



P&B make sails for all sorts of dinghies, from Optimists to International 14s. The Fireball is one of their specialist classes, with their sails taking the top two spots at the 2006 worlds, and the top four at the Europeans. P&B's Dave Wade is a keen and highly successful Fireball sailor – a perfect guru for our project.

# Sails

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Pinnell & Bax's **Alan Bax** and **Dave Wade** take us on a tour of the P&B sail loft as our Fireball sails are born...

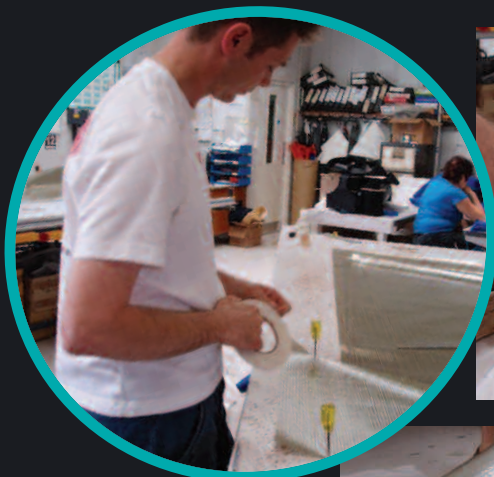
## Our sails – the sail cloth

P&B offer two Fireball mainsail options: more traditional, harder wearing polyester sails and a lighter, higher performance laminated product.

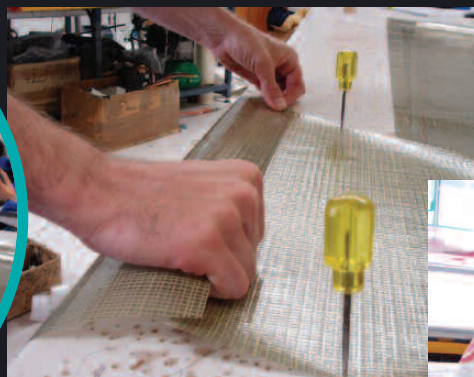
With polyester – generally known as Dacron – the chemical composition of the yarns is all the same except for the differences in size of yarn, the way they are woven and the finish that is applied. The stability of the cloth depends on the tightness of the weave and the number of yarns to a unit area. In addition, the stability of the bias, or diagonal, is greatly improved by the finishing process – often in the form of a resin coating. Diagonal stability is often achieved at the expense of stability along the length and width. It is necessary for the sailmaker to take all of these factors into account when choosing the cloth he needs – usually stability on the bias is a prime factor. Mainsails are subject to heavy loads along the leech (or weft line of the cloth) whilst genoas receive the loads in line with the sheet (or along the bias of the cloth). Most jibs are made from polyester, basically because they get a lot more wear and tear than mainsails – P&B do make some laminate 505 jibs, but a laminate headsail will generally only last one regatta.

**Above** The sail panels are cut by laser.

**P**innell & Bax are based in Northampton, close to Pitsford Reservoir. The company, known as P&B to many, started when Alan Bax and Ian Pinnell became partners in 1985. They moved to Northampton in 1986, and soon became firmly established as dinghy sailmakers. By 1997 the company had developed into a thriving, full-service sailing business, complete with a chandlery and repair workshop.



**Above** Taping the panels ready for gluing.



**Right** Applying the hot glue is a two-man job.





Mainsails, however, get a lot less punishment. Our boat was to have a laminated mainsail. 'Our standard and flat laminate mainsail designs are constructed from Bainbridge Kevlar SL30, which allows us to build sails which are 30 per cent lighter than Dacron sails,' explains Dave. Mylar is a trade name for a polyester film. It is the same as the polyester in normal cloth but extruded into a film rather than a fibre. Because it is a multi-directional film it effectively eliminates the weak bias of conventional cloth giving more stable characteristics. A woven scrim cloth is bonded to the Mylar film to aid the tear resistance and ease of handling. When Mylar was first introduced the adhesive was the weak link, often resulting in delamination. Over the seasons there has been considerable development of bonding techniques and now delamination is less frequent. Kevlar on the other hand relies on the strength of the Kevlar fibres to control shape and so the covering film of Mylar can be much thinner. Cloth manufacturers can therefore align the fibres to the load lines on the sail and because of Kevlar's immense strength can reduce the overall weight of the sail, an important factor on larger yachts.

The development of our Fireball sails goes back years, as P&B are continually looking to improve their designs. For example, after P&B's sails won the 2005 worlds, the P&B design team immediately spent the winter developing them. The result was the 2006 radial-based mainsail, which took the top two spots at

## Looking after your sails

**P&B** shares a few simple tips to help you to preserve the life of your Kevlar sails...

Kevlar sails are 20-50 per cent lighter than conventional sails reducing the weight aloft by a significant amount. The downside, however, is that they are more delicate than normal Dacron sails and should be treated with even more care and respect than normal. Here are a few tips which will help you to extend the life of your sails. Following these guidelines will enhance the life of the sails, protecting your investment and giving you many hours of enjoyment.

