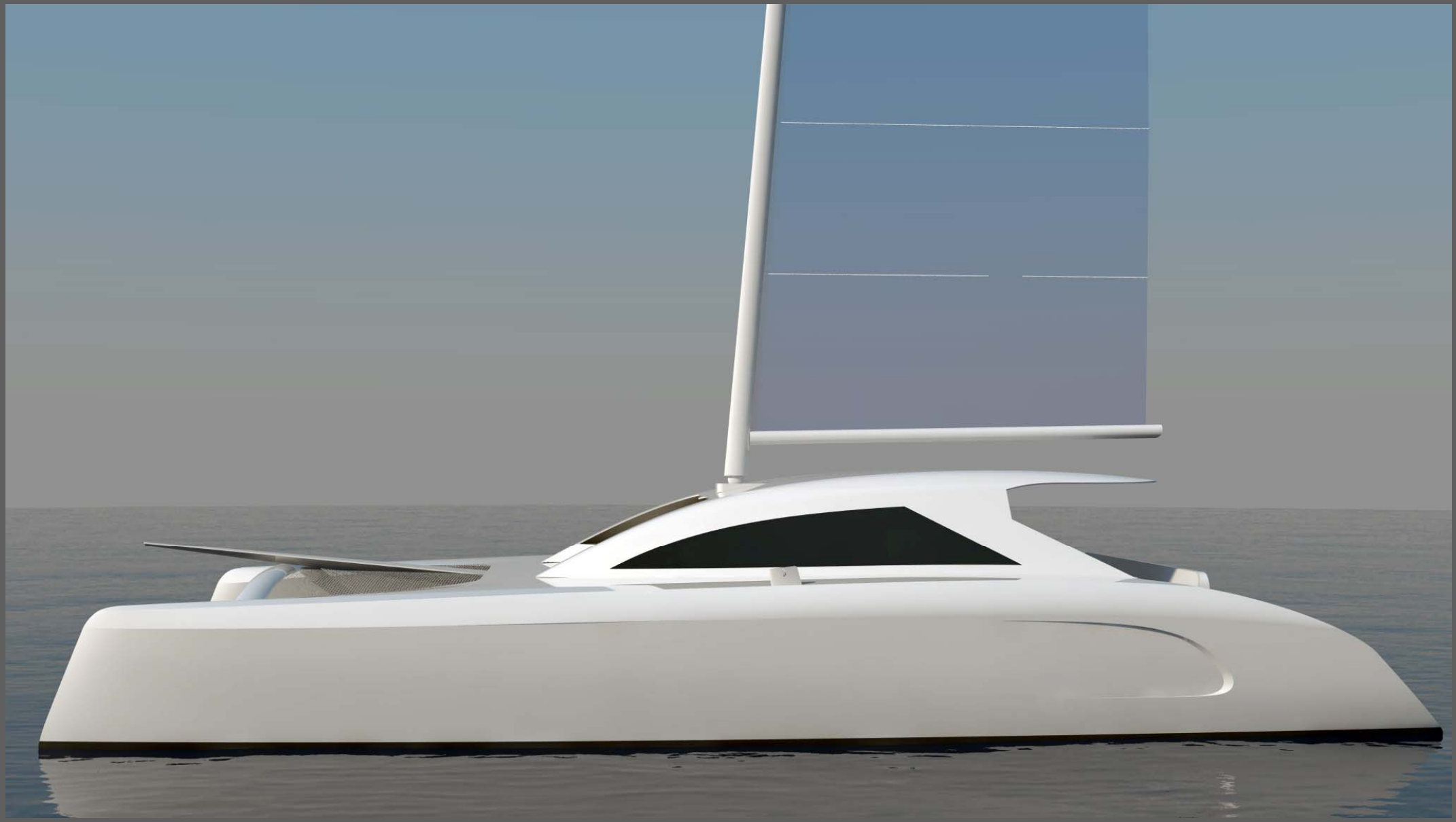
The G-Force 1500 Cruise

Study Plans

Schionning DESIGNS



Design Overview

G-Force 1500C

SPECIFICATIONS	
LOA	15.45 Metres
BOA	7.90 Metres
DRAFT	0.550 Metres
DISPLACEMENT	8000 Kilograms
PAYLOAD	2600 Kilograms
BEAM TO LENGTH	14.5:1
MAST HEIGHT	19.30 Metres
FUEL CAPACITY	200 Litres
WATER CAPACITY	500 Litres
HEADROOM	1900—1965 MM
SAIL AREA (MAIN)	78 sqm
SAIL AREA (S/TACK JIB)	50 sqm
MOTORS	2 x 29-37hp Diesels

With our G-Force 1500 design blasting it's way to the top of the podium in local races and dominating the Asian race circuit with line honours and race records it's no wonder the G-Force performance range have caught the imagination of so many cat sailors.

