The global head of research and development at swimwear brand Speedo talks about recent and future developments.

Swimsuit research

Perhaps the idea of a link between lingerie and the automotive industry seems unlikely at first glance, but there is a place where the two disciplines meet and it's responsible for important recent sports textile developments.

Swimwear brand Speedo runs its own research and development centre, with the name Aqualab, in its home city, Nottingham. It's run by Dr Tom Waller, a serious triathlete in his spare time and a former PhD student at the influential Sports Technology Institute at Loughborough University. The way swimsuit collections look is the work of a separate Speedo design department, but Aqualab does have design talent of its own, often from either of the two areas mentioned above. "Lingerie people know all about covering the body," Dr Waller explains, "and automotive designers are experts at combining different technologies together. We also have 100 years' materials management experience in Aqualab, concentrated in three people."

History of innovation

The centre's heritage also stretches back a long way. Speedo introduced the world to the Racerback swimsuit, with shoulder straps that are straight at the front and crossed at the back, in 1928. In the second half of the twentieth century, a designer named Gloria Smyth was responsible for a string of innovations after serious research on the hydrodynamics of textiles and garments; she was the first to use nylon and Lycra in swimsuits, for example. In 1996 the company launched a new swimwear fabric called aqua-blade, which had alternating rough and smooth stripes to create channels for fast and slow moving water. This was a precursor to the famous fastskin suits that emerged at the end of 1990s with V-shaped ridges to decrease drag around the body in a similar way to the surface of a shark's skin. Tom Waller says that for much of the first decade of the twenty-first century the focus at Aqualab shifted onto contour products for the women's market ("women wanted to feel more confident wearing a swimsuit"), but then at the start of 2008, in time for the Beijing Olympics, Speedo shocked the world with the introduction of the LZR Racer, made from an ultra lightweight, water-repellent, fast drying fabric with ultrasonic welding to give the effect of having no seams, and embedded low-drag panels to help compress the swimmer's body into a more streamlined shape.



Double Olympic gold medallist Rebecca Adlington models Speedo's new LZR Racer Elite (above) and Dexterous Placement Pullback swimsuit (right).

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Olympic success

The LZR took three years to develop and involved the scanning of more than 400 swimmers' bodies. Technical tests involving more than 100 different fabrics and suit designs in various flume and test centres also took place. It was developed in strict accordance with rules laid down by swimming's governing body FINA and received full approval before its launch. All the effort and investment seemed worthwhile when swimmers wearing the new suit won 94% of all swimming races at the Games in Beijing that summer, achieved 23 out of the 25 new


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world records established there and took home most of the medals. Speedo had to amend the LZR in 2009 after a rule-change from FINA, but its new-generation LZR Racer Elite, LZR Racer Pro and Speedo LZR Racer Comp suits have been approved and have come onto the market in the course of 2010.

"I didn't develop the LZR," Dr Waller continues, "and I'm not sure I'd attribute all the Olympic successes to the suit alone, but it's a product that has led to a revolution in terms of the whole approach, the money, the time, the science that went into its production." He insists that the team at Aqualab worked hard with FINA to make sure the new versions of the LZR complied with the changed regulations; new rules just meant a new challenge, he says. The rule-changes centre on the need for swimsuits to be made from textiles rather than polyurethane or other materials that can act as buoyancy aids and the main difference for the LZR is that the low-drag panels have been removed.

In good shape

New developments since then have included an LZR-inspired triathlon range, the Tri-Pro, "an early dabble" into this market. Triathlon participants, of whom there are 150,000 in the UK alone, the Aqualab chief says, are willing to spend large sums of money on their clothing and equipment. Work is already under way for the swimwear collection Speedo will put together for the next summer Olympics, London 2012. Definitive suits for the Games will have to be submitted to the authorities for approval in June 2011 so this project was taking up 40% of Tom Waller's time in the early part of this year, with the creation of initial garments and, before that, all the work involved in completing fabric selection. "On fabrics, we rely heavily on developments from the mills," he says. "Our competitors are looking at the same mills so we have to incorporate that commonality into our garments and still achieve intellectual property."

His team has also been engaged in a project to analyse female body shapes, which has, so far, involved 5,500 body scans. There are nine recognised types of female body shapes, he explains, making it difficult for any clothing company to make a version of all its products specifically for each one; Aqualab's task is to find a way of delivering the needs of all nine in only three variations (upper curve, balanced curve and lower curve) for each product in Speedo's women's ranges.

"I'm very well informed that this will change the perception of buying swimwear," says Dr Waller. "It's hard to get it right because all women want to look good, but two women can be the same dress size, the same height, weight and bra size and still have huge variability in shape. We've used everything we know about fabrics and everything we know about shape and we've made a collection called Speedo Sculpture. Usually, a swimsuit with support inside will have something taken out, but this has everything." He explains that, while the global swimwear industry is worth $13 billion a year, the performance sector only accounts for 5% of this; 65% of swimsuit sales are in the leisure and holiday market and 30% are in health and fitness, but the work that has gone into the Sculpture range suggests that these barriers are coming down. "We're moving to look at anyone who wants to wear a contour garment and get wet," he says.



Part of Speedo's triathlon range, the LZR Racer Tri-Pro has been extensively tested for hydrodynamics, aerodynamics and ergonomics.
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