

Police uniforms around the world are one of the most complex activewear areas, as, nowadays policing is very much a 24/7 activity: whatever the weather

# Nanotechnology may be 'just the ticket'

*Elbeco with Nano-Tex has applied nanotechnology to their 2005 range of police uniforms.*

 Elbeco

**T**raditional everyday duty uniforms haven't always kept police officers singing in the rain. While manufacturers long ago developed rain gear for law enforcement, it has generally come at the cost of comfort. Uniforms designated as waterproof have relied on synthetic fabric, often sacrificing 'hand' qualities.

The Holy Grail for makers of uniforms for police and other emergency personnel has been the development of an everyday uniform that will shield officers from rain, yet allow the fabric to breathe.

Now, with the aid of the latest science of nanotechnology, uniform suppliers say they are on the cusp of delivering a breakthrough. This burgeoning hybrid science of chemistry and engineering is just beginning to scratch the surface of its potential and textiles is one of the early beneficiaries. You might say manufacturers are thinking small in order to score big.

Elbeco is one of the leading manufacturers of uniforms for US law enforcement agencies. The Reading, Pennsylvania company has long provided waterproof outerwear for the nation's cops, including various rain jackets. In fact, one of its latest introductions is the Summit Lifesaver reversible jacket designed to keep out rain, snow and wind while allowing perspiration to escape. The jackets use Elbeco's proprietary Hiptex membrane to keep out the elements while allowing perspiration to escape.

## Untying the Gordian knot

The elusive trick in the business thus far has been to develop a comfortable, everyday uniform for police, fire agencies and other emergency organisations that is both waterproof and breathable. Elbeco now claims to have untied this Gordian knot in the police uniform business by hooking up with a textile nanotechnology company that has been grabbing headlines the last few years.

Nano-Tex and Elbeco have had a working relationship for several years, primarily in the development of a moisture management product. Now, the pair has collaborated on Tech Twill, which they say will be the first deployment of day-to-day police uniforms that are both



waterproof and breathable. The project has been in the works for about nine months. Sample garments have been given to various police departments for on-the-job testing. Members of the National Tactical Officers Association (NTOA) performed the testing in every climate and weather condition to ascertain how the uniforms perform in a variety of situations. The officers wearing the uniforms rate such criteria as design, quality, versatility, comfort, convenience and durability on a scale of 1 to 5. Officers will also write a description of the product and state whether or not they would recommend it.

The early results are positive and Elbeco hopes to have the new uniforms available on a larger scale sometime early in 2005. Corey Lubey, a spokesman for NTOA, believes the new uniforms will have plenty of applications and draw major interest from officers once the word gets out about their development.

"These uniforms definitely have applications for the sniper community," Luby says. "Those guys that are lying down on the ground in rain and snow will see the biggest benefit right away. Generally, it can benefit all police. To an officer writing a ticket in the rain without getting soaked it will be a huge benefit."

But Lubey adds the proviso that the uniforms must indeed be breathable. He says samples shown by Elbeco at the NTOA conference last autumn drew considerable interest amongst officers, but some convincing remains to be done.

One sceptic is Kirby Beck, a Minnesota police officer and a past president of the International Police Mountain Bike Association. Beck, who has authored articles on uniform technology for law enforcement publications, wonders if the water repellency qualities of the new nanotech uniforms will work over the long haul.

"When I hear the term 'repels' water, I interpret it to mean that it will stay dry for a short time only," Beck says. "It will not replace real high-tech waterproof apparel."

### Mixing with the big brands

Nano-Tex is employing its Resists Spills product in this project. Originally named Nano-Pel, this product allows the use of a cotton-polyester blend. Nano-Tex has been licensing its technology to a long list of fabric mills and apparel brands for the past few years, including many big names such as Dockers, L.L. Bean and Nike.

"It's permanent and the uniforms will retain their colour throughout their life," says Andrew Foss, Elbeco marketing manager. "Historically, cotton has not been embraced by law enforcement because until now it didn't retain colour or last as well as polyester. These uniforms will be available for both basic duty and tactical uses. It will also have fire and EMS applications as well."



