

Scorpion

A look into the design and developments for 2015

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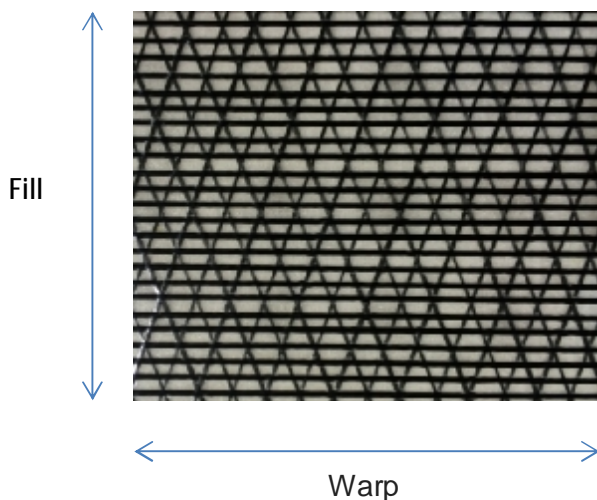
North Sails has had another great season notching up various event wins and championship titles, including 1st and 2nd at the Nationals, 1st and 3rd in Carnac and also 1<sup>st</sup> and 2<sup>nd</sup> in the overall National Scorpion Silver Series and many more. We currently have our seasonal savings now on; please follow the link to find out more about our savings and our current product range and should you have any further questions please don't hesitate to contact Pete Mitchell at head office;

<http://www.northonedesign.com/tabid/26627/Default.aspx>

However good the year has been, North Sails are forever striving to improve the quality of our finished product. During the 2014 season we have been rigorously testing and making changes to both our laminate and our 3DL mainsails to help improve the performance and longevity. Here is what we have come up with;

#### M5-K Mainsail

The most significant change to our M-5K full radial laminate mainsail is the cloth. North Cloth have specifically created this unique style for radial construction; this latest laminate range is called NLXI and available in 04 and 06 styles.



The Scorpions will be using the slightly more durable 06 style. This has been specifically designed for radial construction which holds more strength in the warp direction. Some of the extra strength comes from an additional yarn in the Warp direction for every X-ply running in the fill direction to that compared with the 04 style.

We believe that the XI range is 10% stronger and 5% lighter than its nearest equivalent. These gains are due to superior lamination and better yarn alignment to help distribute the high loads throughout the sail. Some existing laminate styles have an extra yarn that runs in the fill direction so the cloth can be used for a combination of radial and cross cut designs with needing to add more yarns to increase its lifespan and its multipurpose use. However the benefit of the XI cloth is that it doesn't need extra yarn passes in the fill direction as it is solely designed for radial construction, therefore helping lower the weight but also increase the performance longevity at the same time.

Another thing we have changed to the M5K and also the 3DL mainsails is the switch to Maxilite 150 for the foot lens. We found this matches the durability of existing foot lenses but is significantly lighter and slightly more responsive to adjustments of the outhaul. The Finn class love Maxilite because of its strength and just how little it weighs.

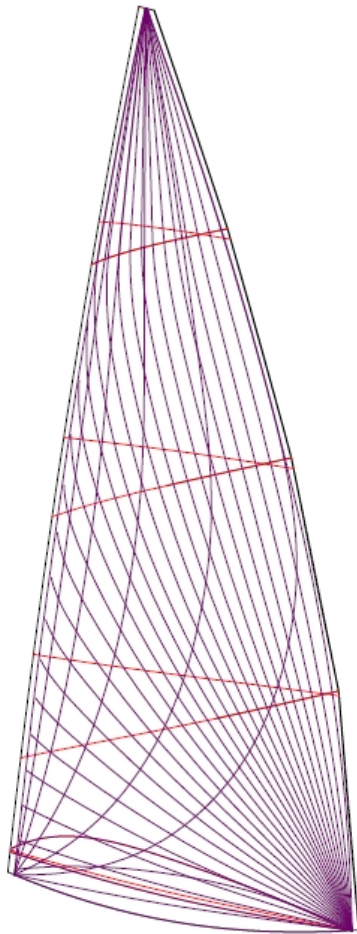
## 3DL Version 2

The main aim of developing the 3DL was to lower the overall finished weight while keeping the great performance longevity that the 3DL is known for. The weight of the 3DL can be controlled by the DPI in the design software (denier per square inch) The 2011 design was 6300dpi, this was a combination of 2x .75 films and a large number of filaments per yarn per pass that all added up to give that finished DPI.

Our North Sails Team Blue member Pete Gray and Richard Pepperdine had been using this first Scorpion 3DL for a number of seasons, and it's great to see that very same 3DL still winning various championships to this day. But having looked back at this, we now know that we can sacrifice some of this longevity to help boost the performance. Here is how we have been able to lower the overall weight of the 3DL to make it lighter than the panelled equivalent yet keep the performance longevity.

