

Body mapping develops inside and out

Convergence is everywhere these days, like a new word to describe almost everything from truth and fiction to mundane objects such as phones and televisions. The relevance of convergence to everyday life is not always apparent and it often seems to go on in the search for unexpected outcomes—new uses that will take the world by surprise and create new instant businesses.

The world of activewear is driven by innovation and has a high proportion of lead consumers who are attracted by new technology. As a result of this we can anticipate that body mapping will feature extensively in future activewear. While we are ready to expect the unexpected in this sort of development, there is considerable logic. The body may be covered in skin, but body temperature and perspiration is obviously different from the back to the armpits, so why do we wear the same technology in both areas?

We have watched this concept develop in WSA over the last eighteen months. The first to examine the problem were those producing underwear and technical base layers. Optimer worked with Swix using integrated Dri-release seamless technology with Optimer's FreshGuard odour neutraliser to develop a range of lightweight functional body wear for autumn 2005. The Extreme group within the range is a seamless Lycra group for high activity training that uses body mapping—a strategically engineered knitting technique with controlled support and fit in specific areas of the garment.

For 2006 we have seen this move into soccer, running and performance wear with brands such as adidas, Pearl Izumi and The North Face.

Malden Mills enters via the military

The Malden Mills approach to the body mapping picture has been a little different and much impacted by their work with the defence

Outdoor jacket uses Gore-Tex XCR and Soft Shell.

 W.L. Gore



Patagonia's Regulator R1.5 jacket blends different fleece weights for optimal high-output, cold-weather performance.

 Patagonia

industries. Within a single panel on a garment, they can adjust the weight, bulk, breathability and the stretch (the latter by creating channels). This means that the back and the elbows for example can move differently. The need for this came, in part, from the military, which wanted to integrate the technology into body armour. The concept is used in Patagonia's Regulator R1.5 jacket and pullover. In this product, bulk is removed from the back to avoid excess sweat when wearing a back pack, and other areas are lofted to provide insulation and padding. Patagonia describes the women's R1.5 Jacket as a "technical fleece that bridges the gap between base layer and insulation by varying fleece densities".

So it is not surprising that, when Enrico Banci from the innovative Pontetorto was looking into the future with WSA, he highlighted seamless technology and body mapping as very important for the future. Certainly the two do go hand in hand as many of the materials that garment designers need to combine require what might be called abnormal joining techniques to avoid discomfort or loss of performance.

In sync with the body's climate zones

The move of body mapping into outerwear, apparently a less obvious use, was announced last year by W.L.Gore. But, there is a clear trend for multi-zoned garments in sportswear which is exerting a strong and decisive influence on the evolution of functional clothing. The Comfort Mapping Concept for Gore-Tex garments is the first technology to be used in this form for waterproof jackets. An extensive range of brands

The technical need for technology

Many innovations are often regarded by cynics as nothing more than a gimmick. But wearing technical apparel that protects the human body from the elements is vital and can even mean the difference between life and death in extreme circumstances.

Here are a few reasons why:

- 12 to 16 kilometres is the thickness of the troposphere, where all weather takes place.
- 95% of a snow flakes volume consists of air.
- 300,000,000,000 tons of water falls as rain around the world every day.
- 36km/h is the speed at which rain falls to the ground.
- -89.2°C is the coldest temperature ever recorded: at Vostock in Antarctica in 1983.
- 1°C per 100 metres is how much cooler moist air becomes as one climbs a mountain.
- 70% of body heat is lost through the head.
- 10 minutes is the maximum amount of time that a human being can survive in water at 4°C to 5°C.
- 1 watt per kilogramme is the amount of warmth that the human body radiates while sleeping.
- Water conducts heat 23 times better than air, so one starts to feel cold much faster if perspiration is not transported away from the body.
- Just 2°C less than the body's core temperature of 37°C can cause significant damage to the body.
- 20,000 litres is the volume of perspiration that a person transpires in the course of a lifetime.
- The human body has 2 to 4 million sweat glands. The hands alone secrete 20 millilitres of perspiration per hour in the form of water vapour. 

are involved in getting garments to market for this winter. The Comfort Mapping Concept for Gore-Tex garments was presented at the ispo Winter 06 and adidas, Berghaus, Gore Bike Wear, Grifone, H2O Sportswear, Haglöfs, Lowe Alpine, Marmot, Mountain Hardwear, Missing Link, Mount, Murphy&Nye, Nike ACG, Peak Performance, Quiksilver, Rip Curl, Rossignol, Salewa, Schöffel, Scott, Sun Valley, Ternua, Tilak, The North Face, Trangoworld, Warmpeace and Wild Roses have all integrated the Comfort Mapping Concept into their collections.