Peter Wilcox (GF1500 Owner "Mojo") is finding her a very comfortable cruiser having now clocked up thousands of ocean miles but he needs to keep her mean and lean for speed, and while we all imagine ourselves as serious racing sailors as we of course used to be a reality check in the mirror sadly reflects a rather more mature sailor with often a very different beam to length ratio. Add in the kids

and grandchildren and it becomes clear our real requirements are a little different now. Usher in the new G-Force 1500 "Cruise" design, this is definitely a better fit as she can carry the extra cruising gear we need for that circumnavigation, the toys we want and the comfortable accommodation to have family and friends join us as and where they can.

CE compliance is optional with this design. European owners and builders will require this. Displacement has been increased to carry the additional structural requirements and provide good cruising payload.

However it is important that she retains her blood lines, good beam to length ratios, fresh power to weight ratios and a moderate mast height and yet just so easy to sail. Main halyard and single-line reefing, dagger control, jib and screecher controls all led to the cockpit making her ideal for safe single and shorthanded, stress-free sailing.

Lorraine and I enjoy sailing together and we find one of us is mostly single handing while the other is off-watch and then all hands on deck when needed for reefing in a squall. When you run into 40 knots out of nowhere, this is where staying in the cockpit reaps rewards. One of you steering, winding her off the wind to reduce speed while the other furls half the jib and winds in a reef or two in the main. Having the controls in the safety of the cockpit is ideal especially if in the middle of the night offshore and of course you need to have a good view of the sails from your winch station.

The decks are wide, clear and one level making walking around easy and safe, the trampolines fitted to the composite forebeam and all composite chainplates and stanchions give very clean neat lines with no leaking fittings or bulky equipment on which to trip.

The cockpit is big and safe with full shade cover and plenty of seating and your option of steering position, single wheel on the bulkhead or twin sports wheels outboard, and the option of an internal helm station for colder climates. Cockpit seating is generous with sill height set at seat level allowing better volume in the aft cabins and more wave protection for ocean sailing and those tricky bar crossings. Not to mention it just might help keep those crocs out of the cockpit up north!

Design Overview

G-Force 1500C

Displacement is increased by 2000 kilograms, the mast and sail areas kept the same this reduces the power to weight ratios from 1.57 to 1.43 (bruce number) or from 46.9 to 62.5 kilograms per square metre (smaller number = faster). She will be an effortless mile-munching cruiser easily running 300 mile days in the trade winds. She offers very comfortable lay-out options. Lay-out Option 1 being more of a charter option with this cat being built in the Netherlands for charter on the Portuguese coast, these are very experienced owners who will circumnavigate later. This lay-out offers a very comfortable saloon with a big galley up and nice Nav station set to port near the steps, there are four double cabins - two queens forward and two doubles aft plus a separate single cabin forward to port. This cabin has two single bunks ideal as a kids cabin while the Queen to starboard is the master cabin with its own en suite head and shower forward while the other three cabins share the two mid head and shower areas.

Lay-out 2 offers a different configuration keeping the single cabin forward, the two queen cabins forward and a queen cabin aft to starboard but removes both mid head and shower areas making a big head and shower area aft to port. This cat is headed to Russia in a cold climate and we have an internal helm station plus two wheels set out each side for good weather steering. This is a very practical lay-out for extended cruising.

Motor options are either the normal twin diesel option, the port motor is in a separate engine room aft of the head area while the starboard motor would be set under the aft bunk or preferably opt for one 50 HP diesel to port driving a 48v generator with a DC 4KW motor to starboard. These coupled to a decent bank of lithium batteries allows silent electric propulsion where needed and the diesel used as your main power for straight-line motoring and doubles as your genset. Our preference is shaft drives allowing easier beaching and with twin folding props less likelihood of snagging fish traps etc.

She uses our normal dagger board system and preferably kick-up rudders as these are far less likely to get damaged in a collision with submerged or floating debris. Unfortunately a very real concern now with our oceans the dumping grounds for many countries. So much easier to simply raise the board then kick up the rudder to free ourselves rather than trying to cut lines from deck or worse having to dive in.

