Customisable female footware based on smart materials could prevent some of the most common foot problems

May 26 2015

InstantShoe. Credit: Biomechanics Institute of Valencia

An adjustable female shoe based on a new memory shape composite of leather and Nitinol material is now available. The new material allows

fitting the shoe to the foot shape after obtaining anthropometric measurements through the Shopintantshoe portable scanner and modifying it with the Shoptool, a machine that completes the process directly in the shop. The consortium of EU-funded project Demo ShopInstantShoe presented the results in Villena, Spain, at Calzamedi's installations.

The new InstantShop tool is compact, lightweight and attractive, and is easily set up in the shoe store for on-the-spot personalisation. InstantShoe is made up of the shaping system, an original machine with three different lasts to cover all the size range, and the intuitive configuration software and the foot scanner DOME, developed by the Biomechanics Institute of Valencia.

Six European partners have taken part in Demo ShopInstantShoe: Biomechanics Institute of Valencia (IBV) and Calzamedi, Texinov (Lyon) and Nimesis (Strasbourg) one from Switzerland, Technoboots, and one from Portugal Ortopedias Twins.

As Juan Carlos González, Innovation Director of Footwear and Clothing Area at IBV, explained: "The service consists of an innovative customisation process that takes place directly in the retail store and scans clients' feet in order to obtain basic anthropometric measures and adjusts the chosen shoes immediately through the Shoptool. This is possible thanks to the new memory shape composite material made of leather and Nitinol." Mr. González adds, "Anyone will be able to get the best fit, and if finally the client does not wish to buy the product, the shoe will recover the original shape by warming it up for a few seconds."

Memory shoes

The new memory shape material provides fashionable female shoes that are fully ergonomic, comfortable, innovative and custom-fit. The entire

process takes place in the shop, so the buyer's experience is completely relaxed, avoiding embarrassment for the little differences that every foot can have. The entire process can be set up in every comfort shoe shop once the InstantShoe prototype is put on the market at the end of 2015.

InstantShoe. Credit: Biomechanics Institute of Valencia

Foot diseases represent an important societal problem and the large majority of people affected are women. The Hallux Valgus, commonly known as bunion, is the most frequent foot deformity and affects 20 percent of adult women. This pathology, together with others such as hammertoes, claw toes, metatarsalgia and ingrown nails, take place at the

forefoot, and are mainly caused by the prolonged use of inadequate footwear, due to the mismatch between the morphometry of the foot and the footwear.

Trends on aesthetics and fashion of female footwear demand a more accurate fitting to guarantee footwear functionality and comfort. However, the variability in the foot size and shape among persons makes achieving an adequate fitting for each individual consumer very difficult, and the result is, especially in the case of women, uncomfortable and unhealthy footwear.

The European footwear industry needs to innovate to remain competitive. Therefore, the shoe industry must identify, assimilate and exploit new technologies as well as develop new concepts, targeting higher added-value applications in high tech areas such as materials and composites. In this context, thanks to InstantShoe, the European shoe manufacturers and distributors can offer their clients a differentiation in terms of individual fitting and personalisation, both immediate and cost-effective.

The DemoShopInstantShoe project received funding from the Seventh Framework Programme of the European Commission and is a direct follow on from the very successful ShopInstantShoe project, which came to promising conclusions in February 2012.

The scope of the DemoShopInstantShoe project has been the development of high-end female footwear that is novel, ergonomic and personalised to the clients' morphometry in a few minutes; the operation being conducted easily by a shop assistant.

The customisation process needs only a few steps: the client first chooses a shoe model that she likes among the customisable collection in the shop. The measurements of the client's feet are taken in the store using

pictures taken and are processed via a specific app. Then, by means of an automatic deformable last, the upper part of the selected shoes are modified to conform the footwear to the client's foot geometry. The upper part of the shoes includes a specific shape memory composite, which holds the given shape: the client can verify the fitting and decide whether to buy the footwear or not. If the footwear is rejected, a treatment in the customisation box restores the footwear's initial shape by heating it to a certain temperature. This whole shaping/recovery process can be performed several times on the same shoe.

The main innovation is that a client with a minor foot disease has many options and can try the models in a shop, with possibility of buying the adapted shoes, or not. In this case, the shop assistant can reshape the model and keep it in stock. This is an advantage also for retail shops, where a new range of customisable shoes can be offered without incidence on the stocks level.

Focus on the shape memory composite

The Shape Memory properties of the shoes' upper confer the ability to keep a form given by mechanical action and to return it to its initial shape when heated.

The new textile is placed between shoe's outer leather and inside lining during the gluing process, and provides the shape memory effect to the composite structure. The key component to get this memory effect is a textile including wires made of shape memory material called Nitinol, an alloy of Nickel and Titanium, which are inserted in the textile structure with a particular patented pattern.

Metallic filaments differ from textile yarns by their very high stiffness which makes them incompatible with a traditional knitting process. As a consequence, machinery adaptation was necessary before running the

loom with these wires.

Provided by Asociacion RUVID