Gore product specialist John Macdonald comments, "We were looking for ways to minimise the loss of warmth in highly functional garments for mountain climbers. Experiments showed we could significantly reduce the cooling effect on the shoulders by using an optimised construction of several laminates and that we could achieve this goal without a significant loss of breathability." According to the company, the concept of subdividing the body into various zones is now a very serious trend and this is a good moment to develop the idea into the field of outdoor garments.

The Comfort Mapping concept allows the use



Airvantage insulation technology uses air for insulation; depending on how much warmth is needed air is blown into air chambers in the torso of the jacket (left) or released using a valve in the collar (right).

W.L. Gore

of different fabrics in different parts of garments, for which Gore uses a patented sealing technology. This sealing allows the combination of fleece backed laminates with tricot backed products, which means that warmth can be added in localised areas while the garment remains breathable and durably waterproof. This is what differentiates the Gore-Tex Comfort Mapping approach from more historic garments that have been equipped with vents, stretch panels and the like.

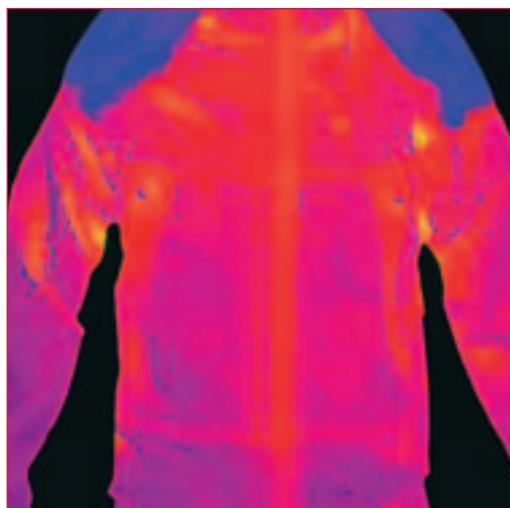
Field testing

Some of the independent testing done with the sample garments provided by Gore led to mixed reviews, such as that of Chris Townsend who took his to test in the Cairngorms in Scotland. The WSA test on the Mount-1 jacket was carried out in the Mourne Mountains in Ireland, a less demanding range but with plenty of peaks to climb in a variety of weathers. Over the shoulders the material is soft shell with nodules of fleece on the inside and extra breathability under the arms and there are five different types of material used in the garments. A variety of Patagonia and Rohan base layers were carried and mixed according to the temperature, both polyester and merino, and the outcomes were very successful. First and foremost in wet and windy conditions you are kept dry and warm, and there is no doubt that the configuration means in many conditions a very light base or T-shirt is all that is required. If there was a message it was that at warmer temperatures breathability did suffer and it was easy for sweat to build up in the lower back area, which can become a problem if it does not dry before the cold sets in.

Inflatables are more than children's toys

Where snow is involved in a serious way, Gore has gone one step further into the unusual area of inflatables. There have been some years of testing and the concept was first

introduced as a lining, but partly as a result of customer pressure newer items display the technology on the outside, sometimes even developing it in logo format. Tubes are built into the garment using a system of two Gore-Tex laminates joined together to be airtight but still vapour permeable. When inflated there is an increase in "dead air" through this insulation. Going downhill it will be deflated while the skier is busy and active but back on the ski-lift it is inflated to avoid getting chilly. The product specialist for Airvantage Insulation Technology is Jürgen Schreiner who moved into this area from the footwear side. He is now excited by the ability to customise the chamber design and by the work going on with the valve for expelling and introducing air. Gore has won a number of design awards for its valve, and it has been adopted by Rossignol in its Airvantage garment. In general, notes Schreiner, the US market creates more baggy garments while Europe is designing garments that hug the body.



This infrared picture clearly shows that insulation technology reduces heat loss in the torso. The blue colour shows reduction in heat loss.

W.L. Gore