*Elbeco's reversible Summit Lifesaver jacket protects against the elements but allows perspiration to escape.*

 Elbeco

Burlington Industries, now a part of International Textile Group, along with Cone Mills, is the majority owner of Nano-Tex. Burlington and Galey & Lord supply the fabric, which so far is entirely woven in the US. The fabric is a 65/35 cotton polyester blend.

"We engineer our chemistry on the nano level," says Renee Hultin, Nano-Tex's president for the Americas. "We're working to engineer a polymer that's much smarter. When you put it on a fabric, you have increased durability and water resistance without altering the hand. With conventional technology, you would have put two layers of coatings on for 20 home launderings or three layers for 30 home launderings and so on. But over time, the chemistry wears off. Our chemistry imparts permanent durability and it changes the fabric. It feels very natural and comfortable. It breathes and doesn't feel like a coating."

Nano-Tex does not use coatings. The company has created nano-scale molecules to do the work. These are one million times smaller than a grain of sand and they permanently attach themselves to fabrics. The molecules are added by dipping fabric into Nano-Tex's proprietary solution before the fabric is cut. Resists Spills causes water and oil to bead up and roll off fabric without penetrating the fibres.

While Nano-Tex's focus has been predominantly applied to casual wear, Hultin says the company will make more efforts in the areas of work wear and uniforms beginning in 2005. She says the move will require only a short learning curve for Nano-Tex.

"We've had some police uniform business sporadically in the past, but never a full programme until now," Hultin says. "We've used our technology for medical scrubs and applications in healthcare, but Elbeco is the first to take advantage of it for uniforms."

Other police uniform companies are taking different routes to keep officers dry. Sally

Swanson is president of Bratwear, a Fife, Washington custom manufacturer of uniforms for bicycle patrol police. Bratwear (the name derives from the acronym for Bicycling Regulators and Technicians) is also a company known for innovation and has recently broadened its offerings to include all types of police uniforms. Swanson put her experience as a fitness instructor and a sportswear designer to work when she founded Bratwear in the early 1990s. She says the degree to which police need waterproof uniforms depends on their specific duties.

### The rainy state

"Uniformed police are going to be out in the weather every season and in order to perform properly they have to have uniforms for the jobs they are doing," says Swanson. "Here in Washington State, where it rains quite often, it's very important to have waterproof garments."

Bratwear has developed waterproof uniforms of various sorts since its founding, but like others in the industry, the company is still chasing the right mix of water resistance and breathability.

Bratwear is sourcing one line of uniform fabrics from Schoeller, the Swiss manufacturer of specialty fabrics. Schoeller's NanoSphere finish is highly water-resistant, but not waterproof. However, it can be applied to fabrics such as Schoeller's WB-Formula that has a membrane and is waterproof, according the Sheree Halleran, Schoeller spokeswoman.

"Recently, Schoeller developed a group of fabrics for day in and day out uniforms for police, military and service industries that is drawing increased interest for its protection and functional properties," Halleran says. "The fabrics incorporate Cordura yarns that reduce pilling and offer high abrasions resistance. With the NanoSphere finish, the benefits include high stain and water resistance, but more importantly for uniforms, they stay cleaner longer so there is no need to wash them as often. In addition, they offer UV resistance and oil and dirt repellency."

Swanson says Bratwear is always looking for new technology to incorporate into its uniforms. "We are fortunate that we are a custom manufacturer and we don't mass produce. So, we have firsthand knowledge of what works and what doesn't."

Swanson says Bratwear is very innovative and routinely offers ideas for new products to police. Or, sometimes simply incorporates the latest technology into its garments as an added feature.

"All we can do is use technology to improve the level of comfort," Swanson says. "We don't necessarily want to change the look."

With a reputation as an innovator, police departments often come to Bratwear looking for something new and they expect the company to deliver.

"Obviously Gore was one of first to bring out waterproof fabrics," Swanson says. "The technology has been around and we've been using it." Through the years, improvements have come regarding the degree of water resistance.

"There's always added technology for breathability. Breathable waterproof fabrics is really a misnomer. It's as breathable as you can get it."

Bratwear's uniforms use blends of various synthetic fibres, mostly polyester, but nylon and spandex are also used. Bratwear also recently began working with Nano-Tex. 