra Sport fabrics for their compression features. Each leg of a pair of leggings was made in a different fabric, one in Lycra Sport, the other in a non-branded elastane knit, and were worn by athletes engaging in various activities. Results show that Lycra Sport Energy fabrics feature improved compression levels during and after wear. The tests also indicated increased garment stability over time, suggesting the item would retain its performance characteristics longer than unbranded elastane fabrics.

To tape or not?

For knit purists, the utility of adding taping to compression apparel remains a subject of debate. Some brands say TPU panels serve little purpose other than to block moisture transport.

For next winter, thermal insulation is the new feature being introduced by Skins, which specialises in what it calls gradient dynamic compression via warp knitting. For the Australian brand, knitting is the best way to achieve the desired level of compression to enhance circulation and increase the amount of oxygen reaching the muscles. Having developed a sophisticated garment design and a sizing system based on measurements of 400 points taken on hundreds of athletes, and convinced of the superior performance of warp knits over circular knits, Skins is not planning on adding taped panels to its ranges. The non-breathable nature of TPU is the main reason why the brand does not consider it an option for compression wear. "Taping may provide muscle stabilisation, but it will not activate blood flow," says marketing manager for Europe, Christian Gut.

For next winter, Skins is improving the thermal insulation of its compression garments by choosing a hollow-core polyamide fibre that stores air inside the filaments. The new range will be presented at ISPO in two weights and with prints. "Our skiwear range targets a skier who wants to ski all day," says Mr Gut, adding that users will really feel the difference on the third day.



The new TL644 reference at Bemis is said to possess the required elasticity characteristics for stretch and recovery. The company will be presenting films and tape with improved stretch at ISPO 2013.

Bemis

Like Skins, 2XU takes a purist approach to compression via knitting. "During the last five years we've looked at taping and other structural applications to stabilise muscles. However our research has shown that unless this application is custom-made to each individual, it can actually dramatically interfere with the desired graduated compression," say 2XU's Compression channel manager, Cindy Liu, and product development manager, Jamie Hunt. New developments at 2XU Compression include tops with lower necklines and longer lengths, as well as a bolder colour assortment.

Specialising in sophisticated knitted body mapping, X-Bionic has introduced a new performance-enhancing tweak that it calls a neuro-response-bandage in the Effektor suits. Placed at the upper forearm on tops (for tennis and golf), and below the knees on leggings, this specially knitted panel exerts targeted pressure on the muscle attachment. "The Neuro-response bandage activates the peripheral nervous system, which results in faster and more powerful muscle reactions," says Pierre Barré, spokesperson for the brand in France.

This is yet another sign that there probably remain many other targeted functions to develop, either via knitting or bonding, down the line.

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