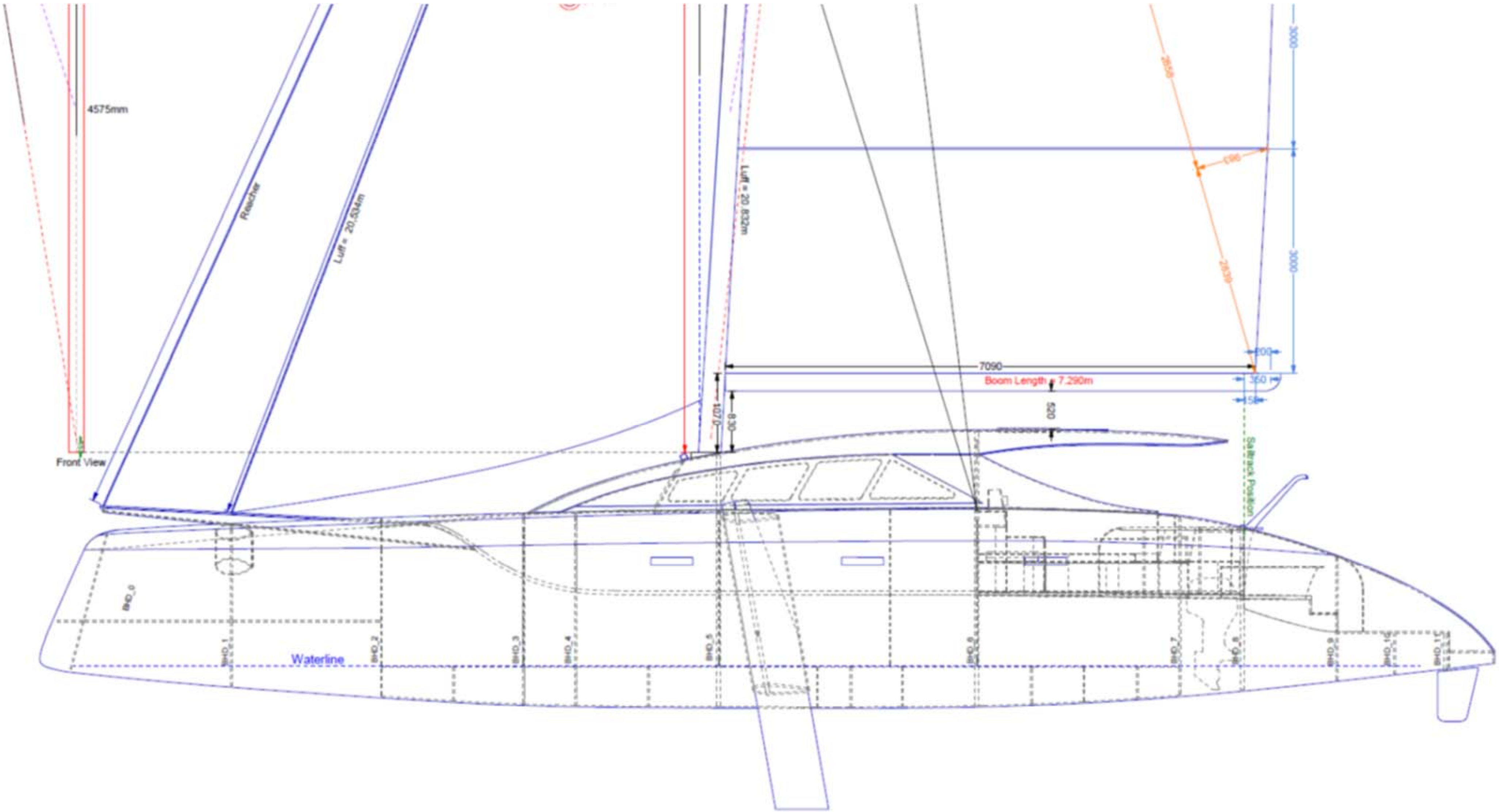
The G-Force 2000

Study Plans

Schionning DESIGNS


4575mm
Reacher
Luff = 20.534m
Luff = 20.832m
7090
Boom Length = 7.290m
3000
3000
520
830
1070
Front View
Waterline
Sailtrack Position

