The adage often applied to sailors' foul weather gear that 'If it works in the Southern Ocean it will certainly work in the Solent' is as true today as it ever was, but sailors of the 21st century expect their clothing to do far more for them than simply keep them dry and warm.

From the Southern Ocean to the Solent



Ellen MacArthur's video diaries showing television audiences how she battled single-handedly against the worst that weather and sea conditions in the open ocean can throw at anyone have done much to reinforce the popular idea that sailing gear is all about extreme heavy-duty protection. Certainly, yachting attire is the first line of personal defence against exposure to some of the harshest natural elements that most people are ever likely to encounter. But there's far more to it than that.

While ocean racing is the best possible product testing laboratory for marine clothing, very few sailors are likely to encounter mid-ocean meteorological extremes for extended periods. Indeed, the trend in the sailing cruiser market for the past couple of decades has been towards ever larger and more comfortable yachts that are equipped for 'short-handed' sailing. It's an ageing market, too, populated by relatively affluent owners now typically in their fifties and upwards.

These are people who are staying physically fitter for longer, able to handle boats that can perform well, but who opt for every mechanical assistance such as roller reefing and powered winches and remote controlled windlasses. They would rather not get out of the cockpit and onto a spray blasted and heaving foredeck to wrestle with an uncooperative head sail. Therefore, they generally do not need extreme foul weather gear. Although they want to stay dry and warm they also want to stay comfortable in their clothing, so they don't want it to be too heavy and restrict their movement.

Of course, there are plenty of younger people who sail, but do so for the action and excitement of 'racing around the cans' in the latest generation of high-performance 'sports boats' - small open keelboats with massive sail areas relative to their size that can surf at 20 knots-plus. Equally, it's a given that these energetic younger sailors want their clothing to keep them warm and dry, but they want to be unrestricted and 'cool' (physically and fashionably) while they expend considerable amounts of energy leaping around their boats.

Neither consumer group has vast amounts of time to spend on their sailing. As Per-Gunnar Haugen, product manager, for watersport with Norwegian sports attire brand Helly Hansen, says: "People are living busy lives. They have less time for leisure so sailing/boating sessions are of shorter duration, maybe just two to four hours. We can see this in the way that boating hardware has developed, and it has had a huge influence on the development of clothing."

✔ DB ✔ TW

Lighter breathing

He adds: "Heavy yachting gear is still important and a mainstay for ocean racing, but the emphasis is moving more towards lighter fabrics, low-profile colours, and features such as water tight single cuffs that are faster and easier to control."

Haugen, along with every other leading manufacturer contacted for this survey, agrees that the single most important development in yachting clothing in the past 10 years has been breathable fabrics. "There's a huge demand for breathability. Everyone has a need for it. People are doing much more active sailing so almost everything is breathable now," he says.

Nick Gill, chairman of Gill International, another leading yacht clothing brand, notes: "If one word has dominated the sailing clothing market during the last five years it is 'breathable'. In the past, it was only the really top end products that would be made using breathable fabrics. Now everything breathes, and at affordable prices. Gill is also starting to see the use of stretch materials and water-resistant and waterproof zips."

Owen Smith, marine development manager at UK-based Henri-Lloyd, says that for yachting: "The past 10 years have seen a significant growth and development of breathable fabric technologies. This move began with outer wear and the introduction of Gore-Tex Ocean Technology (OTEC) fabric and Henri Lloyd's (DWR-coated) TP fabrics which have pioneered this area with the introduction of stretch technology."

Outlining the company's objectives in this, Smith says: "At the cutting edge, weight reduction, mobility and maximising breathable performance are key factors and the trend is to get rid of fixed or loose linings as they add weight and hold water and so impair the garment's performance."

Smith was previously a director of snow sportswear company Lowe Alpine and has many years of experience in the development of protective clothing. He observes: "We have also seen a move away from traditional fabrics such as cotton and wool and the development of highly breathable polyester-based 'next-to-skin' products and thermal insulation that have revolutionised comfort". He adds: "What we are seeing now, is only the start of this trend."

In June Henri-Lloyd launched internationally its latest TP fabric technology, TP2 Alpha, as part of its Shadow One Design clothing range for short-span, in-shore, high-performance keelboat racing. The fabric has a raised Alpha pattern profile that's applied to a tough, but lightweight, polyamide face.

"Internal moisture management and super DWR finish (of TP2 Alpha) add to the sense of wearer comfort and well-being during high-energy activity," says Smith. "The secret to this improved comfort is the ability to eliminate the secondary lining, so delivering lower weight, increased breathability, less friction and a faster drying time."



Considerable attention is paid to the detailing in Gill International's Ocean range. Water resistant zips remove the need for bulky hook 'n loop secured flaps. The collar and hood are similarly secured, making the assembly lighter and more comfortable. Note the Kevlar binding over areas that take extreme wear.

