A new softshell fabric from Polartec could help its clients raise the stakes in offering high levels of protection against the elements without compromising breathability.

The breathability debate continues



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Performance fabrics manufacturer Polartec is launching a new softshell fabric technology in time for upcoming industry events such as Outdoor Retailer Winter Market in Salt Lake City (January 24–27) and ispo Winter 2010 in Munich (February 3–7), at which brands with with a big appetite for technical innovation, including 66 North, Eider, Lowe Alpine, Millet, Montura, Mountain Equipment, The North Face, Norrona and Trangoworld, will display the new products they have come up with using the idea for collections that will hit retail later in the year.

Power Shield Pro is a laminate that can offer a combination of poly or nylon woven face fabrics paired with lightweight to high loft backs. In between is a proprietary new hydrophobic microporous polyurethane membrane that allows airflow through the entire fabric package, Polartec claims, but stops water from penetrating from the outside.

The company's global director of marketing, Nate Simmons, says: "Power Shield Pro spans a wider range of weather and activity levels than any softshell on the market. It will get you home dry, even in a heavy wet snow, light rain or high output activity." In light field tests carried out so far by *WSA* in wind, rain and snow, a jacket incorporating the new technology has stood up well to these claims (see panel).

Mr Simmons explains that the goal at the heart of what Polartec does is to create fabric that allows people to stay out of doors longer, doing what they love, pushing their own limitations.

After inventing the synthetic fleece in 1981, Polartec has gone on to produce more than 400 different fabrics, including flame-resistant and lighter, stronger, warmer, more breathable military applications, and more than 50 styles

of recycled fabrics. In terms of fleece alone, it has 60 different styles available today; one even has 100% merino wool on the next-to-skin side. "Some people have said this is blasphemy," Nate Simmons comments "They've asked us how we could have done this because we're about synthetics, but there's a group out there who loves wool. That's why we've done it." Polartec's move into softshell began in 1998 when it developed the first Polartec Power Shield in partnership with Canadian outdoor brand Arc'Teryx.

Under new ownership

The company's more recent history has been eventful in a different way. In early 2007, a Philadelphia-based venture capital firm, Versa Capital Management, bought all the assets of Malden Mills, the fabric manufacturer's former parent company. As a result, Polartec is now better funded than ever before in its 100-year history, Mr Simmons says. This has made an extended marketing and research strategy possible, including a new laboratory in company headquarters in Lawrence, Massachusetts and a Polartec athletes advisory board. Athletes are wearing in the field right now new products that will not come to market until 2011 or 2012. The company wants feedback from them before finalising those products, all of which, it believes, is helping it cement its status as a partner for innovation among apparel brands.

That backing means quite a lavish launch for Power Shield Pro, he explains, saying: "They like the product and are throwing a lot more resource at this launch than we have for a long time. You will not be able to return home from the trade shows in January and February without seeing this."

The new product has grown out of the environment in which brands feel they can approach Polartec while they are still, as Nate Simmons puts it, "working around a product". He says Polartec is "extremely proud" of the latest addition to its catalogue and explains that it came from its relationship with Arc'Teryx, which wanted something weather-resistant but breathable. They were basically looking for "the perfect textile", Nate Simmons says, attempting to "close the gap on the perfect single garment".

Testing times

He gives a list of reasons why Power Shield Pro can help Arc'Teryx and the other brands that have responded so far achieve this Holy Grail. It blocks 99% of wind, he says, while being highly breathable, incorporating a bit of stretch for comfort and being machine washable. He continues: "When we talk about breathability, we're really talking about air permeability, which is different from the way a lot of the industry talks about this. Air flows in and out of the fabric; the flow is two-way. The industry uses evaporative thermal resistance (RET) as a test and standard (see panel), but uses a hotplate to carry out the test, creating an unnaturally damp atmosphere because it's a totally static test. We're trying to redefine breathability in the industry; we know it will take a long time, but we are at least beginning to address what it really means. For a start, we're marketing Power Shield Pro as highly water resistant, not waterproof."



A Lowe Alpine jacket made from the new Power Shield Pro material.

