

Materials keeping ahead

At one time the choice of upper materials available to shoemakers was limited to leather and natural woven fibres such as cotton. That choice is now extremely wide and includes many specialised materials reflecting the diversity of shoemaking itself. Some of these materials are quite unique in the ways in which they provide practical solutions to problems of foot comfort, safety and wellbeing. Having created these successful materials, their producers nevertheless continue to refine and improve them to meet the ever greater expectations of shoemakers and their customers alike.

Snakeguard Extreme

Emtexglobal has its roots deep in the textile trade of Massachusetts, US. Unlike so many others that have long disappeared, it has evolved over the years both as a company and in the nature of its products. It is now a specialty laminator of fabrics for various industries but with footwear still at the core of its business. Emtexglobal continues to manufacture in the US and also works with long established partners in Asia so as to be close to its major customers.

Although the company still supplies laminated fabrics and meshes for major sports shoe brands, Cordura, nylon and polyester fabrics for hiking and hunting boots, and various other upper fabrics and linings for casual footwear, contacts have been cultivated in both the US and Asia that have made it possible to develop advanced proprietary fabrics on an exclusive basis. Snakeguard and Thornshield are good examples and are both a direct result of technology developed jointly between Emtexglobal and one such partner. These two products have played an important part in protecting hunters, farmers and others involved in outdoor activities.

Depending on the actual species involved, snakebites can vary from merely painful to fatal. While avoiding snakes makes sense, it is not always possible and avoiding them is all but impossible in dense undergrowth. A large number of people around the world have to work in such conditions, a great many others go there to hunt for pleasure, while the military in many countries are required to operate in jungle or bush country during both peace and war. Finding an effective way to protect against snakebites to feet and the lower leg was therefore a prime objective over the years until Emtexglobal finally solved the problem with Snakeguard.

The original Snakeguard is a proprietary non-woven item. It is breathable, non-wicking and is approved for use with all waterproof and breathable systems for footwear. It can be supplied with or without a breathable heat activated adhesive coating so that manufacturers can apply it to any area of the upper that they deem to be exposed to potential snake attack. Once laminated to the upper material it has been shown to offer excellent protection against snake bite.

Emtexglobal has now used its expertise in textile technology and past experience gained through Snakeguard



Snakeguard Extreme offers maximum protection against snakebite. CREDIT: EMTEXGLOBAL

to develop the next generation in snake protection which it calls Snakeguard Extreme. This new product now provides maximum protection using a specially developed lightweight laminated fabric which is still non-wicking and breathable.

The company says that there is now no need to combine other bulky fabrics to achieve protection as the fabric stands alone against the biggest snakes. It is lighter and more flexible than the regular product and, as it can be used as is to achieve the greatest protection from any type of puncture, it enables lighter and more flexible boots to be produced which in turn means less fatigue for the wearer at the end of the day. It is available in solid colours or Mossy Oak, Real Tree and True Timber Camo Prints.

MOISTURE-TECH

Humans perspire in order to control core body temperature and prevent damage to vital organs through overheating. It forms on the surface of the skin from which it evaporates so removing heat energy from the body and cooling us down. Hands and feet are first to respond to any need to lose or conserve heat, so footwear has an important effect on how well the process works.

The rate of moisture produced by feet varies between individuals but 10 grams per hour in total is a good average in normal temperatures. Hot conditions or physical exertion can push it much higher, so dispersing effectively aids both foot comfort and health as bacteria and other microbiological growths will flourish in a warm and moist environment.

The breakthrough in effective moisture control for footwear came with the development of membrane interlinings that allowed free passage of moisture out of the shoe but preventing water from entering from the outside. Since then, the technology has become increasingly refined with different producers adapting their products to offer specific features.

Sympatex Technologies of Germany has been a leading supplier of such systems since 1986. It manufactures a range of products specifically aimed at outdoor footwear and clothing based on a special hydrophilic (ability to attract water) membrane that is highly effective in transmitting water vapour while at the same time providing excellent thermal insulation. It is highly breathable, totally waterproof and extremely efficient in regulating the in-shoe environment.