LOA	19.50 Metres
BOA	8.60 Metres
DRAFT	0.575 Metres
Headroom (Throughout)	Full Standing
MAST HEIGHT	23.00 Metres
SAIL AREA (Main+Headsail)	118+57 Sq Metres
PAYLOAD	3500 kg
DISPLACEMENT	12,670 kg
BRIDGEDECK CLEARANCE	0.950 Metres
BEAM TO LENGTH	15:1
FUEL CAPACITY	600 Litres
WATER CAPACITY	600 Litres
MOTORS	2 x SD-15 Electric Motors or Diesels
SAILING SPEEDS	20—30 Knots +

The new G-Force design of course prioritises performance and this could not be more evident in vessel #1 'KATO' which has been launched with a loaded cruising weight of 12,000kg. Considering similarly sized "performance" production multihulls weigh in at around 18 to 22+ tonnes, 'KATO' is incredibly light and this of course translates into stimulating performance, all while maintaining a luxurious finish and all of the comforts one would expect.

A custom design involves the process of interpreting a client's vision and turning it into a practical reality. The brief for this design was well defined since the owner's previous boat was a G Force 1800 built by the same builder's Noosa Marine, the client, besides many interior and equipment changes, wanted even better performance. Now that is what you call a design challenge! While many features of the original boat remained the same including the styling, a lot of minor things changed in the layout and cockpit, along with some major engineering and equipment changes like the use of carbon in construction, carbon rig and sails and electric motors plus lots more, so although similar in appearance, the G Force 1800 and the G Force 2000 are two very different catamarans.

State-of-the-Art CNC Pre-Cutting

Once the design stage is complete, the CAD model is nested and the panels pre-cut to speed the construction process. ATL Composites supplied the CNC-cut flat panels, however there was something quite special about the panels used. The standard E-Glass laminates were replaced with the ultimate in composite fibres – carbon. Using carbon fibre skins with balsa cores for the structure was the next and final step in making the G-Force 2000 the lightest and most performance oriented Schionning design ever launched.

The use of quality materials is first and foremost in a project of this scope and budget, and especially when weight, strength and stiffness is critical. Using West System resins and hardeners, professional grade fairing compounds and fillers as well as factory-pressed panels have ensured that every single kilogram has been kept to a minimum. The G-Force Series features round-bilge hull shapes, meaning this area is strip-planked, but in any flat areas where precision pre-cutting can be utilized this has been done. The result is a 20 metre performance cruising catamaran that has been *built from start to launch in only fourteen months.*

Layout

The G-Force 2000 interior layout is open plan, with light coloured interior design choices by the owners giving her a very spacious, modern and contemporary feel. The bridgedeck features a 'U'-shaped saloon with comfortable seating and table, sharing the space with a very spacious galley featuring large double sinks and ample bench area. Essentially a layout with only two en-suite cabins, the forward king size cabins have an airy feel with large hatches for light and ventilation. The owner's side has storage forward in the hull where the guest cabin has another berth forward. Both hulls feature a separate head and shower aft of the hull stairways with immaculate benchtops, glass screens and very chic circular basins and taps. Aft of these bathrooms are very neat utility rooms that house washing machine, water maker, air-conditioning units, water pumps and so on. A single helm station with no helm seat is the owner's choice and the same setup he had on his previous boat, it's to starboard and has a large opening hatch overhead so you can stand with head above the cabin for steering in confined spaces. This keeps the cockpit open for socialising, with twin carbon fibre cockpit tables, ergonomic seating and wide walk-through transoms. Aft of the cockpit is the 'toy pit' a large boxed area for storage, in this case it's for kite

G-Force 1800 "KATO"

boarding gear.

Professional & Experienced Composite Boat Builders

Noosa Marine along with other key boat builders around the world have well and truly proven that pre-cutting panels for use in multihull construction should not be viewed as cheap, inferior or home-made. The pre-cut panel building system has a number of advantages for the amateur home-builder and assists them to produce a lightweight boat that will perform well and hold good resale value. Professional builders can also benefit from pre-cutting especially in reducing build time on a one-off project such as this. There are always new innovations and technologies to be considered and integrated, the carbon-fibre laminates on the DuFlex panels are one example of this, in fact 'KATO' is a great example as she includes many of the latest technologies and she still comes in about a million dollars less than many of her production counter-parts. More details can be found on the boat's construction and on the systems installed in the accompanying articles.