Lowe Alpine

In the field

A prototype jacket made from Power Shield Pro has proved ideal for wear, if not on ski slopes, then in windy weather, as well as in reasonably heavy rain, light snow and on clear northern European winter days with the temperature hovering between zero and minus-6 degrees Celsius.

There was plenty of freedom of movement for activities such as walking and light running, including in the hood, lots of handy zip pockets for keys, phone, music player and so on. At no stage did it feel that the weather was in danger of penetrating, and at no stage did the jacket feel uncomfortably hot or cold.

However, the benefits of the jacket were at their most noteworthy during a much more energetic sporting activity, ice-skating. This took place on a municipal, outdoor skating rink, on a cold afternoon in late December. Skating in a group, there was the usual experience of having to discard, progressively, the hat, scarves and gloves that were essential at the start; as the body warmed up, these garments became an encumbrance. A little later in the 45-minute session, the same became true of companions' jackets that had polyester and nylon outshells and polyester lining or wadding. As the skating continued, these jackets became unbearably and unwearably warm, while the jacket made from Power Shield Pro remained comfortable throughout.

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Polartec says no one will leave the forthcoming editions of ispo Winter and Outdoor Retailer Winter Market without hearing about its new Power Shield Pro technology.

ispo

Seams are a traditional problem area for applications like this. Polartec's partner for this aspect is Eagle Speed in Thailand, which has figured out how to put tape on the outside to create a waterproof seam. Some apparel brands, whose focus is more on breathability, are choosing to sew the seams on the garments they are constructing from Power Shield Pro. Polartec also points out that it can make the back of the fabric any way the customer wants, using polyester, nylon and the whole range of options described above. For example, some customers are choosing a very lightweight option for back-country skiing and a higher loft back for standard skiing apparel.

Bill Phair, based at corporate headquarters in Lawrence, Massachusetts, takes up the story and says his company "always looks for real-life testing". The dynamic moisture permeation cell (DMPC) test (see panel), devised by Dr Phillip Gibson, who works with the US military, is certainly a step-up, he says.

Polartec's contention is that making something waterproof is easy. Making something breathable is also easy. It's making something that does both that is tricky. The new membrane in Power Shield Pro allows eight litres of air to flow through each square-metre of fabric per second, Mr Phair insists, while it has a 5,000 millimetre water-column, meaning that water will find it hard to penetrate from the outside, while the through-flow of air is good. The water-column may drop to 3,000 after 20 washes, but this supports the Polartec claim that the membrane is stable. "Some brands see a water-column of 5,000 as waterproof, some don't, but we're deliberately not making the 'waterproof' claim, saying instead that it's highly water resistant. The membrane we have put in gives the air a lot of options for moving through its structure. Air finds a way through, and that air transports vapour. A fabric can be windproof, but if it can't move moisture vapour through in this way, you have to get hot, clammy and sticky before it will push moisture away from your body," he says.

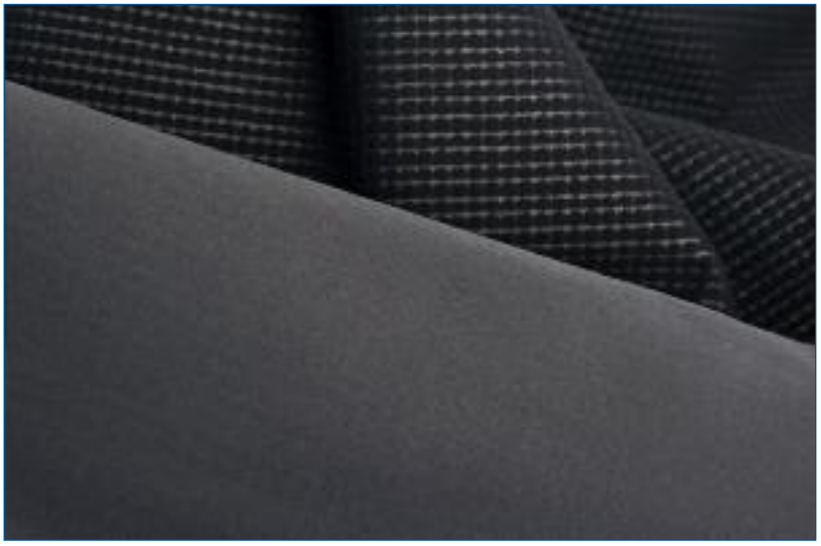
Immediate action

The difference the new Polartec technology can make, therefore, is that it takes a lot less pressure to move air through it. It starts working right away, Mr Phair points out, as soon as you are moving; you don't have to start sweating first.