Sympatex has a strong commitment to ecological responsibility and so this membrane is also 100% recyclable with both bluesign and Öko-Tex-Standard 100 certification. It is also completely PTFE-free, so it ticks all the environmental boxes. It is in fact a clever copolymer of oxygen, carbon and hydrogen made from polyester and polyether. It is produced in thicknesses of from 5 to 25 microns (0.005 – 0.025 mm) and is highly elastic.

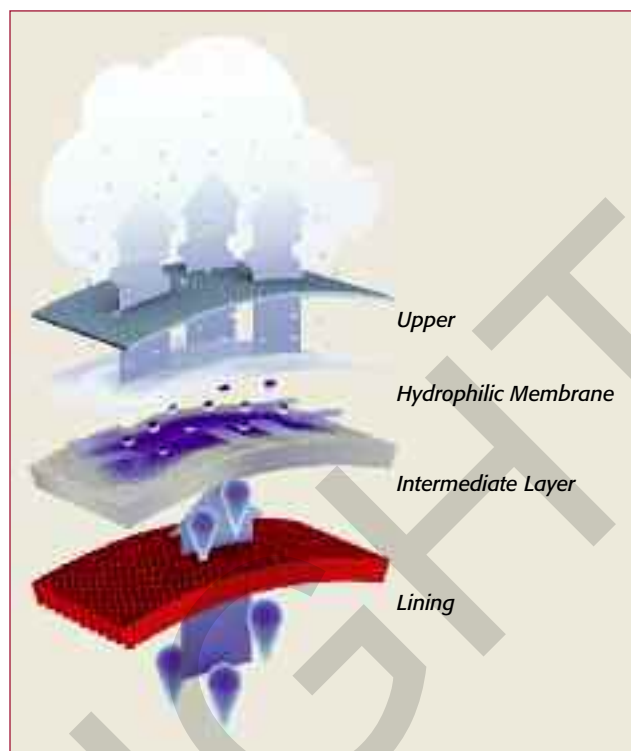
This membrane has been combined with a range of base materials to produce an innovative waterproof lining called Moisture-Tech which is available as a four layer iron-on laminate. The company says it has been able to maximise transmission of moisture from the foot to the membrane by the use of a special intermediate layer which provides perfect dynamic breathability, faster wicking and a dry climate for the foot.

This intermediate layer contains minute 3D air chambers which help to increase the rate of moisture transmission as physical activity increases as the increased roll of the foot creates a pumping effect. This will be of special benefit to athletes of many types as it increases ventilation of the shoe which in turn helps to reduce foot fatigue. Sympatex says that Moisture-Tech also overcomes the problem hitherto of taped seams reducing breathability by redistributing moisture away from these areas to the membrane where it can be transmitted from the shoe.

It does indeed appear to be extremely efficient according to test results obtained by Empa, the National Institute for Material Research and Technology in Switzerland. This involved measuring perspiration in the socks of various types of footwear when static and when moving. The less perspiration, the greater the comfort provided by the footwear. The test showed that the volume of perspiration left in shoes featuring Moisture-Tech averaged 1.98 grams while that for shoes using a top competitor technology came out at 3.54 grams or 78% more.

ECO-ETC.

When Jim and Donna Sheehan founded Sheehan Associates in 1992, they had each already accumulated over 25 years of textile expertise which they proceeded to use to



Moisture-Tech is a four layer iron-on laminate system for in-shoe moisture management. CREDIT: SYMPATEX TECHNOLOGIES

develop a range of performance textiles to specifically address the comfort factor in footwear.

The performance and athletic shoe market was booming but much of the technology had not kept pace with the demands placed on this type of footwear. Heat and moisture build-up in the shoe and the subsequent discomfort this brings was a problem and there was a demand for something that would either remove this moisture or avoid it in the first place. While most people took the former route, the Sheehans decided to research how this heat build-up might be reduced.

The foot is never static inside the shoe, it is always mobile, changing size and shape and reacting to outside movement. Pressure occurs in two main areas: the sole of the shoe in contact with the ground and the foot itself against the shoe lining. This pressure, constantly repeated, creates friction between the foot and the shoe creating heat and causing the foot to sweat more. The greater the foot action—as in running—the greater the friction and the more moisture produced.