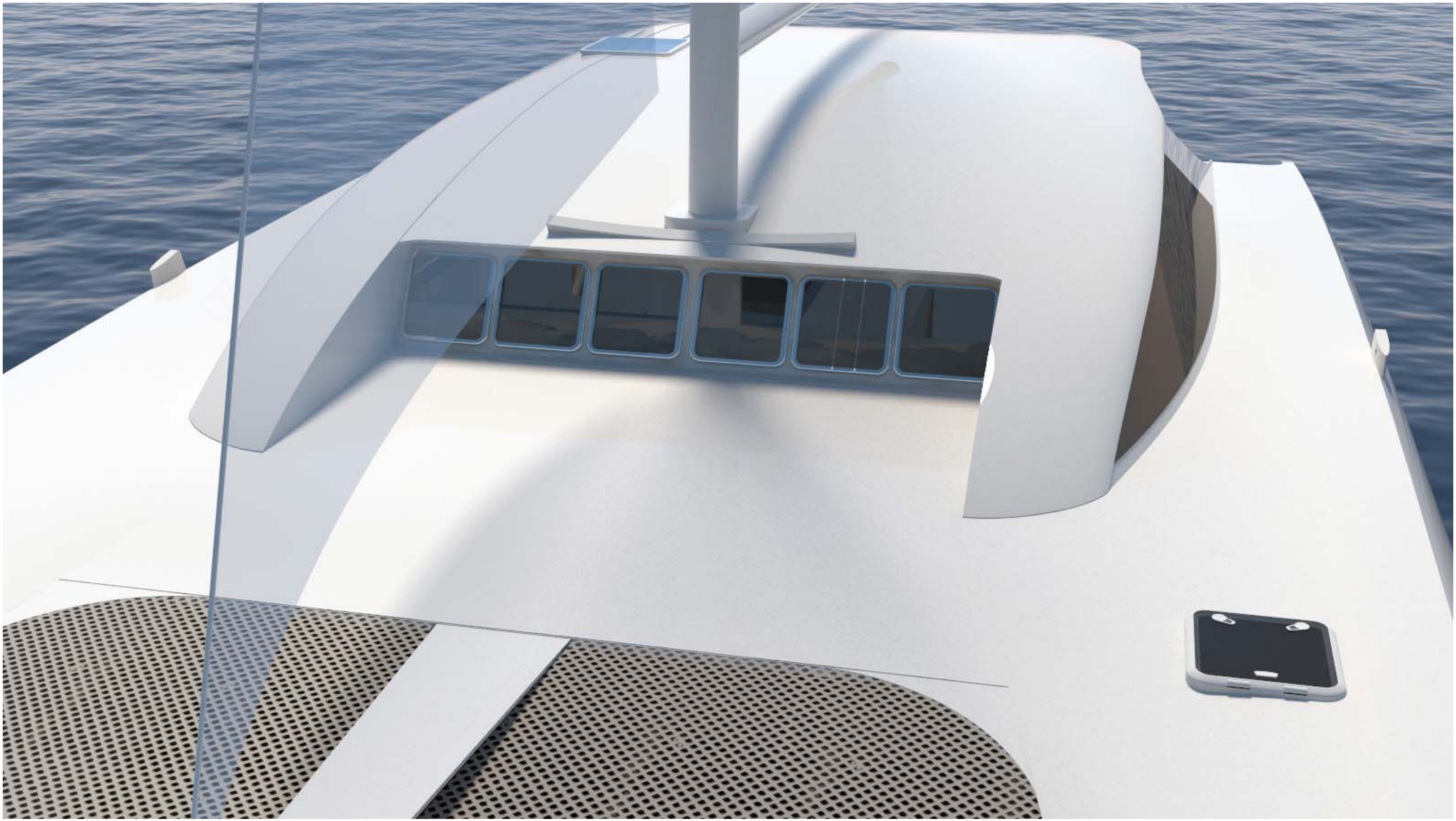
Of course a vessel of this calibre demands only the best as far as equipment is concerned, on the inside as well as the outside. From a safety viewpoint the vessel structure, mast and rigging are under immense loads and forces when underway and as such it is critical to install hardware and equipment that offers good performance but also reliability. The towering 24 metre fixed carbon mast and cutting edge carbon furling boom were supplied by Southern Spars whose experience in high end carbon rigs is well known in the industry. Another innovation used by Southern Spars is the use of EC6 composite carbon strand rigging which is super light. This is all controlled by the latest Harken winches and deck hardware.

