

# HIGH PERFORMANCE RACING YACHTS



# Ultimate customisation for unrivalled performance

Future Fibres is unique, offering a blend of technical excellence, passion and performance that is unrivalled in the race yachting industry.

From pioneering continuously wound, unidirectional fibre for yacht rigging to the introduction of our Flexible carbon cable (FlexC™), Future Fibres has thrust breakthrough after breakthrough into the yachting arena.

Engineering excellence, innovation and design optimization is instilled into everything we do, from spars design and highest laminate quality through to performance rigging solution and locking box mechanism.

Future Fibres can focus on the design and development of a single component, or employ its full capability to take concepts through to the final completion of your product. We have the proven ability, knowledge and expertise to make your race project succeeds and each of Future Fibres project is proof of our quest for perfection.

## >> ADVANCED DESIGN Composite specific software tools

When Future Fibres stepped onto the mast scene, we took the opportunity to raise the bar and innovate. We invested in bespoke mast design software to facilitate live modelling and optimization of the mast design. Mastermind Pro™ is an unprecedented tool that moves beyond stick models and basic section analysis, into a complete 3D loaded structure that models the mast using flying sail shapes developed in a sail simulator.

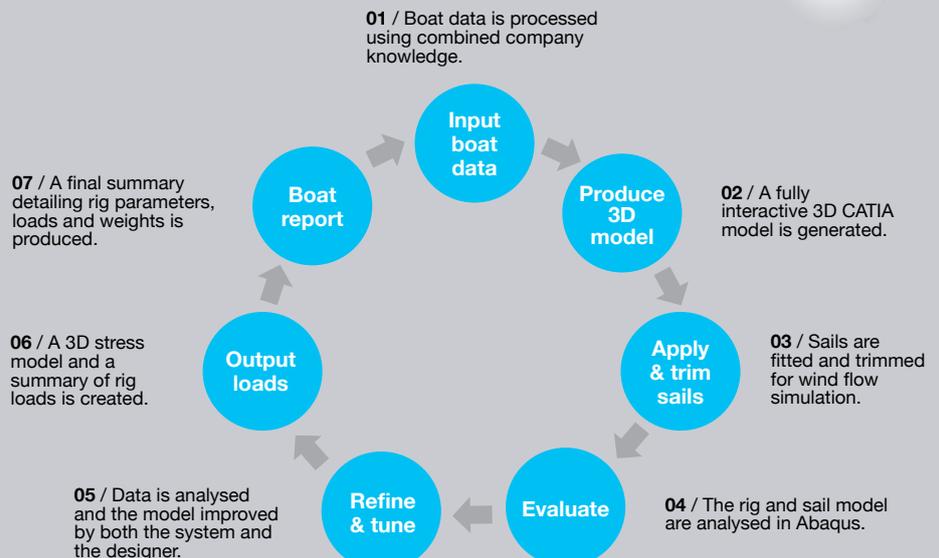
Using a powerful sail analysis tool, the software applies pretension to the rigging, sail forces to the rig and a shell laminate to the mast shape. A real-world ply by ply laminate is applied to the mast surface to evaluate stresses and local buckling. The results are where Mastermind Pro™ really stands out – by producing a complete 3D solution that shows combined stresses in mast, sails and rigging.

'In my 27 years of designing racing yacht rigs I have never seen such a quantum shift in the design methods as Mastermind Pro brings to the table. No shortcuts. No approximations. Mastermind Pro makes full use of 21st century developments in computer hardware and 'best in class' design software to do it right.'

BRUCE THOMPSON >> America's Cup rig designer

## MASTERMIND Pro™

Unique design software for optimized mast design



# >> CUTTING EDGE MASTS

## Raising the bar in design & manufacture

### High quality tooling

Future Fibres masts are constructed to the very highest specification and with new revolutionary moulding technology. Working with tooling specialists Persico SpA, Future Fibres believes that high quality tooling is the cornerstone of a high performance mast, with benefits that go far beyond simple surface finish improvements. Customised machined aluminium female tooling by Persico enable considerable weight savings with significantly improved build accuracy. Future Fibres modular tooling also allows more customisation and optimisation. Other benefits include: distortion free shape for fitting integration; better structural bonds; less glue, filler, fairing and finishing; and single piece spreaders.