The sources of the pressure could not be eliminated but could the resulting friction? The company spent two years trying different textiles and weaving techniques before finding an answer. The result was etc., a lining fabric that substantially reduces this friction. It is made from a high tenacity texturised polyester fibre produced using a special waffle-like knit pattern that is protected by trademark. This knit pattern is what makes etc. unique and is the key to how it works.

The friction between a socked foot and a fabric lining is measured by its COF (coefficient of friction). Tests showed that etc. fabric measured 0.1 or about as low as is possible between two fabrics. It also showed that a boot using etc. as a lining was anything up to 20°F (6.6°C) cooler than a boot



Thermal image after 15 minutes rapid walking – left foot with etc. fabric lining and right foot without. CREDIT: SHEEHAN ASSOCIATES

using a more conventional one. They also showed that this extra 20°F had created 25% more moisture thus clearly demonstrating the relationship between heat and moisture. The latter combination is also a recipe for blisters, calluses, fungus and malodour, so reducing it creates a healthier environment for the foot.

This unique fabric has provided the basis for all Sheehan etc. products ever since. It has also proved highly successful and has been applied to foot form covers and other products. In early 2007, the company launched eco-etc., an environmentally-friendly product with all the performance benefits of regular etc. but incorporating approximately 40% post-consumer waste. End-users not only wanted to feel more comfortable about their feet but also the world around them.

This trend has continued and now Sheehan has introduced the next generation eco-etc. which is made from 100% recycled PET fibres thus further reducing their carbon footprint and satisfying customer demands for the greenest products possible. In the drive to make footwear recyclable, renewable and sustainable while maintaining high levels of performance and integrity, the company intends to remain at the forefront through further research and development of its etc. lining products.

ULTIMATE SUEDE

Artificial alternatives to leather for footwear are nothing new and are extensively used by the industry for low cost footwear production, particularly fashion shoes. Only one however comes close to replicating natural leather in both appearance and physical properties; microfibre. Like leather, it has a fibrous structure except that its fibres are ultra fine. The finished material is therefore very light, has a soft, natural feel and is also highly porous offering excellent breathability and moisture dispersal.

A material is called a microfibre if it is lower than 0.1 denier determined by weighing 9000 metres of the yarn being used and an ultra-microfibre if less than 0.01 denier. It can be produced from nylon, polyester or nylon/polyester blends

and, generally speaking, the finer the fibre the better it is.

Although the term Sea-island is usually linked to cotton, it also describes the best method of producing ultra-microfibre. Nylon or polyester material (the island) is immersed in a copolymer of polyester (the sea). It is then treated with caustic soda, transforming the co-polyester into sodium salt which is washed away leaving only the inner fibres that make up the islands. If the initial denier of the islands in the sea is say 2 and the islands total 21, each island, once free of its sea, represents a microfibre of less than 0.1 denier.

Faytex Corp. uses microfibres to produce its Ultimate Suede, Lammy Suede and Milano linings which it has marketed under the Dri-Lex brand for the past five years. Of these, Ultimate Suede has consistently been the best seller despite being the most expensive. Made from 74% sea island polyester and 26% virgin polyester, it goes through a nine-step process that includes brushing, shearing, dissolving, dyeing, sanding, and heat-setting a number of times before final finishing in order to create its extremely soft hand. The latest twist is embossing.

“Embossing brings sophistication and style to these top-selling fabrics while also providing a supremely comfortable feel. Consumers will be attracted to the subtle patterns and soft feel. They’ll likely be surprised that this is a synthetic and not suede or leather,” says President and GM Cindy Stangl. The company has reported a very positive response to the new finishes from both existing customers and potential new ones.

While embossing is a well established finishing technique for both leather and synthetic materials, it is nevertheless a new, though logical, move for Faytex. As Cindy Stangl goes on to say, “We’re applying a proven process to a proven fabric and think the combination will give a fresh look to designers, a look that works equally well in different types of footwear from pumps and flats to boots and sandals.”

One other plus point is that depending on abrasion resistance requirements for a particular shoe, embossed Ultimate Suede can also be treated for added strength if needed. A further one is that the company claims that embossing adds only around \$ 0.15 to the cost of a pair of shoes. Lammy Suede (24% nylon and 76% polyester) and Milano (100% polyester) have a brushed finish which can also be embossed and have lower price points. 



Tan embossed Ultimate Suede. CREDIT: FAYTEX CORP.