Construction uses our build system arguably the best by far in the world for light, strong, one-off construction. We use a combination of strip planking for compound curved areas with flat composite panels for all single plane areas, this produces a beautiful blend of curves giving a fantastic end result. We use Epoxy resins and knitted fabrics with light balsa or foam cores for unrivalled strength, stiffness and very light structures. The CE Compliant option must use foam cores.

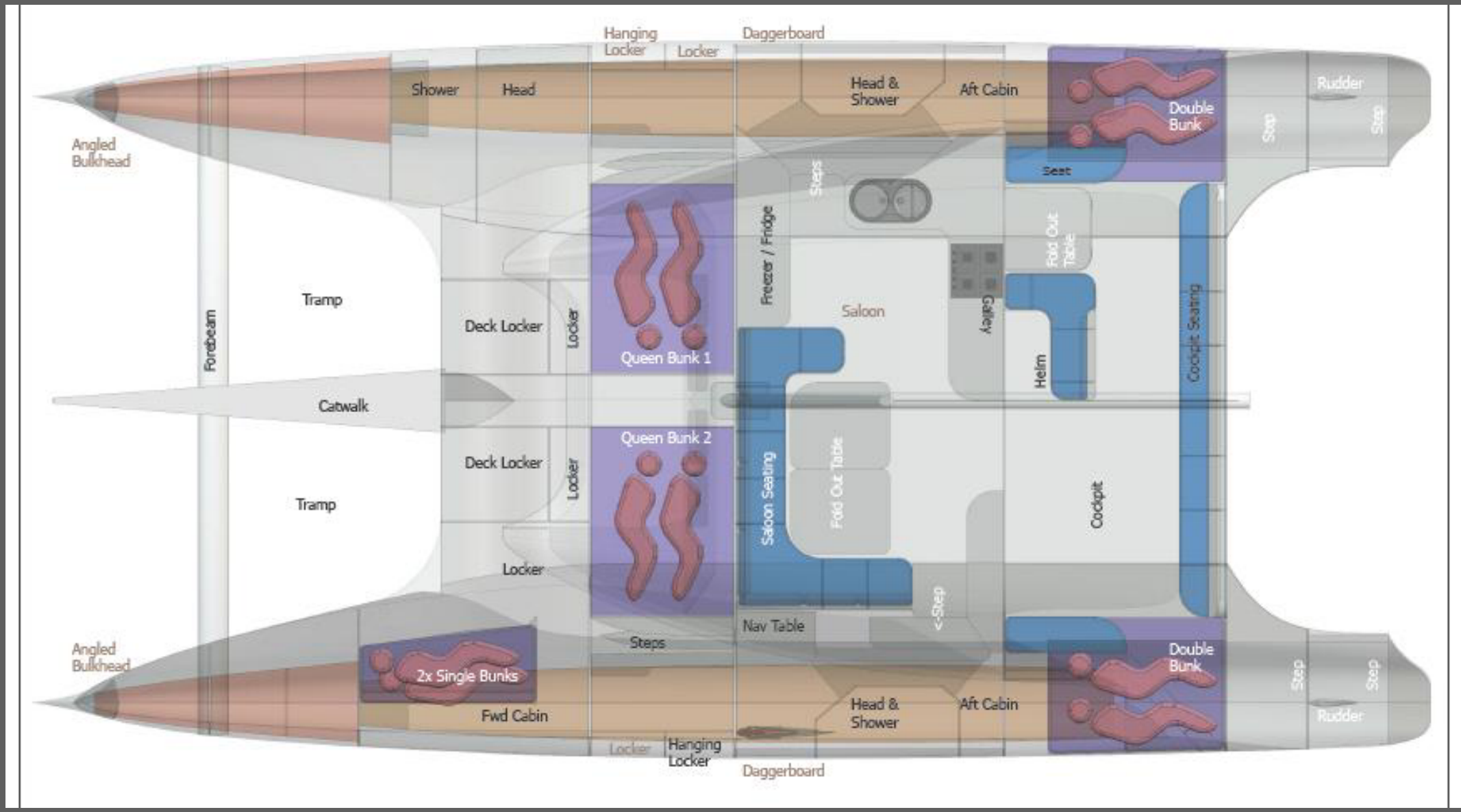
Using modern technology to its best advantage we CAD model our designs allowing us to explode all parts for nesting and pre-cutting into a full kit, speeding up the build of the shell by 30% or more. Plans are cutting edge, very clear and detailed, honed over many years to be the best in the industry.

