

New ski boots pass the sock test

Gore-Tex is famous for keeping water from penetrating a shoe or garment from the outside, while allowing moisture from the inside to pass through. This has worked well for years with soft items such as pieces of fabric.

Ski boots are a world away from this, though. They are, basically, a hard plastic shell with plastic padding and insulating foam inside to add comfort and warmth. Nevertheless, W.L.Gore took the decision some time ago to see if it could use its technology to improve the thermal comfort of skiers' feet while they remain encased in these shells for hours on end during a hard day on the slopes.

On the face of it, this may seem to make little sense, because the casing is waterproof anyway, so why would you need a waterproof lining inside it? However, the company saw an opportunity in the ski boot market, to achieve with Gore-Tex what consumer products manufacturers have been doing for some time in the babies' nappy arena.

The principle is not really to try to keep water out, but, instead, to take water generated inside to the exterior of a Gore-Tex membrane, positioned inside the shell of a ski boot, keeping excess moisture away from the foot.

An easy way to grasp the idea is to picture the rigid plastic outside shell of a boot and imagine a softer membrane inside it like a special plastic bag. As sweat comes off the foot it goes through the bag, and Gore-Tex technology stops it coming back through to the foot as liquid. What happens to the sweat when it reaches the space between the membrane and the hard plastic exterior is that it condenses back into liquid sweat, which sits in a trough at the bottom of the boot. By the end of a day's exercise, quite a reservoir of sweat can build up there, which skiers will be able to empty out by simply turning the boot upside down, although you could just leave it to evaporate overnight.

The main point, though, is that this idea will

collect more moisture than present ski-boot technology, which, instead of the Gore-Tex membrane acting like a filter, only has the plastic padding on the inside of the shell. Under the conventional system, when the foot perspires, the sweat leaks into the foam but has nowhere to go after that because the plastic padding is not breathable.

Sock shock

Gore is confident of being able to prove that its new idea can help skiers keep their feet drier. They will have less sweat around their feet and less liquid sweat there means the thermal resistance of the socks they put on will improve, as the less liquid there is, the more air will be free to circulate around the feet and the toes. This will give users the feeling not just of drier, but also of warmer extremities. Like any liquid, sweat has a high level of thermal conductivity, so any moisture that gathers on your foot will conduct heat away from your skin.

The idea to apply Gore-Tex to ski boots originally came from a development with touring ski boots, for which athletes use soft-shell boots. After, by its own admission, "playing around with the idea" a little bit, Gore reached the conclusion that its technology could come in useful for conventional Alpine ski boots as well.

Gore is still compiling scientific data to back its claims up, but field tests so far have revealed a very graphic measurement for improvement: socks. On several occasions, groups of 12 people took part in whole-day ski-mountaineering exercises, averaging three-and-a-half hour ascents, 45 minutes' rest and 30-minute descents. The company measured the effect of its idea by weighing all the equipment at the start and at the end of each day in the mountains. Socks proved to be the key to proving its success.

"We could see from the weight how much moisture people's socks had absorbed in the course of the day," explains Uwe Bauer, Gore associate for outdoor and sports footwear. "For people who had been wearing a normal, standard ski boot, the average sock weight at the end of the activity was 7.2 grammes. For those who had been using boots with our technology, the average weight was 2.5 grammes, a difference of 288%. So the proof is in the socks."

Ski-mountaineering boots with a Gore-Tex membrane inside will be available in time for the start of the autumn 2007 winter sports season. One company that has already gone into production is Garmont in northern Italy. It has won a contract to supply the Austrian army with the new equipment.

It will take until 2009 at least for regular Alpine ski boots to come onto the market with the new in-built capacity for keeping skiers' feet warm and dry, but Uwe Bauer expects them to be a big hit when they do arrive. "This is a different kind of activity altogether," he explains. "When you're skiing for only 10 or 15 minutes and then spending quite a long period resting while you queue to go up the slope again, the inner boot we have developed really has time to do its work effectively. Your heart rate will increase during the short period of intense activity, and then slow down during the rest period. This will allow the membrane to move even more moisture away from the foot."

He says "all the big names" are in discussions with his company; they are all looking for new solutions because, he points out, the sales figures of many manufacturers have gone down steeply in the last year. "For some of them, turnover has gone down by as much as 80%," he observes, "so a new solution like this cannot come quickly enough for them."

The concept is strong, with the dual benefits of drier and warmer feet sure to resonate with any skier who has suffered the misery, and potential danger, of cold toes.



Field tests have shown that ski boots with a Gore-Tex membrane inside can keep skiers' feet warmer and drier.

W.L. Gore and Associates



It will take until 2009 at least for the technology to become available in standard Alpine ski boots.

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