

Sportswear sector is hotting up

A number of interesting textile innovations were presented and discussed at the recent IFAI Advanced Textiles 09 conference, which took place from in early April in Brussels. One particularly poignant presentation was given by Lieven Tack, market manager electro conductive textiles at Bekintex NV, which covered heatable textiles for clothing and industrial applications.

Mr Tack explained that Belgium-based Bekintex NV is a fully owned subsidiary of the Bekaert Group, which has a broad product focus ranging from tire cord to champagne cork wires and window film. Founded in 1880, the group now has customers in 120 countries and 23,000 employees worldwide. However, the Bekintex subsidiary has a narrower focus. It develops, produces and markets industrial textile products that solve problems associated with electrical conductivity and extreme temperature resistance. Over the years, the division has moved from traditional textiles into the technical textiles sector.

Bekintex uses metal fibres in a broad range of products for antistatic and for electrically conductive textiles as well as in heat-resistant knitted, woven, braided and needle-punched fabrics. One important innovation is its Bekinox warmitex heating pads for textiles which, according to Mr Tack, make textiles, and especially textiles for use in outdoor clothing, much more comfortable. The heating pads are: "An excellent companion for all activities which are undertaken in cool surroundings no matter whether for leisure or during working hours," he says.

Mr Tack explains that integrating wires into textiles is a complex and labour-intensive way to add electrical heating to clothing, which is why the company decided to integrate the heating wires into an easy-to-assemble textile pad. He explains that the end result is a "robust" system

The heatable pads can be used in garments for a range of outdoor activities including hiking, biking, sailing, mountain sports and skiing.

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based on car seat-heating technology. According to Mr Tack, both serial and parallel circuits can be used to create a heating element, depending on the surface and the electrical resistance of the heating wire. However, the lower the electrical resistance of the wire the more preferable serial elements become.

Weighing up the options

In terms of suitable heating wires, Mr Tack explains that it is important to come up with a "hot-spot free system" because, if a filament breaks, the temperature rises and this can lead to fire. Before Bekintex started looking into and developing its own heating wire options, there were three main contenders: copper filaments, carbon filaments and silver-coated polyamide. However, each of these options presented several undesirable elements.

Copper filaments offer superior conductivity but are not suitable for parallel heating. Their most serious downfall is that they offer a limited lifespan because they are so soft and provide such low resistance against multiple bending, known as "flexlife". Copper is not corrosion resistant so an extra protective layer is needed—it must either be enamelled or tin plated.

The second option is carbon filaments, which offer low conductivity and are not suitable for serial heating. The main drawbacks here are that carbon filaments are not washable, parallel heating elements are more difficult to connect and the filaments are very brittle so they have a limited lifespan. The third option, silver-coated polyamide, comprises a thin layer of silver on a polyamide-6 core. It offers superior conductivity but is not suitable for parallel heating. It has a poor flexlife because of cracks in the thin silver surface layer, which cause conductivity to drop. Furthermore, silver is expensive and it is not corrosion resistant, so an extra protection layer is needed.

Striking a balance

As a result, Bekintex developed two of its own products, Bekinox Stainless Steel and Bekiflex, which aimed to maximise the benefits of these three existing options and to minimise the negative qualities. According to Mr Tack, Bekinox offers a conductivity level between that of copper and carbon. It is suitable for serial heating and has a long lifespan and superior flexlife. It is a soft and thin multifilament yarn and is available in different constructions in order to obtain different levels of electrical conductivity.

Bekiflex is also a soft and thin multifilament yarn that combines copper and steel in one filament. Its conductivity is somewhere between that offered by copper and stainless steel, as is its lifespan. Like Bekinox, it is available in different constructions in order to obtain different levels of electrical conductivity. When it comes to choosing which material to use, the decision will be based on the surface area that needs to be heated and the power level required.



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According to Mr Tack, enamelled copper has an average flexlife (the number of cycles before filament breakage occurs) of 800, while tin plated copper offers a reading of just 17. Meanwhile, Bekiflex (6x7x 64 Ìm) has a flexlife of 4,500 and Bekiflex (8x7 x 64 Ìm) offers a flexlife of 6,000. At the high end of the scale, stainless steel Bekinox VN (3x275 x 12 Ìm) has a 5,000 flexlife, while Bekinox VN (6x275 x 12 Ìm) offers an average 11,000 cycles before filament breakage occurs.

As a result, Bekiflex and Bekinox VN offer a longer lifespan and are more washable, both of which are key elements for the Bekinox warmitex heating pads. Mr Tack claims the pads offer high resistance against wear and tear, comfort, lightweightness, thinness and flexibility and softness. The heating pads are machine washable at 30°C and can "easily be integrated into any garment". In terms of heating, he says the pads offer fast and equal heating in well-defined heating zones. Furthermore, each pad is engineered to produce a specific amount of evenly distributed heat.

Other benefits include: safety; the pads are designed to prevent shortcuts and use a low voltage (12V) system; and customisation. The heating pads can be customised to the customer's specific application, and they are available in any shape or size. The pads also offer a variable power range, from 0–60 watts.

Applications

The primary use for these technical pads include heated sportswear and leisure wear including skiwear, outdoor and mountain garments, apparel for hunting, fishing and horse riding and other activities such as hiking, biking and sailing. The pads work particularly well in items such as jackets and gloves. Other applications for the technology include personal protective clothing, refrigerator clothing, police, military and security garments and apparel for airport personnel. The heating pads are also suitable for use in clothing for elderly and disabled people.

According to Mr Tack, the origin of the heatable pad was in sportswear. "We more or less started this idea together with www.innovativesports.com who make heatable jackets for baseball players, this to keep the pitcher's arm warm (this to avoid muscle pain, injuries)," he says. "Besides innovative sports, our heating wires are also used by [heated clothing manufacturer] Gerbings and The North Face. Others are further developing new products related to sports and outdoor clothing."

He explains that the pads are designed to keep the body warm without causing overheating. "There is no real risk for overheating as the generated heat is mostly kept just above body temperature. The innovative sports jacket goes higher to 60°C as it needs to generate an in-depth heat to keep the muscles warm." He adds that the controller automatically stops the electric current if, for some (unlikely) reason, leakage occurs.



Bekintex's Lieven Tack spoke on heatable textiles for clothing and industrial applications at the recent IFAI conference in Brussels.

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