RISE TO THE CHALLENGE: DEVAN & HUUB

With the support of triathlon-focused performance clothing brand Huub, textile technology company Devan has worked to optimise its Moov&Cool cooling solution for those taking part in this demanding sport.

Plotting a path to cool performance

Textile finishing specialist Devan has developed a new cooling solution that it claims will enhance athletes' performance. It sought guidance from those with in-depth understanding of the human body approached experts at the University of Leuven and the Bakala Academy, an athletic performance centre based in the same Belgian city. The advice they offered informed the early development of the solution, Moov&Cool, which Devan unveiled for the first time at the Performance Days exhibition in April 2018.

"The technology was developed after looking at what was already on the market," explains Dr Vanessa Daelman, manager of the company's performance business unit. "There are a lot of technologies that can keep your body cooler during sports activities. Many people are looking at moisture management and how to control sweat to feel comfortable, or at skin temperature."

Comfort was still a consideration, but it wanted technology to have a measurable impact on the performance of the wearer.



Devan believes that if people feel more comfortable during sporting activity, they will exercise more.

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Trials have shown that even if a garment becomes soaked with sweat, Moov&Cool can lower body temperature by up to 0.4°C.

Consultation with physiology specialists at the University of Leuven revealed that the best way do this was to focus on lowering the core body temperature, which can help athletes maintain a high level of performance for longer as it staves off fatigue brought on by heat stress.

Sweat management

Moov&Cool is a topical finishing treatment based on a new polymer that Devan has developed. It can be applied by either padding or spray. It primarily works by managing sweat transfer. Essential for cooling the body, it is the evaporation of moisture from the skin that causes a cooling effect. If it evaporates too quickly or too completely, this vital tool is of limited help. The new polymer helps to absorb sweat rapidly, but the subsequent evaporation is balanced, leaving a thin layer near to the skin to aid the body's natural cooling mechanism.

It has an added heat absorption capacity. "We draw heat from the body and use that heat to evaporate the sweat and to balance the sweat layers around the skin," Dr Daelman explains. She has previously said that what sets Moov&Cool apart from other cooling solutions on the market is that it uses the body's excess heat to evaporate sweat and does not rely on wind as others do. This means it is also suitable for indoor sports garments.

It also offers what she refers to as "an insulation effect". When developing the polymer, the company took inspiration from stomata, the tiny pores on leaves that can open or close depending on the external environment. Moov&Cool works in much the same way. When there is heat and humidity between the body and the fabric, the pores in the polymer open. In cooler conditions, the pores close to hold in heat. Dr Daelman gives the example of cyclists going uphill. During the uphill stretch, they will be exerting themselves and so a cooling effect will be required. However, after they reach the peak and begin riding downhill, the air rushing past their bodies as a result of their speed will give them a cold sensation, something which the Moov&Cool polymer can prevent.

Driven by the desire to prove the measurable benefits of its technology on core body temperature, Devan carried out a number of trials with the help of its Belgian partners. The first of these involved a mixed-sex group of professional athletes (Dr Daelman and the company CEO, Sven Ghyselinck, also took part). It consisted of a bicycle test inside a climate chamber, where hot and humid conditions were simulated. To ensure the results were representative (that is, not influenced by individual athletic ability), the participants were restricted to a fixed lactate level. Changes in core body temperature were monitored by a sensor pill that the participants swallowed. The results showed that those wearing garments treated with Moov&Cool had a body core temperature that was around 0.2°C lower than that of those wearing untreated items. A positive impact on heart-rate was also noted (10 beats per minute lower).

