

Kayaking places specific demands on the designers and manufacturers of technical clothing that are at least as exacting as those imposed by the higher-profile water sports. What follows tells how some manufacturers are raising the game.

Up the creek with the right apparel

In the Spring a young kayaker's fancy lightly turns to thoughts of rising river levels. For those whose passion is to be swept along by raging torrents with only a paddle to avoid being dashed to pieces on rocks, this time of year can be particularly exciting. However, there's a great deal more to paddle sports than just shooting the rapids. Kayaks, the closed-deck Inuit-style craft, and canoes, their open-topped equivalents, are used in a wide variety of water sports. There's also canoe polo, canoe sailing, sea kayaking, surf kayaking, freestyle canoeing, slalom, as well as wild-water and flat-water racing and long-distance touring.

Moreover, most of these activities are carried on throughout the year, so companies that produce clothing for this market need to cater for a diverse range of disciplines and conditions, as well as relatively low numbers of participants compared with other sports. In the UK, for example, the sports governing body, the British Canoe Union, has just over 20,000 members on its books in England, plus just less than 4,000 for Scotland and Wales. It recognises a further 17,000 or so active participants at instructor level or below who are not official members.

In the US, the home of several of the leading manufacturers of kayak clothing, the numbers of listed participants are also relatively small. The American Canoe Association, which claims to be the largest body involved with paddle sports, had 45,000 members in 2000. Although tiny compared with the numbers believed to engage in water sports of all kinds in the US (a staggering 70,000,000, according to the National Marine Manufacturers Association) this is nevertheless a massive leap forward from the mere 5,000 members it had in 1993. There would appear, therefore, to be growth in the sport. At the same time, the ACA and BCU membership figures can be safely assumed to represent only a fraction of the participants in kayaking.



Serving this fragmented market on the clothing side are a dozen or so small specialist manufacturers, most of which are based in North America and the UK. Again, most of these have been established only in the past couple of decades or so by individuals who themselves have been keen prominent kayakers and canoeists and have approached product design from a user's perspective. Leaving aside footwear and safety equipment such as helmets and buoyancy aids, the leading players include: Bomber Gear (USA); Immersion Research (USA); Kayak International Soft-Wear Ltd (USA); Kokatat (USA); Lotus Designs/Patagonia (USA); Navarro (Canada); Nookie (UK); Palm Equipment International (UK); Stohlquist (USA); Whites Manufacturing Ltd (Canada); and Yak (UK).

(left)
The Nemo Drytop from Lotus Designs. Nemo is the company's top-of-the range gear for cold-weather white water paddling.

Function and performance

One point on which all respondents to World Sports Activewear's kayak attire survey agreed on was that the sport's many different disciplines have created discipline-specific styles of clothing. Rick Franken, owner and head designer of Bomber Gear, which manufactures in Durango, Colorado, also observes that: "the technical developments in the outdoor industry have in the last few years advanced to a superior level."

According to Franken: "The importance of protective clothing to paddlers would be specific to the types of the conditions for which they are using the garment."

As to general requirements, however, he says: "Breathability is always an important factor in performance clothing. In this day and age, not using breathable fabric is outdated. Also, freedom of movement is an important factor considering that any range of motion enhances performance.

"Light weight and ruggedness, "has traditionally never been a combination that went well together, but with new materials and production techniques, we are reaching a new level of garment quality."

Marta Miller, marketing co-ordinator at Kokatat Water Sports Wear ('kokatat' is a native American word meaning 'into the water') states: "Safety and keeping dry are the first two priorities, but whitewater and touring paddlers have different needs. Durability, fit and unhindered mobility are the most important criteria for play-boating (whitewater paddling), while touring paddlers tend to place a higher value on light weight, packability and durability."

Whitewater paddling, in particular, imposes demands on sports garment manufacturers that are probably as critical as any they are likely to face. "Fabric durability is important in whitewater paddling," says Marta Miller, "because of the high abrasion and constant immersion that garments are certain to encounter."

She adds: "The extended periods of exertion in whitewater paddling make moisture wicking fabrics an important feature for this market, as well as the use of permeable membranes, face fabrics and garment construction."

For both its whitewater and touring ranges, the list of fabrics used by northern California-based Kokatat is extensive. These include: 2oz coated nylon taffeta; 4oz coated nylon Oxford; and 500-denier DuPont Cordura. For breathability it uses 3.2oz Gore-Tex Evolution three-layer nylon, 1.8oz Gore-Tex XCR three-layer nylon ripstop; 1oz Gore-Tex Paclite two-layer nylon ripstop; and 2oz Gore-Tex Windstopper polyester.

Other fabrics used by Kokatat include 2.8oz (two-ply) Supplex; 4.6oz Power Dry polyester; 6oz Polartec Series 100 double-faced polyester; 5.4oz Polartec Power Stretch polyester; 2 and 3mm neoprene; coated Lycra; 6oz polyolefin; and 7oz Microstretch.



Described as 'a plush line of insulating comfort' Kokatat's Surfskin is a thermal fabric laminated to a fleece lining. Shown here as a long sleeve top.