The distinctive black sails are from North Sails, again more carbon, carbon 3DI sails are made in a mould in Nevada US and then put together in New Zealand. KATO hit 24 knots while reaching on a test sail and it was reported "she's slippery and easily driven to these speeds", Julian went on to say "she's a very easy boat to sail".

Raymarine instrumentation and chart plotter adorn the dashboard behind the carbon steering wheel, and a Spectra water maker is installed. *Oceanvolt supplied an electric propulsion system that is exceeding expectations achieving a speed of 10 knots*, information on this system and set-up will be provided by Oceanvolt in a separate article.

It is evident the overriding theme of the vessel is carbon fibre, even the heads are completely carbon – along with the dog bowl - now that is dedication to weight! The G-Force Series have been a familiar name over recent years, and yet still we see this proven design concept pushed further, culminating in the 2000 - 'KATO'. The G-Force 2000 design is available along with a full material package including pre-cut panels.


GF1950RR

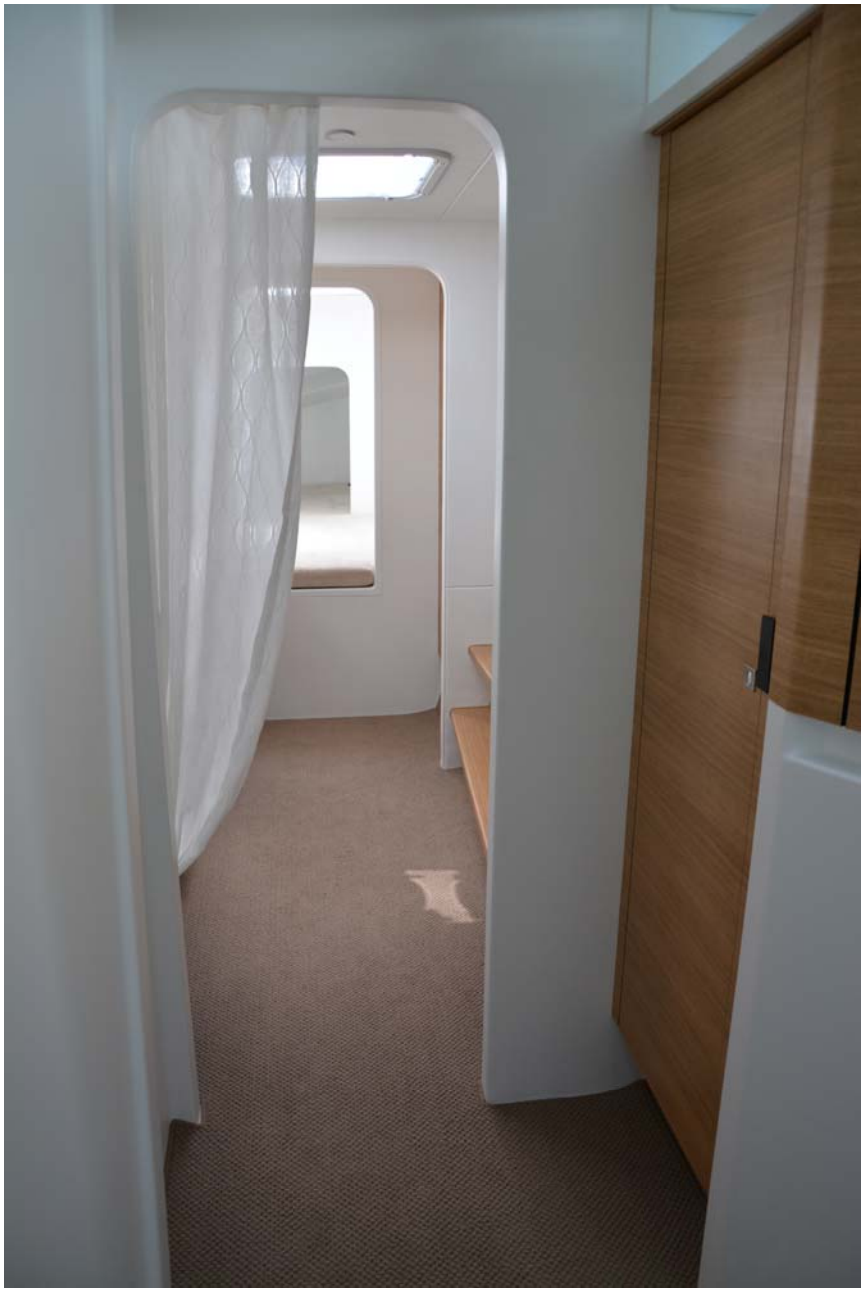


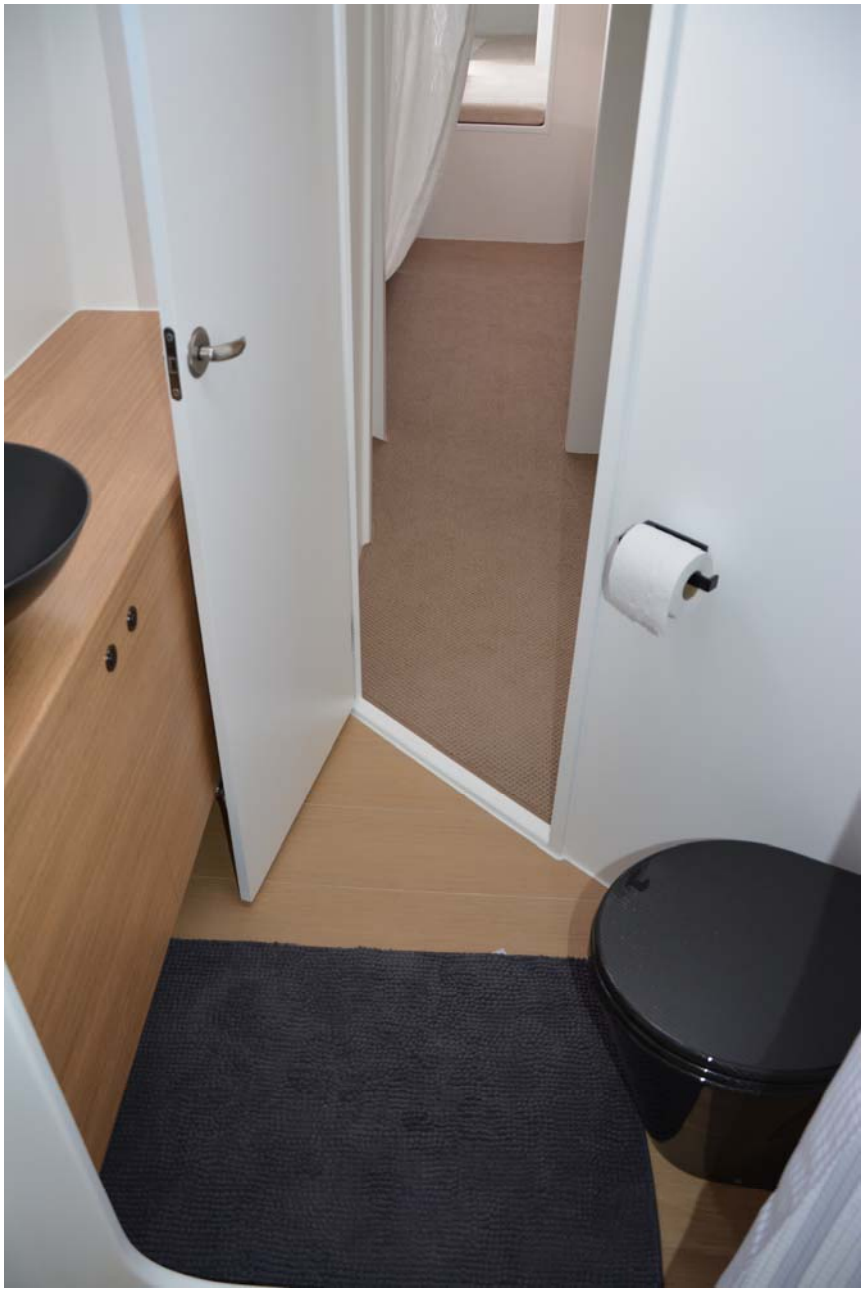

KATO


THE
BOAT
WORKS


120°
7.5
3


SPECTRA





Our designs are based on cored composite construction techniques using West System epoxy resin and knitted fabrics. But given the range of today's composite technologies, which solution works best for catamarans and why?

Resin Choices

We use West System epoxys for their high strength and adhesive values. It also fully protects the boat against water absorption and it can not develop the dreaded Osmosis. We choose ATL Composite's resin systems for their superior quality, reliability and value for money. Having worked closely with the ATL Composites team and their products for many years, we know we can stand by their material solutions, and rely on great service should something unexpected happen.

