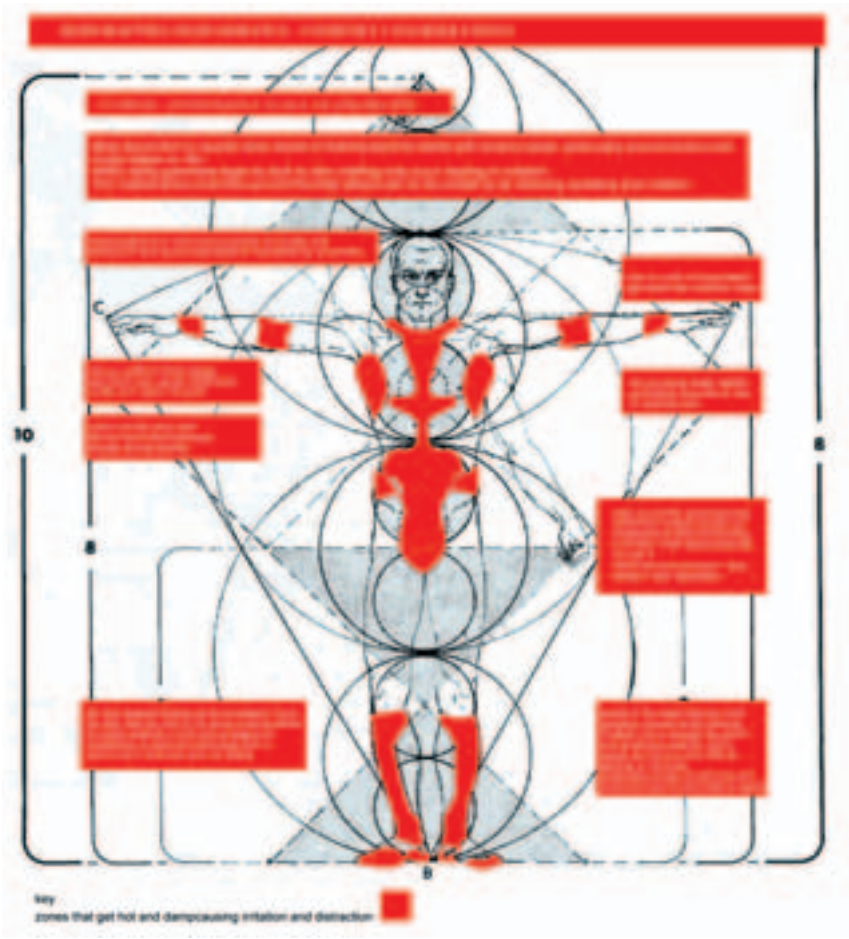
Body Mapping. Not the topographical version of the latest technique in forensic pathology as portrayed in television drama, more a confirmation that some clothes need to fit closely to improve sporting performance, but where they touch is capable of causing discomfort and therefore working against any improvement. A form of textile Catch-22.

Bringing the body to bear?



Such is the speed of clothing development that only those with a long-term attention span will recall that Body Mapping was the technique owned up to by Nike during the development period of the football shirts worn during the European Cup series in 2000 - a whole twelve months ago. Nike more than justifiably claimed the credit, but its a safe bet that the majority of other leading brands are all presently committed to the results of similar research, so now we can remove the capitalisation and discuss body mapping as a legitimate part of global development programmes for sports equipment, and in particular football shirts (some brands insist that the product is called a jersey, but tradition dictates that football players wear shirts, rugby players wear jerseys).

In common with most successful physio-metric assessment techniques, body mapping is easy once you have the right sensors, accurate metering, a full range of physiologies to act as check and balance, and the training and intellect to successfully interpret the results. In one form or another, it has existed as a science since clothing became rather more than just an aid to modesty; the outdoor clothing industry has been using similar techniques for a number of decades. The end result of the current exercise is a chart of the human body highlighting individual hotspots and the brown fat areas where the largest quantities of perspiration are produced. It is not surprising that few subjects are exactly similar; the charts produced are composites of many sets of measurements and the final applications are generated to match the metabolism of as many potential users as possible.