Safety is very important to us, we perfectly balance the sailing performance without compromise and coupled with our engineering and high safety factors in key areas. We have high reserve buoyancy in the bows to prevent burying, leaving many compartments sealed as buoyancy tanks, many of these will be high up in the unlikely event of capsize. The bottom section of the hulls below cabin sole makes up a massive box beam for strength and worry free beaching.

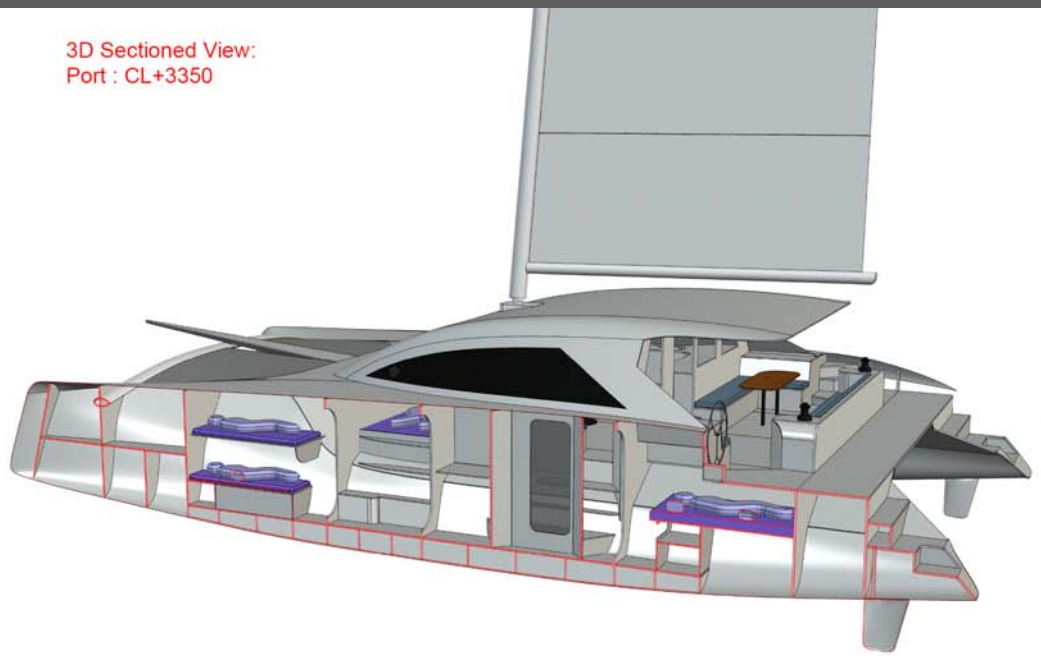
She is a very easy cat to build even with no previous experience or if you have the means ask one of our recommended builders for a quote and get sailing sooner. This is a very capable ocean cruising cat - the luxury of good waterline length makes her fast and comfortable and while she is big enough to offer real comfort she is small enough for a couple to easily handle in all conditions. She will make you smile if you do a bit of club racing, able to show most a clean transom heading over the horizon.

The 1500C has good payload of 2600 kilograms at DWL, we would normally paint the WL 100mm above DWL as this keeps that area clean but more importantly offers a guide to cruising load. When coastal cruising you will be sitting a little above DWL (Design Water Line) but when heading overseas very likely be fully loaded and about 50mm below DWL this increases payload to about 3500KG's. Not a problem as you use food and water as you go and arrive after a few months back on the light side of DWL. She can carry a good load but remember you must keep that discipline to build as light as possible or you simply build a heavy cat using up your payload.