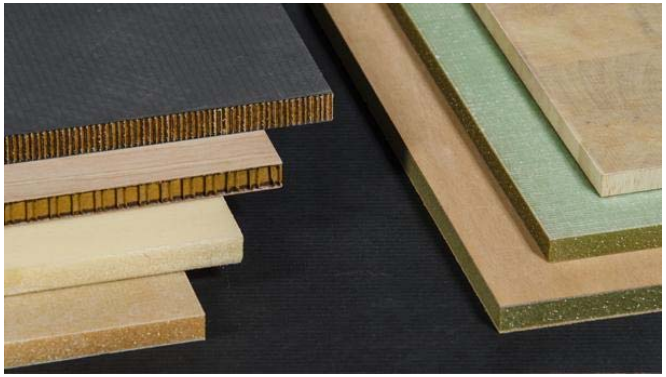
Cloths

We prefer Colan brand cloths for their quality and low resin absorption, custom made for Schionning Marine at six (6) stitches per square inch for easy wet-out and rounding corners. This may not seem important but when working with a material for an extended period of time, the small things make all the difference.

CORES - Which one to use?

The core choice is usually quite confusing. Cores have different capabilities and properties, and their benefits I feel are utilized fully in our catamaran designs. A quick look at their abilities:

Balsa end grain (150 kg/cubic metre) has exceptional qualities including very high compression strength, extremely good sheer capabilities and fantastic sheer stiffness. Compressive strength is the resistance to collapsing when pressure is applied perpendicular to the surface as when pushing directly onto the material with the point of your finger. Balsa is far stronger than Foam (80kg/



cubic metre) in compression. Foam is stronger than honeycomb type cores, both the paper and the plastic.

Balsa is also far better than foam or honeycomb in sheer. This is when the core sample is held flat between your hands, one hand slid one way and the other slid the opposite way, when the core tears through the middle the core has failed in sheer. The amount of stretch you feel before the core shears is shear stiffness. To compensate for sheer weakness the core is made thicker. So 13mm Balsa may be equal in sheer to 19mm Foam.

Paper Honeycomb (50kg/cubic metre) is very efficient and lighter than the other core choices. This can be used for external use but needs extreme care to prevent water penetration. Ideally it is used for all internal furniture and smaller bulkheads. Should water get into the core you lose 50% of its values. It can be suction dried and restored back to full strength, though this can be a long process. Paper Honeycomb has similar strength and sheer ability in the vein lines and about 80% across the veins compared to Foam.

Our hull skin thickness is quite thin, we therefore find the core works harder and it's stiffness is noticed in the finished structure (sheer stiffness). Generally a balsa or WRC shell is noticeably stiffer than a foam boat using equivalent laminates. Balsa has very good values and we can produce a shell using a very light laminate. It will be very stiff and very resilient to fatigue.

There are many boats sailing that are built from foam so even with its poorer values it works well. Initially one would expect this cat shell to be lighter as it is ½ the weight of Balsa. We do have to compensate for its weaknesses and will then add at least double the reinforcement on the outside to spread that compression load over more core and need a triaxial type weave to compensate for the veneer content that runs fore and aft on the Durakore. Secondly, we need to increase the Core thickness to compensate for the shear value, usually neutralizing the weight advantage. Thirdly, foam absorbs a lot more resin into the open surface cells than timber and so increases weight. Fourth, foam is an inert type material tending to follow the surface and not naturally stay fair, fairing usually uses more bog and again adds weight. Fifth, because of the inert characteristics, foam requires a much more complex control mould, this takes a lot more time and is slightly expensive.

The end result using Foam in my experience is always a heavier shell with less stiffness. Professional builders can achieve a good result but usually use vacuum bagging and very good molds to achieve this. The Wilderness 1230 has a foam option. It weighs 200kg less than the Balsa version.

Honeycomb needs to be much thicker and needs much heavier laminates which makes it a silly choice for cat shells. (Nomex excluded)

Western Red Cedar has all the advantages of strip Durakore, but has a real weight penalty because of its higher core weight.

These are the reasons we prefer Durakore and Duflex Panels for our home built designs.

The success of our designs I feel, stems from the practical common sense approach of a boat builder, coupled with many years of live aboard experience and over 100,000 nautical miles in some of the worst conditions in the world. This experience makes one aware of the power of the sea and the need for a boat to be able to survive these conditions, protect her crew physically and psychologically as well as being a fast comfortable vehicle for all the good times. I am sure you will find our designs reflect our sailing and live-aboard experience and will give you the offshore confidence to sail safely anywhere in the world. Multihulls are '*beautiful, safe, cruising boats'*. We hope you find them as exciting as we do.