The other aspect of body mapping is an assessment of the effect that the clothing has on the body where one is in direct contact with the other. Simplistically it can be said that all sports clothing fabrics are in touch with the body at all times. True, but there are areas of the body which are energised by the type of contact; an overlocked seam against the soft skin of the armpit, tightly woven fabric bunching at the waist, a cut end of sewing thread protruding from a collar-located label. All are good examples. Energising in this context should be taken to mean soreness and discomfort, two factors that should have no place in the clothing worn by modern football players at any level of the game.

Turning the body map of potential and actual discomfort into a concept of textile-based smoothing and soothing is a process that runs at two interfaces. First, the knitting techniques employed. Second, the improvements made during the cut, make-up and trim processes.

Textile engineering plays the major part in dealing with the removal or transferral of heat, moisture vapour and perspiration. Double-faced knits and heat-fused twin layers exert a push-pull influence on moisture vapour and liquid sweat, using a hydrophobic fibre next to the skin and a hydrophilic component on the outside. But the latest developments are seriously clever.



The results of Nike's innovations in sports body mapping can be seen above. Building the differential knit on to the companys Dri-FIT pique fabric has added another dimension to the performance of this moisture-managing textile.



Umbro launched a new England game shirt earlier this year carrying the description of a timeless yet revolutionary design inspired by the Cross of St George. The claims include 20% less weight than previous designs and a performance developed fit. MVT is effected by the placement of pinhole mesh panels in the hotspots and additional ventilation panels. The whole of the fabric is treated with Umbro's Vapatech process to facilitate the rapid movement of perspiration away from the skin. Wearing comfort detail includes softer knit at the collar, sleeve cuffs and hem, and the neck labels are printed in place rather than sewn separately. Any potential irritation at the neck from cut thread ends and embroidery is thus prevented.

The body maps are opened into the horizontal plane and the physiological requirements for the comfort of the wearers are encrypted into the instructions given to the knitting machines. The results are fabrics where the differing performance requirements for each area of the body are knitted in juxtaposition in one piece, leaving the CMT operation to complete the garment with the minimum number of seams. This technique of differential knitting can be applied to either warp knitting (e.g. as at Penn Nyla) or weft knitting (as at Cloverbrook), which in turn produces differing final textures although essentially serving the same ends. Thus the generation of mesh areas to vent hotspots, panels where elastane is co-knitted with micro-fibres to prevent bunching, softer meshes at hems, cuffs and collars to reduce rubbing and an overall lighter knit to reduce fatigue.

Most of the leading brand owners also specify chemical processes as aids to improved MVT (moisture vapour transfer) performance, although more than one knitter expresses the opinion that the gains from this technique have reached the optimum. The benefits from textile engineering are seen to be in the ascendancy, although it is readily admitted that such opinion is as much the result of vested interests as technical judgement.

The fibres used vary widely, only cotton and linen not making an appearance. Polyester micro-fibres

The problem with today's news is just that. News is for today. The 30-second headlines are beamed, the black capital letters printed. Readers and viewers may be alarmed, reassured or have their fears and prejudices reinforced. Once published, it is often difficult to get those same readers to reassess their understanding of the story once the true facts are established. The media's focus at the start of 2000 on a TBT scare is a case in point.

Of football shirts and printing inks; of North Sea clams and smells

Roughly eighteen months ago, in January 2000, European news reports drew attention to the fact that limited traces of the chemical tributyltin (TBT) had been found in football shirts produced by Nike and on sale in German sports stores. TBT is the bactericide component of a number of textile processes aimed at odour reduction and the main element in anti-fouling paint used on ships. At high levels the substance is believed to be the cause of neurological problems in humans and animals; its banning has been the subject of intensive international lobbying for some time.

