ASK THE EXPERT: LUCA MOSSO & AMIR NANKALI

Sports and outdoor brands are increasingly opting for bonding technology instead of stitching in garment seams. The questions in this issue's **Ask The Expert** focus on the best ways to apply the technology in sports and outdoor apparel.

Bonding technology in apparel

Sports and outdoor brands are increasingly opting for bonding technology instead of stitching garment seams. Our two experts—Luca Mosso of Macpi and Amir Nankali of Bemis (representing two of the most prominent technology providers in the market)—tackle the questions on this subject that readers from around the world sent to asktheexpert@sportstextiles.com.

Question: What are the main reasons for the growth in interest in bonding technology that we have seen in sports apparel in recent times? In response to this interest, what have technology providers done to make the technology—including the glue, the machinery and the processes—stable enough to cope with demand?

Bernard Cugerone, chief executive of JRC Reflex, Romans-sur-Isère, France.





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Position:	Director bonding division	Global director of product development

Luca Mosso: The main reasons are the search for higher comfort and wearability. This has led to a drastic reduction in seam thickness and the need for higher performance, especially in garments that require total seam recovery. And, of course, brands like the possibility of designing something totally different from traditional stitched garments. Giant steps have been taken in the last three or four years on the equipment side and in the adhesive range. Machine manufacturers are looking to design machines that can provide more versatility and flexibility in order to reduce drastically the overall costs. The adhesive industry is offering glues that provide great performance in terms of recovery and durability. Of course the bonding application is still a world to discover and constant innovation will result in wider applications, not only in the garment industry but also in the footwear and automotive sectors.

Amir Nankali: Function and form. In the outwear market where the waterproofness of fabric is critical, bonding allows for seam construction or component attachment without needle holes (which, in order to remain waterproof, must be seam taped later). Bonding also allows designers to introduce new features to the garment, and offers a "clean" look, low profile, and in some cases, increased comfort and wear. In more technical outerwear, bonding contributes to weight reduction of a garment as well.

Bemis has over 20 different adhesives for bonding textiles. Adhesives are offered in different chemistries, physical properties (modulus, recovery, hardness), activation temperatures, and melt flows. Both factories and machine manufacturers have developed processing techniques

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The Bemis apparel team has been working closely with manufacturers including The North Face to develop its adhesive film technology.

Corey Rich/The North Face

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and equipment to make bonding processes efficient and predictable. There are several factories that now have a core competency in bonding technology. We need to continue to work on developing new adhesives and bonding equipment in order to have more robust and cost effective processes.

Q: We are currently producing a kind of welding "glueing" pocket. The construction consists of four layers. The shell fabric is either 20D or 30D nylon welded with adhesive tape to the zipper. There is one more layer of shell fabric, then the tricot pocket bag. The zipper and the tricot pocket bag have come apart and our customers prefer not to stitch them together. What would the best way to make all parts adhere together securely?

Francis, Winner Sportswear Limited, Vancouver.

LM: The reader doesn't mention the kind of glue he is using and the parameters he is setting in the machines. If I understand correctly, he got some delamination into the seams but actually it is quite difficult to propose a solution looking only at the picture he kindly provided. My guess is that he should change to a different adhesive or to set different machine parameters for temperature, dwell time or pressure. Bonding application doesn't allow for any short-cuts so a wrong machine setting even in the presence of proper adhesive can result in delamination. Our technical staff could provide an effective solution, but would need a few samples to work with.

AN: When an adhesive is used to bond two fabrics together, the level of adhesion depends on two different types of bonding. These are referred to as chemical and mechanical adhesion. First you have to establish if the adhesive is compatible with the fabric being adhered to, which is primarily determined by the chemistries of the adhesive and fabric. You also need to be aware of any finish on the fabric that may interfere with chemical adhesion. Some textiles are treated with water repellent finishes, and some of these, such as silicone and some fluoropolymer water repellents, make it very difficult to adhere to the fabric. In addition, any remaining lubricant used during spinning or weaving could interfere with proper adhesion. Second is mechanical adhesion—specifically, the level of penetration into the fabric to form a good bond. This relies on the flow properties of adhesives, bonding conditions, and porosity of fabrics. Since there are many factors in forming a good adhesion, we strongly recommend thorough testing on actual fabrics, which allows you to select the correct adhesive compatibility to your fabric, and also allows for establishing the best bonding conditions for your part.