WHAT MAKES A GOOD MULTIHULL?

Choosing a design can be difficult so we hope that this introduction helps clear the way a little.

Cat design is not just a matter of two hulls floating a cabin above the water. Only in fairly recent years have the basic elements of design and an understanding of their effect on the use and performance of the finished boat been properly understood.

The basic principles of good design should ALL be present in the boat you're considering building or buying. These will blend together to produce an excellent and safe multihull.

THE BASICS ELEMENTS OF A GOOD DESIGN:

Good Engineering Our boats are well proven. With over 400 Schionning cats on the water, and many performing under extreme stress whilst racing, we proudly claim we have never had a structural engineering failure of any sort in our designs. We work with some of the best Aerospace engineers in the composite industries to achieve this.

Flat Decks The flatter deck lines have a number of advantages. Secure footing while reefing, anchoring and in rough conditions. Life lines should be at a sensible protective height instead of set down a level. A flat deck is great for socializing, sunbathing or as a kids playground too.

Buoyancy Buoyancy distribution is the placement of buoyancy in the hulls. Our designs have between 50 and 60 separate sealed buoyancy tanks built into every shell so they are almost unsinkable. Most old designs hobbyhorse (rock fore and aft), this makes them uncomfortable and inefficient. Modern designs have the buoyancy pushed towards the hull ends damping down the hobby-horsing tendencies and giving a lot more safety downwind where the buoyant hulls stop nose-diving. Coupled with a lot of reserve buoyancy higher up in the forward hulls this adds an enormous amount of safety and gives you confidence when sailing off the wind.

A soft 'V'd entry quickly picking up reserve buoyancy with lots of reserve higher up is an ideal combination.

Good Bridgedeck Clearance High Bridgedeck Clearance is essential. A short cabin length with long hull overhangs is a good safety feature. Good clearance on a cruising cat is 600mm – 800mm, a Performance cat 700mm – 900mm and a Racing cat 800mm – 1000mm. Chamfer panels add high reserve buoyancy and need less clearance than a similar cat without them. They also reduce wave slamming and add strength.

SAILING ABILITY AND PERFORMANCE

Power to weight ratios show how well a cat will sail in light conditions. As wind strength increases, one reefs the power to stay at safe acceptable speeds (this is different for different people).

The Bruce Number is a commonly used value and very useful in comparing cats, displacement is not always reliable and will vary with load. A Bruce Number = 1 is very slow, 1.3 – 1.4 is a good cruising value, 1.5 – 1.9 reflects a very fast cat. Boats like the French 60' Tri's and "Club Med" are running to extremes like 2.3.

A light and efficient cat can often sail out of trouble and outrun severe weather patterns, shorten passage times and avoid bad weather by getting there in the existing weather window. Most good designs will tack through 90 degrees at a speed of 8 – 10 knots while reaching at 10 - 13 knots comfortably with Main and No. 1 in 15 knots of wind.

Daggerboards are efficient and allow very shallow draft for beaching. With a strong reinforced bottom and with kick up rudders, it's easy to beach our cats. Should you want shallow keels to protect inboard motors, then a combination of shallow keels and fixed rudders are a good option, daggerboards would still be fitted as usual.

Low Drag is a good characteristic. Slim hulls reduce drag and are efficient. A good cruising cat would have a Waterline beam to length ratio of 11.5 to 12.5:1. A performance cruising cat 12.5 to 14:1 and a racing cat 14 to 20:1.

It is important to note that *ALL* these elements must be present in a design to make any of them valid. For example, a design can be really good looking, have high bridge-deck clearance

a powerful rig and sail plan and be built reasonably light and show a fair displacement, but then have an 8:1 Beam to Length ratio. She'll be a good looking, powerful boat but it will be impossible to go forward, except slowly!

There is no reason why a good modern design does not have all of these features. If you find some of these lacking it is usually for the wrong reasons. A lot of cats have very little bridge-deck clearance because the designer is concentrating on a low profile cat which looks good or being dictated by interior accommodation and ignoring the fact that the boat will pound badly at sea. This is not only noisy and uncomfortable but can well be the cause of structural problems. Our designs have been developed around these practical elements of good design and then we accommodate personal comforts and lifestyle choices.