The immediate effect of the news story was the removal of Nike football shirts from three major store chains. This was paralleled by a series of tests carried through by the company that, initially, did not offer confirmation of the presence of TBT. The company said that it was at a loss to explain the original findings since it did not use TBT in any of the textile processing for the shirts. The Cologne-based Kaufhof retail group not only removed Nike products, but also Danskin fitness kits and Falke training socks, all of which proved to contain medium-to-high levels of various organotins from the anti-bacterial processes employed in their manufacture.

Subsequent to the original report, an international lobbying organisation tested shirts from Puma, Adidas, Fila, Nike (again) and Jako; the mysterious presence of the organotin was explained. The problem lay not in the textiles but in the PVC inks used to print club and personal insignia after the manufacturing process.

Nike again carried out its own tests and this time confirmed the presence of TBT. A spokesman added: "We are treating the matter seriously, but the levels are so low that there is no cause for concern."

Professor Michael Braungart of the Environment Protection Agency, based in Hamburg, Germany, said: "At no time has there been any risk from wearing a Nike shirt. In seafood, for instance in clams from the North Sea, the contamination from TBT is up to 20 times higher than in the sports shirts." This comment caused some minor flutters in the seafood extraction and preparation industries but nothing like as much as the original report.

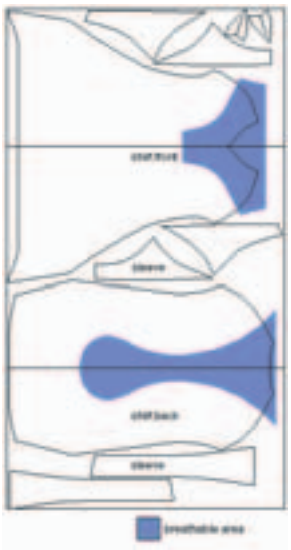
The subject has been lost in media clutter for the past few months, but recently the German federal minister for the environment, Herr Juergen Trittin, once again called for the banning of organotins, and TBT in particular. A phone around to the major football shirt brand owners has confirmed that printing inks containing TBT no longer form part of any clothing specifications.

are predominant which is hardly surprising given their strength, abrasion-resistance, rapid drying times and beneficial contribution to the finished garments appearance. Nylon plays a lesser part, but seems to have found favour with some Western European manufacturers and football clubs, particularly where fit of the finished garment has been enhanced by the addition of elastane.

During the year 2000 season, one leading manufacturer linked with the Woolmark organisation and placed Sportwool on the backs of one of Britain's leading clubs. A mixture of 30% merino wool and 70% polyester is seen to have been successful in performance terms.

The replica shirt market, that multi-million pound sterling industry that provides the financial underpinning for most of the research outlined above, has often been on the receiving end of a great deal of negative comment in the international press. Undoubtedly there have been some rather questionable marketing tactics employed in the past, but there is little point in raking over cold ashes here, although it is worth pointing out that the shirts currently purchased by the fans from those hard-working kiosks at almost every major venue are exactly the same as those worn on the pitch. Consider also that the apparel purchased by the fans receives considerably greater wear and tear - over a longer period, than the colours racing up and down the pitch in front of them for a couple of hours or so. Possibly body mapping would be even more precise if it were applied to the fans as well as the players.

Derryck Draper



A typical Cloverbrook cutting layout showing the body mapping exercise applied to a differential knit. The mauve colouring shows the hot spot/high perspiration areas

Puma has trade marked its lead performance apparel Cellerator and has added the tag line 'biology is the best technology' to highlight the thinking behind the use of physio-metric measuring techniques. In turn, this led to the development of advanced USP (Ultimate Sports Performance) fabric technologies to provide the basis for the range.

Moisture Management is self-explanatory in its effect on the bodys micro-climate, and adds the benefits of a high resistance to the production of bacteria and odour. Intellimesh is described in application as 'intelligent ventilation panels' providing a thermo venting system to keep the player's body cooler, drier and fresher. Puma Slim Fit is said to provide an automatic protection against shirt-tugging defenders.