Precision tooling delivered Coal IIa R (previously Alegre) a faultless surface finish with a perfect structural join through the co-curing of fore and aft shells. Local buckling analysis enabled the wall thickness of the mast to be pushed to the minimum which, in combination with high modulus fibre, delivered a significant 8% tube weight reduction which allowed redistribution of weight to the bulb for a lighter, stiffer and more controllable rig package.

### Reduced weight & windage / increased stiffness

Future Fibres combines intelligent design, weight reduction and component integration with the selection of lightweight materials and the latest joining technologies.

For example, Future Fibres combines fittings in the rig wherever possible. If you were to look inside a Future Fibres mast, you will find a lot of custom tooling which allows, for example, the integration of a locking box mechanism with a stay attachment. Many elements serve a dual purpose offering further weight saving as two fittings are combined into one integrated structural solution.

### Excellent laminate quality

Relentlessly in quest for perfection, Future Fibres excellent laminate quality rests upon a highly skilled and experienced professional team, sound procedures, cutting-edge precision tooling, advanced design and top quality manufacture. Future Fibres constantly achieves extremely high quality standards as demonstrated by the NDT (Non Destructive Testing) testing of each mast laminate performed as part of Future Fibres' Production Quality Control process.

### Simple, reliable locks

Locks form the most critical mechanism inside a rig. Used aggressively under pressure situations, this essential mechanism can make the difference between winning and losing a race. Future Fibres has invested heavily in R&D to deliver a high performance lock solution with optimized design meeting sailors' demands. In addition, Future Fibres locks offer improved serviceability as the locks are easily accessible for on rig inspection and service.

# >> RACE BOOMS

## New line of copy to come

Future Fibres race booms offer an optimised structure with a shape delivering the most efficient performance balance in terms of compression, vertical and side bending loads, local and global buckling as well as enhanced connections of key fittings. As with all our structures, detailed FEA (Finite Element Analysis) of the fittings and structures is performed to provide an optimised product. The result is an

organic looking shape where the high curvature allows for significant weight savings over the traditional rectangular flat sided box shapes. Having comparatively less compression than a mast, honeycomb cored panels offer opportunities for further weight savings. Additional weight and performance benefits can be achieved by adding reef locks which reduces compression in the structure and require lighter reef lines.

"We had a fantastic Future Fibres mast on the boat. It is the first Vendée Globe Race, in fact the first round the world race that I haven't had to go up the mast and that is the acid test."

MIKE GOLDING >> Skipper, Gamesa

# >> PERFORMANCE RIGGING

New line copy required

**Carbon rigging are the smallest, lightest, strongest, safest cables offering significant performance improvement.**

“We recognise Future Fibres to be the market leaders in furling cable technology. The Future Fibres cables are performing very well, exhibiting excellent torsional properties without compromising our optimisation goals.”

ANDREW HENDERSON >>  
AC 35 Rig Team Manager at Oracle



## Continuous winding

All Future Fibres cables, regardless of core technology, are manufactured using continuously wound fibre to create the inherently simple, safe and strong fibre loop. Continuously wound fibre provides the best fibre alignment and load sharing of any composite cable production technology providing the highest cable performance in terms of strength and weight for a given stretch.

Another significant and long term advantage of this core technology is the fact that there is no need for any termination or mechanical link to transfer the load from the cable to the deck / mast. Whilst it can be supplied as a “soft-loop”, metal spools are generally used to increase longevity and ease of interface. Wound technology offers the best opportunity for fully composite terminations and will always offer the lightest possible terminations compared to all other construction methods.

## From FlexC™ to Deflecting FlexC™

From FlexC™ to Deflecting FlexC™ Future Fibres' FlexC™ cables are unique and combine all the benefits of carbon fibre (stiffness, strength and excellent fatigue resistance) with the flexibility, impact resistance and general handling benefits of a dry fibre cable. FlexC™ has undergone an extensive test programme with a number of development partners (Open 60/Volvo 70) clocking up extensive sea miles to put the product through its paces before bringing it to the broader market in 2009.