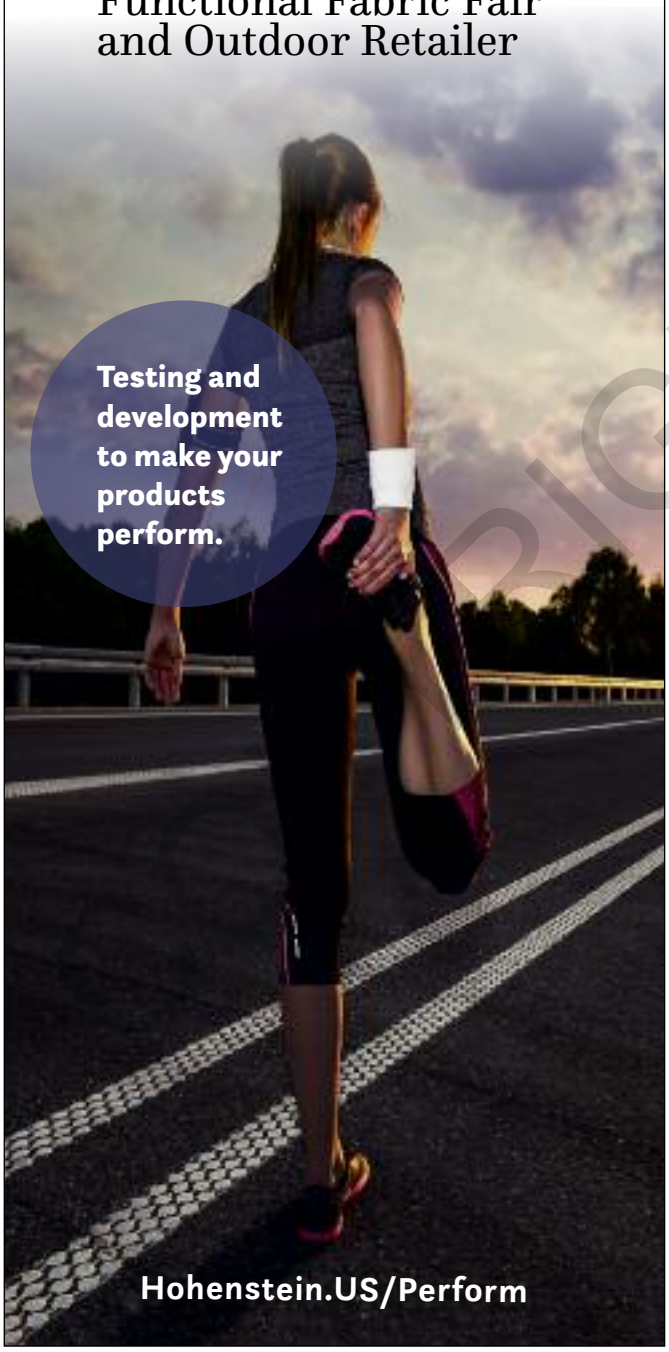
The follow-up trial focused solely on male athletes. The reason for this was that the company wanted to test the polymer's effectiveness in saturated garments; as men usually sweat more than women, it was decided an all-male group was best suited. On this occasion, athletes and their garments were pushed to the very limit. "Even when the shirt was really soaked, the technology worked and cooled the body down by up to 0.4°C," Dr Daelman says, and maintains that other cooling solutions are not as effective when a garment is already wet.

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From amateurs to elite athletes

She is quick to point out that ambitions for Moov&Cool's applications are not confined to elite professionals; they also wanted it to be useful for recreational athletes. This presents a different set of challenges, according to Dr Daelman: "They [recreational athletes] look at sports activity differently. Professional athletes are looking for that tiny bit more they can do to beat their competitors, while for recreational athletes it is about fun and being active."

As a result, comfort is more important than performance. "The more comfortable you can make them during sports, the more sports they will do and the more health benefits they will get out of it," she says. The third trial focused on indoor sports, where conditions are often hot and humid, with a spinning class the chosen activity. The data gathered again showed a positive effect on both core body temperature and heart rate.

Based on these three studies, the company has devised three categories into which it believes the majority of activities fit, with each of them requiring different amounts of the polymer. "We wanted to make sure that it was easy for people to look at their sports activity and place it in a certain category and understand how much of the product they would need to give them the benefits," Ms Daelman says.

The 'light' category covers activities that don't cause a big change in core body temperature, such as jogging and walking. Comfort remains important however, so Moov&Cool's sweat management capabilities are useful here. The 'pro' category includes activities like running or cycling for between 30 and 60 minutes. The technology's sweat management and cooling effect are required here. The 'elite' category relates to higher-level athletes who really want to make improvements to their performance and so would benefit from the lower core-body temperature that Moov&Cool has been shown to trigger.

Triathlon tests

Devan has worked with triathlon-focused performance clothing and equipment brand Huub in this regard. Dr Daelman says the two companies first crossed paths at the Performance Days exhibition. UK-based Huub was impressed with the test results, but it wanted to run some trials of its own.

The Huub team has been making clothing for endurance sports for a combined total of more than 40 years. It sums up its approach to product design with the statement: "We are not slaves to fashion, but to form, fit and performance". Maximum performance is the aim and it takes a very scientific approach to achieving this. It provides kit for a number of elite athletes, including UK triathlon stars Jonathan and Alistair Brownlee, who occupied the top two steps of the podium for the men's triathlon event at the 2016 Summer Olympics in Rio de Janeiro.

