RISE TO THE CHALLENGE: BEKAERT AND CONCORDIA

Variation on a theme

Over the last 20 years, there has been a significant increase in the number of wireless products used in the household and in places where we work and relax. These appliances include mobile phones, wireless internet, doorbells and headphones. According to Belgian companies Concordia and Bekaert, these gadgets emit varying levels of electromagnetic interference (EMI). And high levels of EMI have been linked to a number of negative symptoms such as headaches, anxiety, depression, nausea, fatigue, leukaemia and even miscarriage. In relation to sport, it is believed performance can be significantly impacted by EMI.

As a result, the two companies have worked together to produce a new fabric that protects the wearer from the radiation. Recuptex is designed to shield the body from 99.99% of external EMI as well as shielding it from magnetic fields that are created within the body. According to the two brands, EMI shields can have a range of "healing" effects on the body as well as enhancing performance during sport activities.

Borrowing from medicine

It was Bekaert that originally came up with the idea for the fabric. The Bekaert group has a broad product focus ranging from tyre cord to champagne cork wires and window film. It has customers in 120 countries and generates annual sales of €4 billion. Bekintex, a technical textile division within Bekaert, came up with the idea for the fabric.

According to Pol Speleers, product market manager at Bekintex, the idea for the product came directly from the medical sphere. "Textile fabrics made with stainless steel fibres have

Bekaert and Concordia have developed a fabric that blocks out 99.99% of external electromagnetic interference (EMI).

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been used for more than 20 years as a drug-free pain relief method to reduce phantom limb pain," he explains. Phantom limb pain is the sensation appearing to come from where an amputated or missing limb used to be, that it is still attached to the body and is moving in sync with the other body parts. "By covering the amputated area with a stainless steel fibre containing fabric the pain sensation can be relieved," Mr Speleers continues. He claims that later studies have shown that the same type of fabric could be used to stimulate or shorten recovery time after taking part in intensive sport activity.

The actual concept Bekintex came up with was based on a range of pregnancy aprons in China that contained metal fibres in a bid to protect pregnant women from EMI. "The initial idea was to improve the existing products and to make it more comfortable," Mr Speleers says. "As this product could be used as shielding fabric for the EMI pregnancy clothing, we focused our joint marketing forces first on the Chinese pregnancy clothing market. Chinese pregnancy clothing has contained shielding properties for decades and as neither Bekaert nor Concordia had any share in this market, we believed it could be possible to enter this market with a totally new type of fabric."

The metal fibres Bekintex developed are thin filaments taken from various different alloys, with diameters ranging from 1.5 to 80 µm. For comparison purposes, a human hair usually ranges from 70 to 100 µm. However, the fibre needed to be turned into a wearable fabric, and that is where Concordia came in.

Recuptex features the metal fibre in a regular pattern both in the warp and the weft of the fabric to produce a Faraday cage effect. The metal fibres used range in diameter from 1.5 to 80 µm.

Bekaert Group

Concordia Textiles is a family-owned business that is active in the technical, sport, fashion and interior textiles arenas. Its activities include weaving, dyeing, printing, finishing, coating and laminating fabrics. The company has an annual turnover of approximately €50 million and employs around 290 staff. Its customer base includes a number of large sport and outdoor firms such as Columbia Sportswear, Musto, Decathlon, Lacoste, Millet, Lafuma and Quiksilver.

Concordia helped to develop a special binding, which it subsequently patented, that only contained metal on the inside of the fabric, so that the outside could be dyed any colour. According to Chris Schoonjans, director of sales and marketing at Concordia, the Chinese fabrics contained metal throughout and therefore always appeared dull and dark.

The first major challenge they encountered, Mr Schoonjans says, was getting the shielding to work in the first place. Then it had to make sure the benefits were maintained after multiple washings. Finally, the two firms had to weave the fabric using different yarn counts and threads to ensure it was producing the optimum effect.