Gill International

Multi-layered sailing

For ocean racing, where harsh conditions can prevail over extended periods, an integrated multi-layer approach to clothing still makes a great deal of sense. According to Owen Smith, Henri-Lloyd was the first to introduce soft-shell technology into the mid-layer market sector with its APEX Award winning Force jacket and salopettes, which use Polartec Windpro stretch fleece with a water repellent finish.

"We also introduced the Avid mid-layer which uses the highly breathable TPT fabric technology that's totally waterproof, with a thick thermal pile lining." Smith says. Next to the skin, he adds, his company's Fast Dri core products also provide up to 30+ sun protection factor, while its leg wear provides 50+ protection (according to Aussie Rules ratings) with protection for up to eight hours.

Nigel Musto, managing director of Musto, the world's largest marine clothing manufacturer, says that while there have been major improvements in sailing wear over the past 10 years, "in terms of technical development, there have been no major breakthroughs since we worked with Gore to develop OTEC fabric in 1993-94. There have, of course, been plenty of improvements since then, including the development of a stretch OTEC, which we are now using in all of our top-of-the-line products.

"We have worked hard on weight saving and have found the optimum weight for all the different types of sailing," he claims. "Weight needs to be very different in the Southern Ocean compared to the Solent, and that is reflected in our product lines. Mid layers have also reduced in bulk, so it is now easier to move about quickly. Underwear fabrics have benefited from good anti-microbial finishes, so living with your crew mates on a 60ft yacht for weeks at a time with no changes of clothing need not be anti-social."

Musto adds: "Overall we have become much more refined and user friendly, while still dealing with the unique problems we have - of very high volumes of salt water, high levels of activity followed by long periods of rest and, at the extreme, weeks without changes of clothing."

Although yachting can provide extreme challenges for protective clothing manufacturers, the sail wear industry has tended to take a cautious approach to fabric development, preferring to let others take the lead and then evaluate and adapt technologies to its own specific applications. As he points out: "Sailing is very rarely first to market with a totally new concept, as our sport is much more demanding than most others. We need to have higher levels of durability, and to design to a much higher degree of proofing."

He continues: "Stretch is a prime example. We could not use stretch Gore - Tex until it had been proven in the Southern Ocean with an OTEC membrane. It takes time to do this. If we cut corners we can end up with guys at sea for weeks at a time in extreme conditions with leaking clothing. It is life threatening, so we prefer to move slowly."

Owen Smith suggests that conservatism of sailors has also been a factor in the cautious attitude of marine clothing manufacturers towards pioneering new fabric technologies. "Developments in outdoor clothing have dominated advances in technical sailing clothing," he says. "The outdoor business has had breathable fabric technologies available to it since the 1970s. The average outdoor enthusiast tends to pay more attention to their personal comfort and the clothing they wear as these are the key components of their sport. But in our experience, the average sailor puts the boat first and thinks about clothing as a secondary element. It is a continual programme of education and awareness to get sailors wearing breathable clothing from the inside out to maximise their comfort and performance".

Nick Gill believes that the transfer of technology is more of a two-way process. "I am sure we all learn off each other. The sailing environment is tougher than the general outdoor clothing environment. Although new ideas tend to appear in the outdoor market first, they usually need perfecting before we would use them in garments that will be subjected to prolonged periods at sea. This was the case with breathable fabrics and, more recently, with water-resistant zips."



Henri-Lloyd's Foil Jacket, new for 2004, was developed for the Oracle BMW Racing team's campaign in the 2002/3 America's Cup.

Henri-Lloyd

Helly Hansen's Per-Gunnar Haugen comments: "Technology has transferred down from outdoor high-activity attire, such as skiing and climbing. For sailing we've worked to make it more durable for rough weather on water."

With a product portfolio that spans the gamut of sportswear markets from freeride skiing through hiking and mountaineering to whitewater kayaking, the Norwegian manufacturer is well placed to move its technical know-how around from one market sector to another. That's true, for example, of its Helly Tech and Helly Tech XP specification fabrics. These use hydrophilic coatings that transmit moisture from the inside to the outside in an osmotic process.

Helly Tech has a 5,000mm minimum waterproof rating, while the XP version, rated to 15,000mm, is claimed to offer 25 per cent more breathability. It's also elastic.

For highly active watersports, where breathablity and freedom of movement are more essential than rugged protection against hostile elements, the Norwegian manufacturer is pioneering the use of eVENT fabric in clothing design - unless one chooses to include footwear, in which context one would have to mention Henri-Lloyd, which uses it in certain of its sailing boots/shoes.

Gill International also uses the fabric, but not in the yachting market. Here, the application is cycling apparel.

The performance claim made for eVENT is that it delivers the highest level of vapour permeability currently available on the market. While most waterproof breathable fabrics function by an indirect process of absorption, diffusion and evaporation, eVENT is said to be the only one that directly vents perspiration moisture. This hydrophobic system allows vapour to pass directly to the atmosphere through microscopic vents in a membrane of expanded polytetra-fluoroethylene (ePTFE), thus preventing any uncomfortable build-up of moisture that might be momentarily trapped inside the garment and enabling the wearer's inner garment layers to remain dry.