Volumes and values at odds with technology

A dilemma facing Kokatat, and indeed all paddlesports clothing manufacturers, is that while the technical demands are high, the market volumes and values are relatively small. A cursory look around most international boat shows is enough to indicate that in the pantheon of waterborne recreational activities, kayaking and canoeing occupy a pretty lowly niche. The London International Boat Show held in January this year had only three stands listing paddle sports-related exhibits, although the organisers say that when the show moves to its new Docklands ExCel location next year, more exposure is planned for this and other lower-profile water sports.

Even so, few paddlesports clothing manufacturers can justify massive investment in new materials. According to Marta Miller, many of the fabrics used in immersion garments such as drytops and drysuits derive from the dive and offshore sailing markets. The latest hi-tech stretchable and breathable fabrics that have started to appear in competition sailing "have yet to make much of an impact because of the lack of durability and high cost/benefit ratio," she says.

However, one important exception here is SurfSkin, which, says Miller, is "a paddlesport-specific fabric." This fabric, according to Kokatat, combines insulating comfort with paddle-specific articulation. Garments made in it have an exclusive competition cut that makes use of its four-way stretchability, and are body hugging. The outer fabric is a wind and waterproof barrier that's laminated to a fleece lining for comfort next to skin.

Regarding fabric technology, Rick Franken sees a cross fertilisation process taking place between the various outdoor clothing markets. "The technology in the outdoor industry is the result of the different disciplines all feeding off each other. Our garments have taken concepts from many different sports, maximising function and form," he says.

In contrast to Kokatat, he sees that "stretchable/breathable/waterproof fabrics have definitely entered the paddling market. Many of our products incorporate this type of material in order to increase freedom of movement and ergonomic comfort," he adds.

Bomber uses three-ply HB Toray, which is a waterproof/breathable material from Japan. "We

have also developed a 2.5-ply dot matrix waterproof/breathable material that is much lighter in weight and more supple than the three-ply and is more cost-efficient," says Franken.

He adds: "To create our seals we use latex and for all our pockets we use urethane coated zippers. We also use 0.5mm GMC Titanium neoprene and 10-13oz. Lycra."

Design and style playing a part

As in most sectors of the sportswear business, the materials used, while vital to the performance of any garment, are just one side of the fitness-for-purpose equation. Just as important is garment construction, and not just from the function perspective. In a market with a young profile, more so at the play-boat end, style is also a major factor. Rick Franken points out: "A new area that has undoubtedly become an important factor in outdoor clothing is style. With more and more young, fashion orientated individuals getting into the sport, style is as important as form."

In competitive kayaking, he asserts, "Consumers look for maximum mobility, minimal bulk, and eye-catching style. They pay less attention to warmth and special features. Touring canoeists, on the other hand, are looking for maximum warmth, multiple features and protection from the elements."

Marta Miller identifies garment construction, and what it contributes to freedom of movement and style, as the important criteria in kayaking technical clothing among several other leading manufacturers. "The biggest breakthrough in recent years has been in the areas of patterning and aesthetics," she says. "Refinements in patterning have led to better fitting garments with greater freedom of movement."

In the UK, Yak, the paddling attire and buoyancy aid brand marine survival gear specialist Crewsaver, in Gosport, Hampshire, has been paying considerable attention to ergonomic shaping and ease of movement in its recent product offerings. Its cagoules, for example, have generously cut sleeves with plenty of room under the arm so as not to restrict even the most vigorous paddling manoeuvres.

Kayak International Soft Wear, based in New Jersey, USA, has gone further than most in this direction with the construction of paddling cagoules using its proprietary Paddle Shoulder construction system, which it claims offers unrestricted freedom of movement. The design, says the company, "duplicates the symmetry of the kayak paddle, and, like kayak paddles, are the driving force behind the unique design and function of the product." The Paddle Shoulder is based on a raglan or saddle shoulder, but has a 'split-yoke' feature to provide better fit and comfort. Importantly, it avoids the complex intersection of seams at pressure points on the shoulder. Kayak International claims this development to be no less than "the single most important development is active sports attire today."

From Yak's perspective, the company's clothing designer Dave Ordish observes: "The requirements are similar to those for high-performance sailing gear. Breathability and freedom of movement are essentials. Some tops have built-in foam for buoyancy."

For kayaking gear to keep its wearers as dry as possible and at the same time provide maximum protection and freedom of movement, it is essential that the different clothing components all work together. Clearly, cagoules need to overlap and fit closely to what's worn below the waist, be that dry trousers or salopettes or neoprene longjohns or paddling shorts.

Even though the latter are expected to get wet at times the idea is keep as dry as possible. "Whitewater paddlers want a more waterproof gasket," observes Kokatat's Marta Miller. She adds that for touring paddlers good ventilation is also important. "The majority of touring paddlers value an adjustable type closure that allows the garment to vent," she says.

But where staying dry is paramount, kayakers have an extra level of protection that's afforded by spraydecks. Part garment and part paddling apparel, these are broad-waisted skirts that flare out so that the edges hook over the cockpit combings where they are held in place by quick-release shock-cord loops. In the Yak range these are offered either in heavy-duty coated nylon or, for an optimum seal, neoprene.