WHICH DESIGN...

We have many different design ranges. All incorporate the elements of good design discussed above so choosing a style, size and layout comes next. Layouts and some things like steering position can often easily be changed so don't be put off if you really like a particular design but find a few small elements you don't like, talk to us and we'll see if we can incorporate your choices.

We've taken particular care with the balance of construction methods in our designs, making them light and strong yet easy to build in small sections, most of which are manageable by a group of friends when they need turning over and moving. The blend of strip planking and light flat panels kept in single plane form, makes building easy and quick and produces a finished catamaran of classic good looks which will not date quickly, giving you very good investment security.

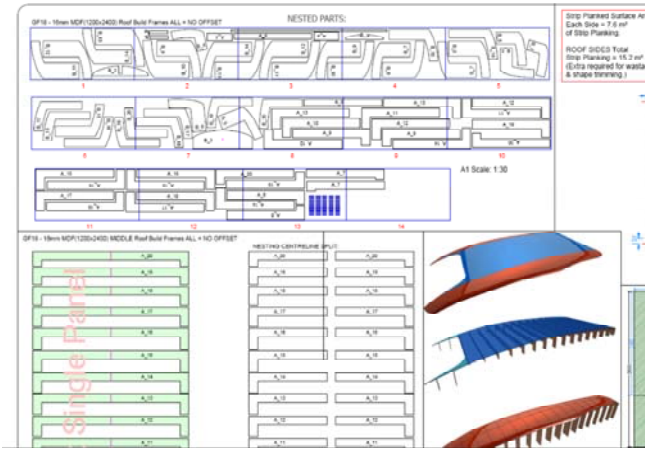
CAN I AFFORD TO BUILD?

One of the first steps in changing your dream into reality is figuring out whether you can afford the boat (or more likely, how much money you 'don't' have!). Two realities here are, firstly, two similar sized boats with similar displacement, built of similar materials, will cost much the same to build. Designers' estimates of materials are often inaccurate and sometimes minimized to lead one to believe their design will be cheaper to build. This is definitely not the case, ***similar boat, similar price!*** Your choice should therefore be towards the boat that suits you best and is a good investment. Secondly, we know a lot of people who could not afford their boat at the onset so don't be discouraged. Once you start building it is surprising how you focus your interest, spare time and money into your new project. With our new owner-builders we suggest they start with the smaller items which can be built in the garage, carport, (lounge?) etc. These initial items use very little material and money but use a lot of time, so at the early stages you can get a lot done while you wait for your old boat or car or house etc. to sell. These items are; dagger-boards and cases, motor pod, forward beam and catwalk, cabin roof, rudders, dinghy etc. The experience and confidence gained building these bits speeds up the second stage of larger items and gets the whole project finished much sooner.

Good luck with your research and project, don't hesitate to contact us should you need further information or a chat about our designs.

Jeff Schionning

Plans and Ordering



Advice is readily available to help with your design choice and various options available.

COST OF PLANS:
The G-Force 2000 Plans are AUD$55,000.00. This includes postage anywhere in the world.

UNLIMITED BACK UP SERVICE: Our back-up service is unlimited, our professional boat builder (Jeff Schionning) will be here to guide you through any problems throughout your entire project. Email and phone support is available during business hours Monday to Friday.

HOW TO ORDER PLANS: We require a signed and faxed or mailed PLAN ORDER FORM with every plan order. This form explains the terms and conditions and plans will not be mailed until a signed order form is received.

PAYMENT: WE ACCEPT: Bank cheques or direct deposit into our bank account. Please email info@schionningdesigns.com.au for our account details. Credit cards are not accepted for plan purchases.

PLAN DELIVERY: Plans are delivered electronically on a USB drive via mail, or the plan files can be downloaded. The plans consist of A1 and A3 plan sheets and the A4 boat building manual, all in PDF format. Other delivery options can be arranged if required.

Building a boat is definitely a challenge but with good plans, our helpful friendly support and the modern materials available, it's never been easier. The investment of time and money is very worthwhile, offering a rich life experience, fun reward when you launch her and financially you can certainly stand to gain substantially.

We look forward to hearing from you again and wish you the very best with your project.

Schionning DESIGNS

info@schionningdesigns.com.au
+61 (0)2 4997 3322

286 Bundabah Road,
Bundabah, NSW
2324 - AUSTRALIA