Although Polartec's direct involvement comes further upstream, it acknowledges that putting across its arguments about the true meaning of breathability to consumers and retail staff is a tricky task. At one level, Nate Simmons says, it should be clear to everyone that if air can't move relatively easily through a jacket, shoe or any other finished product brands and retailers ought not to describe it as breathable. But he

Polartec is presenting Power Shield Pro as highly water resistant and "much more breathable" than other systems on the market.

Polartec



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The new Kishtwar jacket from The North Face is another new product that uses Power Shield Pro. Polartec says the material is ideal for activities ranging from back-country skiing to golf.

The North Face

seems to sense how difficult it would be to convince the industry of the logic and, arguably, fairness of that position. So instead, he says again that Polartec is limiting its ambition for now to making it clear to the public that a garment made from Power Shield Pro will be "waterproof enough and way more breathable" than people are used to finding in a single product.

He continues: "You can wear it in the rain; lots of customers say a water-column of 3,000 millimetres is enough for that, and we are offering 5,000; 5,000 millimetres is a lot of water. You would need to kneel in puddles or sit for a long time on a wet ski-lift to get wet. You can ski in it all day long. We view the product as ideal for garments for randonée and back-country skiing. People are wearing multiple layers with hardshell on the outside. This will challenge the conception that you can't use softshell in skiing, and allow enthusiasts to wear fewer layers." He adds that enquiries are also coming in from apparel brands who are interested in using the technology in their collections for walking, hiking and even golf, in fact for "a wider range of activities in a wider range of climates than we've ever had before".

The RET test

The main characteristics that tests on breathable and weatherproof products seek to measure are as follows.

- ***Water resistance*** is the amount of water pressure (in millimetres) that a fabric sample can withstand before leakage occurs.
- ***Breathability*** is the amount of water vapour (in grammes) that can pass through a square metre of fabric during a 24-hour period.
- ***Wind resistance*** is the maximum wind speed a fabric can block.

The evaporative thermal resistance (RET) test measures microclimate drying time and is widely used in the performance textile industry to compare the ability of different materials to dissipate moisture vapour from the body of the wearer to the outside. The typical way of generating heat for the test is to use a sweating guarded hot plate procedure. Academic studies have confirmed that the measurements gathered using a sweating hot plate are predominately influenced by fabric thickness, rather than the pore characteristics of the fabric.

The ASTM F1868 - 09 standard test method is a possible indicator of clothing performance, but measurements produced by testing fabrics in this way can be different from the performance of clothing when people wear it. Clothing weight, drape and tightness of fit can minimise or even neutralise the apparent differences between fabrics or combinations of fabric measured by this test method.

There are variations: thermal resistance and evaporative resistance of clothing can be measured with a heated mannequin in an environmental chamber in accordance with test methods F 1291 and F 2370.

Dynamic approach

The dynamic moisture permeation cell (DMPC) method is a newer way to test the ability of fabrics to transport water vapour.

The basis of this method is that air at two different relative humidities flows over the two sides of the test sample. By measuring the water vapour concentration at the exits of the cell, it is possible to measure how much water vapour crosses the sample. Results may be shown in terms of water vapour flux—that is, in grammes per square-metre per day. The test measures humidity on the top of the sample, on the bottom of the sample, the difference between them and the mean relative humidity.

The DMPC method has shown that some highly popular and market-leading materials have much better water vapour transport properties when they are in a humid environment than in a dry environment. Other materials, such as most textiles or microporous membranes, have a nearly constant water vapour diffusion resistance, regardless of the environmental conditions.

Dr Phillip Gibson, a civilian scientist working on the US Army's material sciences team, who developed this method, has said: "I've noticed over the past 15 years that all the materials seem to have gotten a whole lot better. It's very rare now to find a really poor material being tested or showing up in a jacket. That used to be the case a lot more frequently in the past. Materials that were just not breathable were being sold as breathable. I really don't see that any more at all."

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