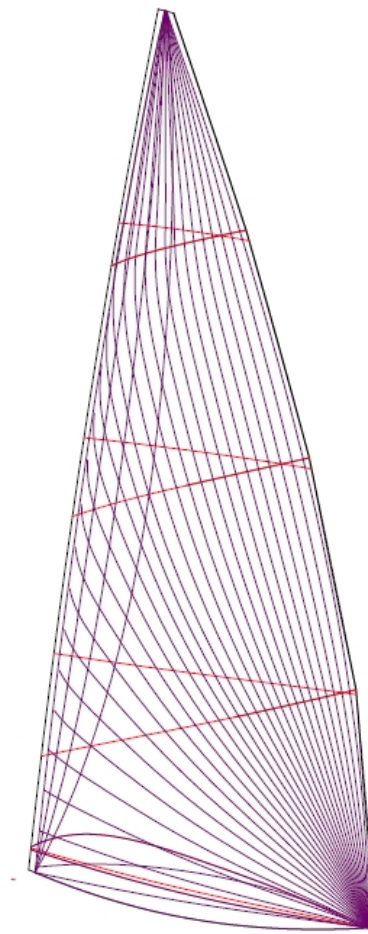
Below are two layouts of our 2011 design and the new 2014 design, these come from our 3D layout software. The purple lines that run to and from each of the 3 corners are passes (1 line represents 1 'pass' or 'yarn group'), the 3 red lines that are perpendicular to the leech are the batten pocket passes and the other 3 red lines that run parallel to the foot are the  $\frac{1}{4}$ ,  $\frac{1}{2}$  and  $\frac{3}{4}$  trim stripes (a standard feature on all Scorpion up wind sails to help aid the crew in trimming)

Fig.1



Old 2011 Layout 6300dpi

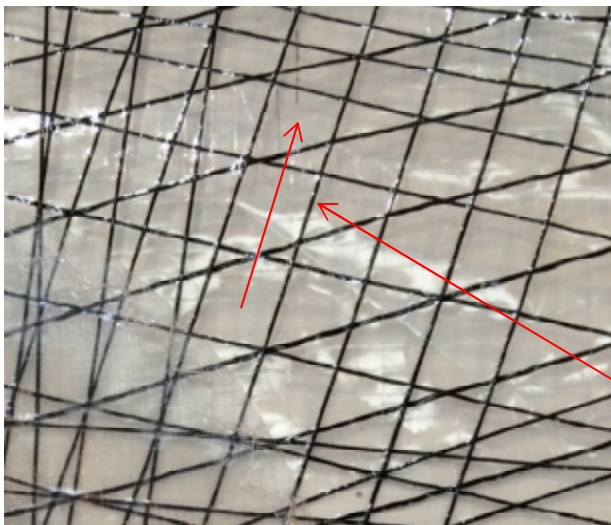
Fig. 2



New 2014 Layout 5000dpi

The most obvious difference between the two layouts is the number of yarn passes running from the tack to the head. For the new 2014 design layout we have taken out 2 of the outer luff passes and then repositioned the 4 that were left closer to the luff so they can work together more efficiently in distributing the high loads from the rig.

If you look closely you can see we have also lowered the density of the passes running from the clew to the luff below the middle trim stripe while increasing the density of the passes running above and nearer the leech. The main reason for this is that the leech naturally holds most of the loads in the sail and therefore needs more support/passes so the stresses are more evenly distributed and which will improve performance longevity. Other than simply removing passes to help lower the dpi, we are able to control the amount filaments that make up each yarn.



What is a 'pass' or 'yarn group'?

A pass is a group of yarns that are laid down simultaneously from the fibre head on the gantry hovering above the mould. These run side by side along the anticipated lines of load in the sail. This is a photo of the outer luff pass near the tack of a Scorpion mainsail. These passes are made up of 7 Aramid yarns that are running almost vertical with a slight angle towards the leech.

This yarn is the centre of the pass.

The 2011 design featured a sandwich made up of two .75mm mylar films this leaving a 1.5mm thickness, with the new 2014 layout we have been able to replace the mid film from .75mm to .5mm, this lowering the finished weight and making the sail slightly more supple and easier for sailors to read. This will have very little effect on the overall longevity of the sail as the yarn passes take the vast majority of the distortion (shear, shrink and stretch)

A great feature of the 3DL is the internal batten pockets. These are moulded in with the sail and have many advantages to that of one being sewn on; it's lighter, stronger because it doesn't have stitching which will break down the film and creates a smoother exit on the leech which is important in creating a fast sail. And plus it looks great!

Another change to the 3DL is the switch from Dyneema PSA patching to North's own Cuban Fibre patching. This is significantly lighter yet slightly stronger than the Dyneema. And with it being opaque you can see the thread passes meeting at the corners which is pretty cool too!

To find out more about the technology used in 3DL please the link below;

<http://www.northonedesign.com/TECHNOLOGY/3DLTechnology/tabid/1820/language/en-US/Default.aspx>



Photo courtesy of Notts County SC and David Eberlin

North Sails Team Blue members Pete Gray and Richard Pepperdine using the new 2014 3DL to power them to victory at Notts County SC and with that winning the 2014 Silver Scorpion Series. North Sails Pete Mitchell and crew Simon Forbes finished 2<sup>nd</sup> overall.