As this issue of *WSA* went to press the eVENT Smocktop had been pre-market trialled by sailors in Scandinavia and France. It was also due to be used by sailors in the 2004 summer Olympics. The full international market launch, however, will be at major trade and boat shows this autumn in time for the 2005 boating season.



Wet or Dry: New from Musto for 2004 (left) is the Breathable One Design Smock. A dry version is also offered with latex neck and wrist seals. On the right is Helly Hansen's new Smocktop, the first yachting garment to be made from eVENT fabric.

Musto / Helly Hansen

Full immersion compromise

Where full immersion is a distinct probability, Helly Hansen is also due to launch a new Aquashell top and pant for dinghy sailors. This will use a fabric developed by the manufacturer Malden Mills that comprises an outer shell of rubber lined with Polartec. "This has four-way stretch and is fantastically flexible for maximum freedom of movement, and it breathes," says Per Gunnar.

Other manufacturers of technical clothing for yachting also work with branded textile manufacturers to develop variants especially suited to their applications, commonly using high-profile ocean and in-shore racing (such as the America's Cup) as the test beds for this.

Although most sailing wear manufacturers are keen to identify themselves with well-known brands of technical fabrics, Gill International a few years ago broke away from the pack by sourcing from non-branded suppliers. "We believed the premium they added to the price was not reflected in the fabric and it ended up confusing the customer," says Nick Gill. "There were too many technical-sounding names, swing tickets and fancy eulogies. It was hard for the end user to compare one fabric against another," he maintains.

So, instead of leaving the consumer to draw his own conclusions about a garment's performance based on his own ideas about fabric brand values, Gill International devised its own simple Gill Yellow Dot classification system. Here, garments are marked with one to five dots, each number of dots indicating a level of performance.

To find suitable fabrics to meet these requirements, "Gill set out to scour the world for the very best materials - irrespective of name - and test these independently in the laboratory and on the ocean," Nick Gill relates. "We found by travelling to Japan and working directly with the latest technology coaters we could specify our own fabrics. If one did not come up to the required standard we could tackle the problem from where the weakness was, be it durability, breathability, or whatever. We used our test results to fine-tune the fabrics. Our requirements tended to be tougher than most manufacturers', but they were willing to develop the fabrics as the higher performance helped them in other markets and sports."

Nick Gill adds: "We had blind trials in the Southern Ocean comparing the branded fabrics with our own and in every case we could match the best and at the same time reduce prices by 30- 40 per cent."

By this approach Gill has managed to secure not just price savings, but also weight, and both without any compromise in quality. Here though, garment design is also a vital factor, Nick Gill points out. His company's Ocean foul weather gear range underlines the principle that light is better: "Weight can be saved by different means than just using lighter fabrics," he says. "For example, avoiding unnecessary overlays and flaps, and removing garment linings."



Hugh Styles (ex-Olympic squad Tornado, now a Laser sailor) wears Gill International's new Hybrid Smock, a tighter-fitting spray top with seamless underarm stretch panels for freedom of movement. Instead of conventional latex neck and wrist seals, Gill uses the same microfibre fabric as used in the main body of the garment for an improved level of comfort.

Gill International

He adds: "Gill's base fabric is the same weight as ocean-going gear from other leading brands, but the end garment ends up 25 per cent lighter. Gill is primarily concerned with the breathability of the overall garment and not just the fabric. And overlays and flaps reduce breathability."

A recent product offering, the Hybrid Smock that was launched this year, demonstrates the point that the trend is towards lighter being better. Hybrid is primarily aimed at the dinghy market but is also finding a welcoming audience with warm weather sport boat and offshore sailors.



The Element jacket from Henri-Lloyd. This fleece can be worn under a waterproof jacket or on its own.

Henri-Lloyd

Hybrid uses a combination of lightweight and stretch fabrics for improved freedom of movement, reduced windage and comfortable seals. "This is a garment that works in a lot of climate conditions," says Nick Gill. "Hybrid provides unparalleled comfort as the weather warms up."

Given the closely competitive nature of what is the relatively niche market for protective sailing gear, it's hardly surprising that most manufacturers are reluctant to give away too much to their competitors about their product development plans. But, it is a safe bet that they'll all be closely watching any technical advances that they could employ in their own business sector. One such area of advance that one manufacturer, at least, has dipped into is phase change materials. Henri-Lloyd is using the smart technology developed by the Outlast company that helps to regulate temperature within a garment by changing its physical state, thereby releasing energy. "We are already using Outlast technology in our Extreme Deck Boot," says Owen Smith, "and now combine it with our TP Ocean breathable membrane that provides waterproof and breathable protection."

Others, however, are more circumspect. Says Nigel Musto: "We have a lot more work to do before they prove their suitability for the environment we have to deal with".