Vancouver-based Winner Sportswear Limited is currently developing what it calls a "welding glueing pocket" using seamless technology.

Winner Sportswear Limited.

Q: What is the ecological status of the systems and technologies companies use to apply bonding to sports apparel.

Claire F, Edinburgh, Scotland.

LM: From the perspective of a machine manufacturer, we try to design machines that minimise energy consumption and heat dispersion, using insulating material from the aerospace industry. These features also help reduce the use of air conditioning in factories and work areas where bonding machines run. There is no proof that a bonded sports garment is more or less polluting compared to a traditional stitched garment, but the environment is always an important consideration in machine design.

AN: I can only comment about Bemis adhesive technology. The Bemis product line utilises 100% solids chemistry to manufacture adhesive films, i.e., we do not use any solvents in the production of our adhesive films. In addition, most of the waste generated from our process is recycled and may be used in downstream products from our business. Thermoplastic adhesive films can be handled in factories without any special precaution, since these adhesives require only heat and pressure to be activated, and do not produce any VOCs (volatile organic compounds) during the

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applications process. Bemis's 100% solid thermoplastic adhesive films are environmentally friendly.

There are no formal studies done to establish differences in energy consumption between the bonding and sewing process, yet in limited laboratory studies, we have seen no measurable difference between the two processes.

Q: To what extent is high-quality bonding technology at risk from intellectual property rights infringement? What can technology providers do to preserve their intellectual property rights? What are the possible consequences for users of bonding technology in sports apparel if copycat companies with inferior technology come onto the market?

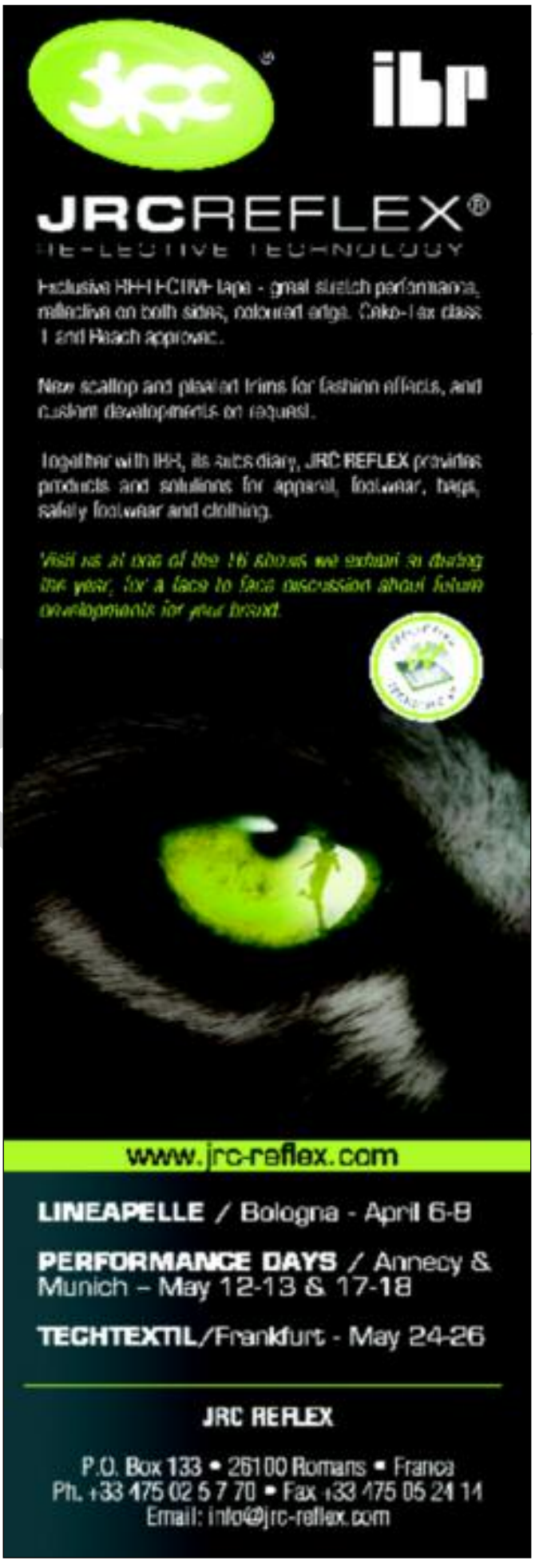
Silvia L, Oregon, US.

