

Built to work!

Structured luff sails have created fresh challenges for deck and rig hardware designers with working loads going through the roof. This has spurred Rigging Projects to develop some creative solutions

Load-sharing sails have generated a lot of excitement at the cutting edge of sailing – first code sails, then headsails, now mainsails – and with good reason. Their performance boosting potential is significant and their ability to give a huge range of depth and camber to sails is leading a revolution of tech trickling down from the America's Cup to all boat platforms, even superyachts. The ability of structured luff sails to reduce loads has been grabbing headlines but the load has to go somewhere else. That creates new challenges for designers of deck and rigging hardware. Rising to the challenge, Rigging Projects has developed some creative, forward-thinking solutions.

'We've always looked to push boundaries,' says Nick Black, a partner and designer at Rigging Projects with a background in naval architecture and grand prix sailing. 'When there haven't been solutions in the market to handle emerging technologies, we've always gone after it, often starting from scratch as we did with our locking headboard cars. We've seen our product range grow exponentially in a short period of time to deal with these challenges. With structured luff sails, the camber

control is incredible. You may be reducing the load on your forestay but the load split between sail and forestay has gone from 10 per cent on the sail, up to 40 per cent and Rigging Projects have had to come up with unique products to deal with this.'

'As a result our auto halyard lock range has seen an extreme jump in loads. This was a driving factor for us integrating load cells into our forward locks. For example *Aquarius II*, the 212ft ketch that Royal Huisman is building, in partnership with Rondal, would normally have had a 15-ton jib halyard lock. It has now jumped up to 40 tons. It used to be enough to have a load pin on the forestay or rigging terminal but if we're going to handle such large loads we really need to know where they're going and thus we designed the first lock with an integrated load cell.' This new style of lock is already on the 155ft sloop *Hyperion*, which also needed a new, stronger topmast section to handle the extra strain of a new structured luff code 0.

Halyard locks are just one small part of the Rigging Projects Group. With the recently launched Gunboat 80-01, Rigging Projects Design was instrumental in bringing together the owner's team, Gunboat, North Sails

Above: for the first Gunboat 80, Rigging Projects had to re-engineer its locking headboard car design because the boat's Helix structured luff mainsail triples the cunningham load, which massively amplifies the load on the headboard car. Fitting the new one on the same track section was a feat of engineering

and Southern Spars to develop one of the most advanced performance cruising cats. 'We were excited and lucky to have an owner with the vision and belief in all of us as a team to 'design in' load-sharing across the whole sail wardrobe including, for the first time, mainsail Helix structured luff technology which was pioneered at the last America's Cup. As with headsails the cunningham load on new Helix mainsails has jumped threefold,' Black explains. 'For 80-01 it's 6T (compared to 2T for non-structured) and that's a massive change which amplifies the load on the headboard car. We had to redesign our locking headboard car to work in the same envelope but handle these extra loads, which is quite an engineering challenge.'

More and more, Rigging Projects design services are brought in at project initiation by boatyards or private clients to help bring together the design loop and sailing system implementation.

'We're tremendously passionate about our role in helping clients realise their dreams with their boats,' Black says. 'Our ability to do the turn-key package from initial design concepts to hardware provision, textile manufacturing



Above: Rigging Projects' new X Car on the mainsheet track of the Mills 68, Pelotari. **Left:** Rigging Projects' jib halyard locks now have integrated load cells. **Above right:** North Sails' Design Suite software enabled the Gunboat 80 rig design team to fast-track load results and hardware placement

and servicing means we are unique in the industry. For the GB80 we were brought in from the conception of the project, working alongside VPLP, deciding sail plan parameters and defining all the sailing systems. The owner's preferred sailmaker was North Sails and with an eye on the owner wanting to create something special we were able to work with North Design Services to make this possible.

'We help with our back catalogue of knowledge to determine the load case runs for the sail and spar package. The accuracy and speed of the North Sails design suite means that we able to fast-track load results and hardware placement often before the lines plans are finalised. This leads to major acceleration in project decisions and weight saving and ultimately allows more time to design the right custom solutions for the project. The strong collaboration that exists between North Sails and Rigging Projects is a major benefit to our clients.'

'It's a new and exciting era of sail design we are developing,' says JB Braun, head of North Sails Design Development. 'Being able to bring technology we developed for the America's Cup and implement it in these projects is a great benefit for all sailors.'

Some of the notable Rigging Projects involvements this year on consultancy and hardware have been the provision for the Gunboat 80, the two new Baltic Yachts launches and the mast hardware for the 152ft *Art Explorer* catamaran. The new PB72 semi-displacement foiling catamaran and a new 100ft monohull project at Persico are two exciting projects they have been working on together with North



Design Services, and these are certain to be two of the most exciting launches in 2024.

It's early days for structured luff mainsails but the Gunboat 80 is already showing that the benefits include easier boat handling alongside the boost in performance. 'With a normal mainsail you'd be able to change the mast curve by about 120mm, with a structured luff we can overbend the mast another 30 per cent by putting six tons on the cunningham,' Black explains. 'That extra flattening allows for another level of control not seen before which can help with a steadier hull fly or not having to drop that reef in for another couple of knots'.

These gains are significant enough that Southern Spars deemed it worthwhile – as it was for the America's Cup boats – to go with high-modulus carbon fibre for Gunboat 80-01's mast instead of ultra-high modulus carbon, which would have been too stiff to withstand the extra 30 per cent bend. 'It's worth giving up some of the weight advantage for the improved sail trimming ability and performance gain of the structured luff mainsail,' Black says. 'Being able to work with Southern Spars who designed all the AC masts gave us that confidence to push this tech forward in this arena.'

Quinny Houry, head of North Sails Palma, who implemented the sail package, says: 'The mast properties combined with North Sails Helix technology have pushed the design envelope up to America's Cup levels. These developments bring smaller and yet more versatile sail wardrobes.'

For cruising boats, the major advantage of Helix structured luff technology is to reduce the inventory of sails on board. 'The wind range that each sail works in becomes much wider thanks to the ability to change the camber,' Houry says. On the PB72, as with the Gunboats, we've managed to take sails out of an

already small inventory and required sail crossovers to achieve the boat's VPPs. This is a game changer even for a normal cruising boat.'

So what's next?

'For us it's all about friction,' Black says. 'To get the full advantage out of these systems we need to reduce friction and that's where we are concentrating our R&D efforts in all our product ranges such as the recently released X Glide sheaves.'

'The R&D programme we have developed has enabled a new mainsheet traveller car to be launched at the METS trade fair this year. All our boats, not just the foiling ones, are looking for that active edge of trimming and the ability to move the traveller as fast and easily as possible. Again we've gone back to the drawing board, starting from scratch and come up with something unique. We are excited to show this off at METS and the spin-offs from this tech will lead us into some other industry improvements, so watch this space,' Black concludes.

Success has fuelled rapid expansion, with 30-40 per cent growth year on year for the last decade, a bespoke running rigging business established at Zaandam in The Netherlands, new service and support teams in Palma, Mallorca and Rhode Island, USA and a recently set up bespoke manufacturing facility for Rigging Projects hardware. All their hardware is now manufactured at their HQ in Hampshire, UK. But Black is keen to point out that the key to it all stems from close collaboration with other key innovators. 'The best thing about these projects is all the engineering brains coming together,' he says. 'Take PB72, for example, we were working with North Design Services, Southern Spars and Morelli& Melvin. It's very rewarding for everyone, we each have our role but it's all a team game and we are very lucky to be involved.'

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