Its pursuit of performance, and its record of exploring the unconventional to achieve this, means it was no surprise that Moov&Cool's credentials piqued Huub's interest. It carried out its independent trials in partnership with Dr Steve Faulkner, head of sports engineering at Nottingham Trent University, located close to Huub's base in Derby. Devan treated some of the brand's triathlon suits with Moov&Cool for the occasion. As well as being tested in a climate chamber, there were also some trials to test the technology in everyday conditions.

The data from these trials has not been made public, but Dr

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Ambitions for Moov&Cool applications are not confined to elite professionals; it believes the technology can help recreational athletes too.

Faulkner released some broad conclusions after they were carried out. He said that there was a positive impact on core body temperature and on cooling behaviour for those subjects wearing the treated suits. Athletes reported feeling less hot and more comfortable during exercise while wearing the coated suit. Although she was unable to offer any more details, Dr Daelman did say that the tests carried out in Nottingham backed up their own data.

In his conclusions, Dr Faulkner said: "I was not expecting to see such benefits to athletes' perceptions and physiological function. There are many coatings that claim to have 'performance gains' that are often unsubstantiated so I was somewhat sceptical at first. However, the data we have collected point to a measurable benefit of having your tri-suit coated with the Moov&Cool technology; it could lead to significant improvement to your race-day performance."

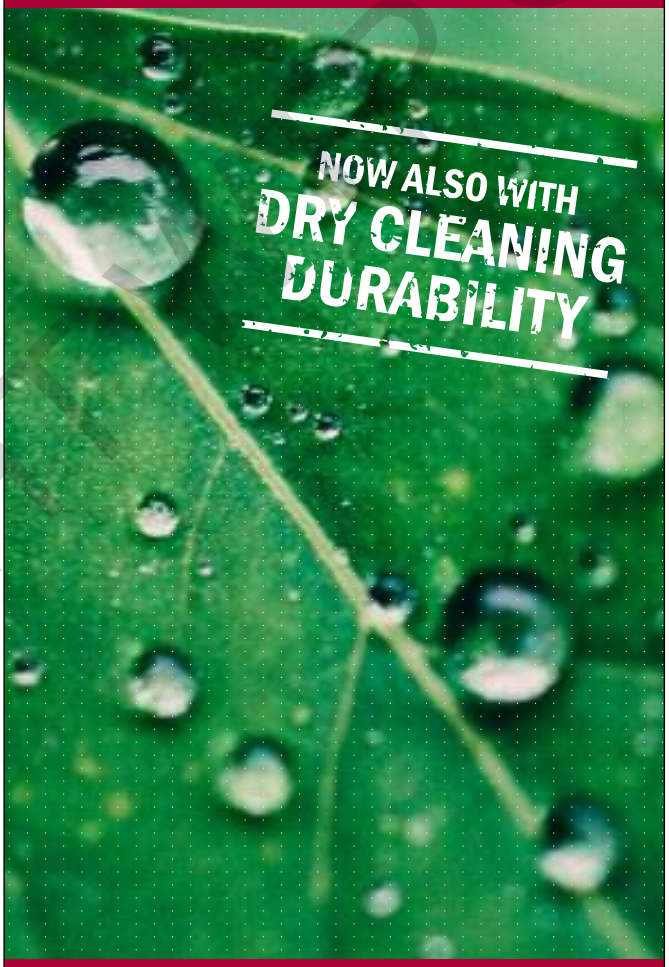
The requirements of triathlon clothing are unique, with competitors facing the triple challenge of swimming, cycling and running. The components take place in that order so the triathlete embarks on the second leg wearing garments still wet from the swim. The insulating effect that Dr Daelman mentions comes to the fore here, as it prevents a cold feeling from seeping in. In addition, Devan has proved that Moov&Cool continues to work when a garment is saturated. As a result, Huub has now entered into an agreement with Devan to be the exclusive user of Moov&Cool in triathlon suits.

Broad applications

Dr Daelman tells *WSA* that the company is carrying out trials with a number of different companies now. It has no plans to tailor the technology to any specific sport, preferring instead to guide potential partners towards the best formulation of Moov&Cool for each situation, which depends on the type of activity, the environment and the type of person taking part. With the three categories Devan has created, light, pro and elite, there will be a wide range of possibilities.

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