Talking of seals

In its top-of-the-range cagoules Yak uses both neoprene and latex to seal the necks and wrists of the garments. The company's Kaleva dry cagoule, for example, has twin neck seals, the outer in neoprene, and the inner in latex. The reason for this, Ordish explains, is that while neoprene is softer and more flexible, latex gives the best grip. The downside to latex, however, is that it degrades.

US manufacturer Lotus Designs, which three years ago merged with the Reno, Nevada-based outdoor leisure clothing company Patagonia, makes a similar point, "Unfortunately, we can't guarantee our latex seals for the life of the garment," said a spokesman.

The company's top-of-the range gear for cold-weather white water paddling is its Nemo line. This is made in a tough and supple nylon fabric bonded in a three-layer construction to a waterproof/highly breathable H2No Storm HB barrier. Its



Crewsaver's Yak Mistral cagoule illustrates the degree of flexibility built into the shoulder area of the company's designs.

Process of Kold Fusion

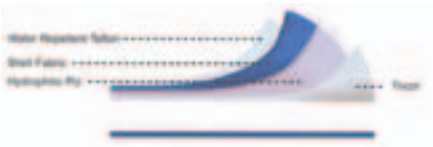


Figure 1 *In this figure a 3-layer shell fabric is to be bonded by means of Kold Fusion with another 3-layer fabric.*



Figure 2 *The 3-layer shell fabric is coated with a hydrophilic coating, and the 3-layer fabric lining is also coated with the same coating.*

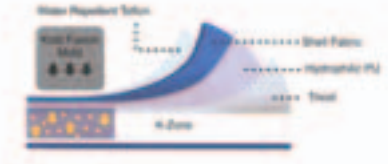


Figure 3 *The coated surface are aligned and placed under a Kold Fusion mold. As pressure is applied on these two uneven surfaces, millions of air molecules are trapped inside forming air gaps. Kold Fusion emitted electrons pass through the mold into the 3-layer shell fabric. Electrons leaving the 3-layer fabric get trapped in the K-Zone unable to pass trhough the air gaps. The excited trapped electrons in the K-Zone, bounces between the two surfaces and bombarded the molecules stimulating them with enough energy to form a molecular bond together.*

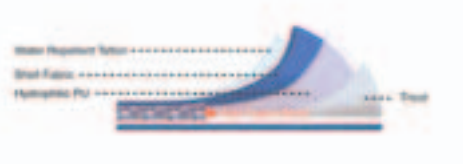


Figure 4 *The two materials with Kold Fusion form a molecular bond, a homogenous multi-layer structure with fabric sandwiched in between, making the bond literally impossible to separate without first tearing the fabric.*

Bomber Gear

Deluge DWR (durable water repellent) finish sheds water continuously to reduce surface saturation and increase breathability. Heavier fabric is used on the shoulders and elbows to reinforce areas susceptible to abrasion, while Y-joint sleeves and anatomically curved elbows allow unrestricted movement. The double-tunnel waist seal cinches tight with a shock-cord and cordlock; its 2-mm mesh neoprene skin is designed to grip the spray skirt. Latex gaskets and gusseted StretchCoat outer cuffs seal the wrists and neck.

Minimalist kit

While the materials and construction of kayak attire becomes more sophisticated, there's also a clear movement among manufacturers to keep detailing to a minimum. Whereas sailing jackets, for instance, usually have plenty of pockets, in kayaking cagoules these are often more of a restriction than a useful aid. That why, with Yak's paddling cags, for example, generally there's no more than one, usually positioned at the centre of the chest. As Ordish points out: "Buoyancy aids over pockets are not useful, even for touring canoeists who may need to carry maps and compasses, for example." So, rather than put pockets in the cags, Yak prefers to put them in its buoyancy aids.

Seam techniques

Yak tapes all of its seams, but some of its competitors are now starting to move away from this manufacturing technique. Rick Franken observes: "In the last three years, technology has advanced not only in fabrics, but in production techniques as well. We have now integrated a new type of technology known as 'Kold Fusion' where we no longer use the traditional technology of sewing. We actually weld materials at a molecular level, bonding fabrics together without thread or seam tapes. This technology allows for faster production time and better waterproof seams."

Looking ahead, he foresees: "In the near future we will find garments that are completely welded together without any stitching or taping. I believe thermoform clothing will also become a norm in the industry. As long as there are people interested in the outdoors, there will always be improvements to make and build upon."

One possible direction that development could take is in the use new 'smart' fabrics. Marta Miller explains that such fabrics "have the potential of reacting to both the body temperature of the user and that of the outside environment." Thus we could see garments capable of adjusting their waterproof/breathability ratio accordingly. It will be interesting to see whether paddle wear manufacturers will be able to steal a march on their higher-profile yachting clothing colleagues in the application of such technology, rather than clinging onto their coattails.

Bob Greenwood



Bomber Gear's Radiator Drysuit in Toray 3-ply breathable fabric. The design features a Vault Water Lock Waist Band that locks onto a sprayskirt to form an effective barrier.