LM: From our perspective the economic damage caused by copy-cats is huge. Every year we make heavy investments in research and development only to find half a year later that there are copies in the market. We have applied several patents to our machines and have made applications for others, but if we can count on a sort of protection in Europe and the US, in the Far East, and in particularly in China, there is no way to fight back. First of all there is no clear legislation in China regulating intellectual property rights, and secondly the few rules available are so complicated it gives the impression Chinese authorities are more interested in protecting the copy-cats than the genuine manufacturer.

In bonding applications a key factor is the temperature, which must be constant and without any fluctuation. We have heard of several cases of delaminated garments caused by the use of copy-cat machines, which are not able to provide an even and regular temperature (either by hot air or electric heating elements). Of course their prices can be initially very attractive, but if you add the damage you can suffer from delaminated garments and the cost to fix it, the initial price is no longer a key element. I really wonder if one day it will be possible to reach a kind of understanding between garment brands and machine and raw materials suppliers to fight back together against this dangerous trend, which is heavily affecting the economy of each company. This issue is not only related to machines, but also to the thousands of fake garments that you can find everywhere.

AN: There are domestic and international patents to protect unique bonded constructions. For example, there are several patents on how to construct bonded seams. At Bemis we have chosen to protect our market share through constant innovation and providing technical services for our customers. Since bonding technology depends on many factors to be successful, we believe the best way to protect the technology is through strong partnerships with major brands.

Our biggest concern is when companies bring bonded garments into the market without proper testing and/or quality assurance procedures in their factories. Failure in the market will give consumers the impression that bonded garments may not be durable and cannot be trusted. There are significant laboratory data and field test results to show that when the right fabric and adhesive combination is used and the production process is under control, strong and durable bonded garments can be produced.





Q: Applications of bonding technologies seem infinite. How do you see it developing in future? Do you believe, for example, that bonding could replace stitching in all types of garment manufacture?

Florence Ferrari, journalist specialising in textiles, France.

LM: I can only agree with your reader. Applications are endless and, most importantly, are not focused only on garments. We have developed successful projects with bike saddles, travel bags, safety protection equipment and so on. There is definitively a future for this technology, although we believe it will never replace traditional stitching from garments. Fashion brands are looking for innovative applications, but I doubt we will ever see a tailored jacket that is completely bonded.

AN: We believe the future of bonding depends on several key factors:

- Value Proposition: We have to communicate better the advantages of bonding over sewn technology and educate consumers in the benefits of bonded garments.
- Adhesive Technology: We must continue developing adhesive systems that can be used at high production speeds, adhere to a wide variety of textiles, and withstand required performance after assembly is complete.
- Bonding Equipment: We must continue to develop cost-competitive, high-speed bonding machines and bonding techniques that can competitively replace sewing machinery.

We expect to see a lot more hybrid garments (garments that use both bonded and sewn technology in their construction) over the next few years. Bonding has been adopted and well received in outerwear, performance wear, and intimate apparel. We have already seen fully bonded garments in these markets, and we expect these segments to continue to grow. The demand for bonding textiles is also strong in non-apparel markets. As examples, backpacks and soft goods manufacturers are using bonding to replace sewing in order to introduce unique features and new designs. The automotive market has been successfully bonding textiles for vehicle interior applications where this technology allows them to build their parts and designs at lower manufacturing costs.

We believe with improved adhesive technology and advancements in bonding equipment, there is significant upside potential for bonding technology as a means to replace sewing in many apparel applications, where both design flexibility and functional performance can be improved.

Next time:

In the May-June issue of *WSA*, an expert will answer questions on the subject of **compression garments**. All readers are welcome to send questions in. Please write to asktheexpert@sportstextiles.com.

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