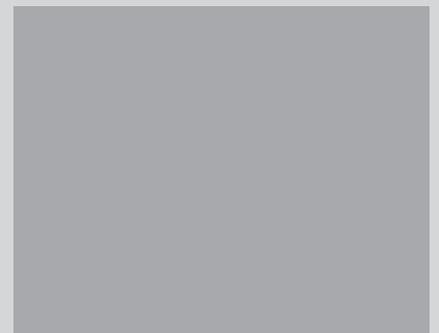
Deflecting FlexC™ is the most recent development evolution of Future Fibres FlexC™ technology. By taking off the terminations, the use of Deflecting FlexC™ allows for a simpler, more reliable, cleaner high performance system leading to reduced weight and improved air dynamics.



## The right fibre for the right application

Future Fibres believes in finding the right fibre for the right application. We balance various competing project needs; weight, windage, usability, durability and price, finding the right combination to meet a client's specific objectives. That could involve carbon, Dyneema, PBO or a combination of all four. Unlike the majority of suppliers, we are not restricted to one material, and we can offer an unbiased recommendation.

Taking the Shockwave example, the lateral rigging and bobstay were made from ThermoSet Carbon (TSC) which has proved to be the smallest diameter and lowest windage in the fleet. The aft rigging is made from the innovative, flexible carbon product FlexC™. Finally, all of the high performance torsional cables and other strops and in-mast deflectors are PBO for their light weight and stiffness.



## Furling speed is king

Originally developed for the Volvo fleet, code cables (or torsional luff cables) have a specially engineered resin impregnated cover which transfers the torque from a furling unit through the end fitting and along the length of the cable. They are designed to make furling sails and staysails faster, easier and safer.

Future Fibres leads the world in torsional code and top-down furling cables. To meet varying project demands, Future Fibres has developed a whole range of customised furling solutions.

## TorqueMatch™

Code or top-down cable performance is determined by torsional strength and stiffness rather than traditional measures of cable break strength and stiffness. At Future Fibres, we developed a bespoke software TorqueMatch™ to specify the cable to the torque requirements based on sail area, sailing conditions and furling unit. TorqueMatch™ allows to engineer the cable exactly to the defined torque requirements.

## Top-down Furling

After developing a high performance cable for furling loose luffed gennakers, Future Fibres investigated a top-down solution to produce a tighter furl and eliminate the risk of a wrap at the head of the sail. Whilst the technique might be the same, the demands on the cable are significantly different. This small but significant change in requirements meant a fundamental product redesign.

Future Fibres successfully developed a cable which retains the high performance torsional characteristics of its existing top-down gennaker furling cable but which is stiffer, lighter and with a smaller overall diameter. A re-design of the covers and a new proprietary braid and resin formula was also developed. The resulting top-down code zero furling proves a high performance solution with no repeat of the problems experienced with the previous system.

“When it comes to furling cables no-one would dispute the fact that Future Fibres makes the best furling cables in the world.”

MATT MASON

>> BMW Oracles' AC33 Boat Director

## Future Fibres Retrofit – boosting performance

A Future Fibres retrofit allows for a fantastic improvement in speed but also in balance, stability and motion at sea. It also gives your yacht a new life aesthetically, which is a greatly appreciated by-product of the Future Fibres package.

“Shockwave’s success is down to the significant transformation she has seen over the past few years, of which the mast and rigging has been a large part. The mast and rigging from Future Fibres have proved to be another step in the right direction, and the new boom will continue to enhance our performance.”

REGGIE COLE >> Skipper, Shockwave



## >> EXPERIENCED & TALENTED TEAM

New line of copy to come....

Future Fibres brings together 140 of the best people in the industry with the right combination of experience, intelligence and drive required to deliver the highest calibre product. Our core design team is open to new ideas and outside influences to continuously push the boundaries in a rapidly changing environment. If there is a project that is breaking new ground,

Future Fibres will assemble the right team of technical experts to deliver the best possible solution. Incorporating 17 different nationalities, the Future Fibres team is bound by a shared passion for performance and a drive to deliver the next wave of composite solutions.



## >> FUTURE SERVICE

Keeps you sailing no matter what

### Delivering Performance, Reliability and Personal Attention

- Future Fibres Regatta Support
- Personalized service by qualified personnel
- NDT testing for carbon rigging
- Load monitoring systems
- Central record keeping
- Quality Assurance



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