A research project at Minho University in northern Portugal has led local sports brand Lacatoni to apply the findings to the football shirts it supplies to seven of the country's top football teams.

Portuguese breakthrough in football shirts

A research team at Minho University's centre for textile science and technology has successfully carried out an extensive study of the best combination of fibres, fabrics and functionality for football shirts.

The team, based at the university's Azurém campus in the city of Guimarães, set out with the aim of examining in as much detail as it could how textile engineering applies to sport and other physical activity. The investigation team members may have dared to dream what it would be like to produce a shirt that professional footballers would want to wear, but did not stipulate this as an objective. Nevertheless, this is exactly what has happened.

At a recent presentation of the project at the Avantex Forum, which took part alongside Techtextil in Frankfurt in mid-June, research assistant Filipe Soutinho explained that the team began by defining the functions that it felt would contribute the right amount of "multifunctionality" for a football shirt in 2009, while still providing a high level of comfort. "The main issues are multidirectional strength, moisture transfer, thermal insulation and, because footballers need comfort to be able to play, drape," he said.

He and his colleagues went to work on a selection of single-jersey and plated-jersey weft-knitted fabrics to see which combinations worked best. These sample shirts included two from adidas, made from 100% polyester incorporating the brand's Climacool thermoregulation technology (specially engineered mesh, vents and fabric construction to aid the body's own cooling system), and one from Lacatoni, a Portuguese sports brand.

The next step in the project was to distribute the samples among local professional footballers—from top-division clubs Rio Ave and Sporting Clube de Braga—and among players from the university's own team, complete with a questionnaire to capture from-the-field feedback. The main outcome of this, Mr Soutinho explained, was that the researchers were able to articulate the players' own priorities for how the ideal shirt should perform.



Portuguese sports apparel brand Lacatoni has taken the Minho University ideas on board.

Minho University

He explained: "The players told us they want a shirt that's light, that controls moisture and body temperature, that fits the body well, that has as few seams as possible and that reduces the discomfort players sometimes have to endure from sponsors' logos."

The exercise produced an interesting and diverse set of results.

In the single-jersey knitted fabrics, the basic yarns were polyester and polypropylene, combined with elastane for stretch, plus specialist textile technologies including Outlast for temperature regulation, Coolmax for wicking and Bioactive from Trevira for antimicrobial functionality. Different combinations topped the poll for different things. For example, for thermal insulation polypropylene and Outlast worked best, whereas for wicking, Outlast combined with polyester proved more popular among the footballers taking part.

For shirts made from plated-jersey knitted fabrics, polyester with Outlast and polyester

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with Coolmax scored the highest marks on moisture control and on air permeability, while participants said the polyester-Outlast option had the best drape.

Using the information from the study, the University of Minho then set about constructing a shirt of its own, attempting to include all aspects of what the athletes in the study had said they liked best. "Still trying to avoid having seams come into contact with the body," Filipe Soutinho explained in Frankfurt, "we used a patchwork technique to add functionality, putting the different fibres and technology combinations in different parts of the shirt."

The finished product has an inner layer of trilobal polyester and an outer layer of Optimer's Dri-release yarn constructed from a blend of synthetic and natural fibres that accelerates the water-release rate of wet fabric. The Dri-release in this instance is combined with some of the moisture-management and anti-microbial technologies in the area under the arms (Trevira Bioactive), and with thermo-regulatory technology in the area across the torso and the shoulders (Outlast).

"So we have all these different knitted fabrics in one shirt," Mr Soutinho concluded. We have an international patent pending and are working with Lacatoni to supply seven teams in the Portuguese first division."



adidas apparel fitted with the sports brand's Climacool thermoregulation technology also featured in the Portuguese study.

adidas