- Always store your sails in dry conditions, loosely rolled if possible,
- Always keep the sail bags straight when transporting the sail – use two people if you have to, do not bend it over your shoulder,
- When unrolling be careful not to crease the sails too much and if possible find a spot out of the wind,
- Try to keep flapping to a minimum,
- Think about using some older sails if the race isn't too important or when it is really windy (Force 6 and above) – strength is not the issue here, but flogging dramatically reduces the life of your sails,
- Be careful when returning to shore not to crease the sails too much when lowering the sail. It might be worth taking the main down head-to-wind off the beach and rolling the sail properly then returning to the shore under jib.

the 2006 worlds. 'The radials reduce the distortion that the high kicker loads produce, improving sail longevity,' explained Dave Wade, when we went to see our sails in production. This design was developed even further to produce the sails which would grace our Fireball for the 2007 nationals – a process that is ongoing today as P&B continues its programme of tuning, racing and testing, trying out new cloths and designs to move the sails on in order to stay ahead of the game.

**Above left** Marking out the luff curve.

**Below** Alan Bax shows us how the batten pockets are stitched on.





**Right** The clew patches are stuck on with doublesided sticky tape.



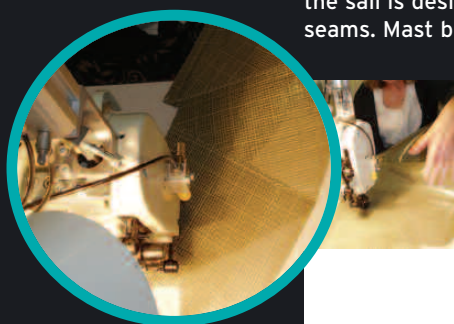
## The spinnaker

P&B offers two Fireball spinnaker designs, both constructed from 0.9oz Dynalite, a stable and durable cloth and available in a choice of colours or Arix 720ns. This year they have added Bainbridge Airx 620ns to their range. This cloth has a firm finish but is slightly lighter than the 720ns, a good silicone coating and combines top performance with good longevity.

- Design S: cut to minimum half height, ideal for lightweight crews, and is fast on shy reaches.
- Design M: a medium spinnaker, a superb all rounder and the more popular of the two – this was the choice for our crew.

## Sail shape

In order to create the desired amount of fullness the sail is designed and developed by shaping seams. Mast bend has to be taken into account



**Right** The sail returns to the machine.

**Below** Applying the all-important finishing touches.



as this will affect both the fullness and the degree of change between flat and very full. Shape is built into a mainsail using two methods:

- Broadseaming is simply curving the edge of the cloth panel so that when joined to the straight edge in the next panel it forces camber into the sail. Broadseaming introduces an aerofoil shape to the sail generally curved in the luff area (front) and straight in the leech (back).
- Luff round. Further shaping is added to the sail by making a convex curve on the luff side of the sail. If the sail is set onto a straight mast this results in extra fullness forced back into the sail. For this reason mast bend must match the luff curve of the sail. Too much luff round results in too much fullness in the sail entry, too little luff round – a flat or distorted entry commonly known as luff starvation.

The foresail is built in the same way using smaller amounts of broadseaming and usually negative luff curve, as there tends to be luff sag. Once again the rig must be tuned to fit the sail.

## Laser cutting and gluing

With a bit of an idea about the design process and cloth choices, we watched the construction of our sails. It all starts with the computer laser cutter which cuts the sailcloth panels, and draws on some of the guides needed to help with the sail's construction. The design work is all done on computer which then drives the laser cutter. 'All our Fireball sails are computer cut giving smooth and consistent sails,' explains Dave.

Flying 15 legend Alan Bax was working on a batch of Fireball sails, so we were able to see the whole process. The sails are generally produced in batches of six, apart from some classes like the National 12s where the sails are usually one-offs. In a week P&B will make around 12 suits of sails.

Once the cloth for the sail is cut, the seams are glued using the 'Ultra Bond TM adhesive System'. Basically, hot glue is used to join the panels of the sail. Sticky tape is used to hold the panels in place, and masking tape to stop the glue leaking out of the seam, then a thin film of hot glue (160 degrees) is applied to the seam with a glue gun – it's a two-man job as a roller is also used to spread the glue.

With the sail's panels together, the sail is pinned out and the luff curve marked.

## Onto the sewing machine

Next the sail moves to the sewing machine where the batten pockets are stitched on. This is done before the patches are stuck on with doublesided sticky tape.

Finally the sail goes to Irene who finishes off machine stitching the sail before Ross applies the finishing touches – adding the eyelets etc. Then the sail is numbered up ready for dispatch.

## And next...

Amazing graphics as Grapefruit Graphics get on the case, plus Nick Gill runs through the clothing he's selected for our crew. Meanwhile, it's no good having fast sails unless you set the rig up properly to work with the sails' design, so we'll be bringing you the ultimate rig tuning guide from P&B. ■