He explains that with the Chinese fabrics, the percentage of stainless steel used in the fabric was quite high in order to achieve high shielding levels. For the Chinese manufacturers to achieve a shielding effect like Bekintex and Concordia, the inox percentage had to be around 30%, which is why the Chinese textiles looked so dull and dark, he explains. "We also started with a bigger amount of stainless steel yarn, but because the Bekintex yarn is the finest in the world, we found during trials that we, percentage wise, could have the same shielding with only 11% of Bekintex. The steel yarn is the most expensive, so the lower the percentage, the cheaper it is and the less rigid and dark it becomes."

The yarns are combined with polyester in a

regular pattern so that every 'X' number of threads is a PES-Bekintex thread, both in the warp and the weft. This covers the whole surface of the fabric, which then acts like a Faraday cage. "Even though the surface is not 100% covered by inox, the yarns in the warp and weft are connected to give the same result," claims Mr Schoonjans. In order to get the best results, several weaving set-ups were trialled and the shielding results were measured. Each trial used different yarn counts and varied the configurations of the inox-PES yarns used.

Suited for sport

When the product was finalised at the end of last year, it was launched under Concordia's Texishield brand name. However, the two firms soon realised the same fabric could also be used as a recovery material, and that is how Recuptex came to be launched. "This product can be used by athletes who have to recover very fast after extensive training or competition but also by people who had some injuries which need to heal," explains Mr Speleers.

The biggest challenge, according to him, was penetrating the Chinese market with the initial product. "The Chinese pregnancy clothing market is very conservative in so far as they are still very reluctant to switch to a product with a European style and design. The other point is that they always see European products as very expensive, although most of the production processes could be carried out in future by our Chinese associates. Up to now we have not been successful in selling anything into that market and therefore, the Recuptex line was launched in parallel," he explains.

According to Bekintex, its Recuptex fabric can help athletes recover more quickly after intensive training and can also help to speed up the injury healing process.

Concordia Textiles

Final touches

The fabric has been tested by Professor Johan Catrysse at the Electromagnetic Compatibility Laboratory in Belgium and has been proven to help prolong participation in sport and create greater inflammatory response. Mr Schoonjans even claims it can help bone fractures to heal more quickly, boost metabolism and modulate the distribution of calcium.

Concordia claims that, after performing the various trials in terms of the fibre content, the shielding fabric continues to be effective after multiple washes, so long as it is washed on a wool cycle. The inox fibres are only visible on one side of the fabric as a result of the special weave design and the final fabric, Mr Schoonjans says, is "extra strong, flexible and durable". Added to this, it offers UV protection and looks like a totally normal fabric.

Because the outside of the fabric is made from 100% polyester, it can be dyed any colour the customer wants. It can also be coated and laminated for a range of garments used in yachting, skiing and snowboarding. Using the fabric in garment form is a more straightforward way of covering the whole body than using a similar concept in the form of bandages, which are also available.

The bandage forms have been proven to work, according to Concordia, with subjects tested reporting less muscle pain and more muscle power compared with a placebo group tested at the same time. The bandages, which contain inox in one direction were wrapped around the subjects' thighs in both directions to create the Faraday cage effect. However, this technique is really only effective for small areas of the body, whereas Recuptex can cover more or less the whole body.

The next stage will be to test the fabric, hopefully in partnership with a sportswear brand, and with the help of Lyon University. According to Mr Schoonjans, there has already been some interest from sports brands. One of the interesting elements to test is whether the jackets containing the fabric are less effective than closer-to-skin garments. Although the two firms are not expecting this to make much difference, they are hoping to be able to provide evidence of this and show the full effect the fabric can have during both active and less active periods.

Recuptex will also be adapted to make it more suitable for different activities. For rain and snow wear, for example, it needs to be lightweight so that it can be worn as part of a layering system. For running it will need to contain some stretch elements so that it moves with the wearer. There is also the option of adding an eco-friendly fibre such as Tencel to the mix. "We're still playing around with it", Mr Schoonjans explains.

Both Concordia and Bekaert were represented at the Innovations in Sports Textiles conference in Ghent, Belgium (June 24-25).