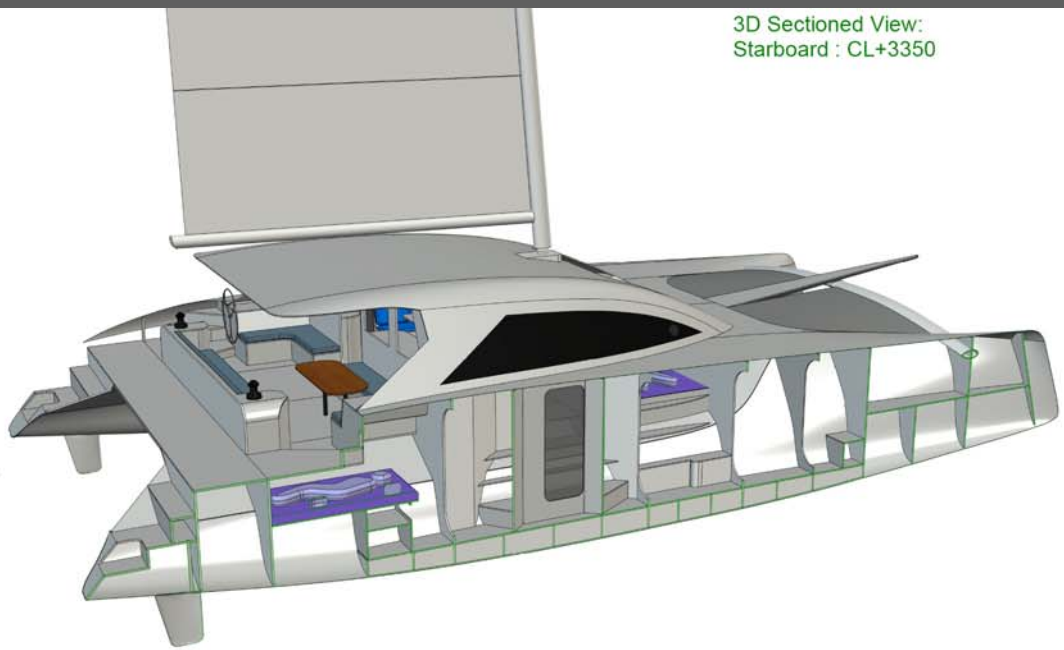
We hope you find her as exciting as we do and look forward to talking to you further.

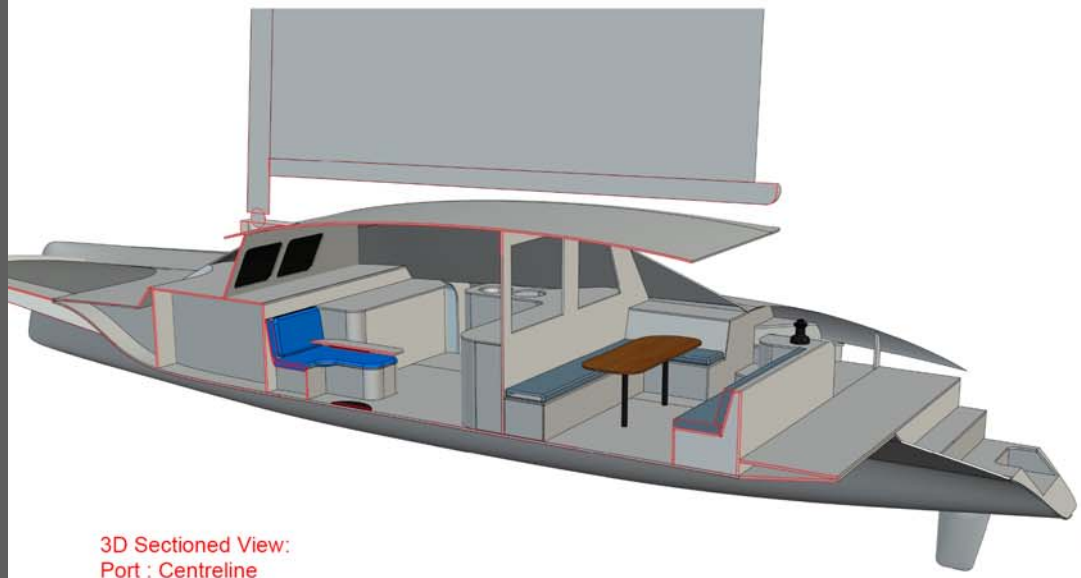

Hanging Locker
Locker
Daggerboard
Shower
Head
Head & Shower
Aft Cabin
Double Bunk
Rudder
Step
Step
Angled Bulkhead
Seat
Steps
Freezer / Fridge
Fold Out Table
Tramp
Deck Locker
Locker
Queen Bunk 1
Saloon
Galley
Helm
Cockpit Seating
Forebeam
Catwalk
Deck Locker
Locker
Queen Bunk 2
Saloon Seating
Fold Out Table
Cockpit
Tramp
Locker
<-Step
Nav Table
Steps
Angled Bulkhead
2x Single Bunks
Fwd Cabin
Head & Shower
Aft Cabin
Double Bunk
Step
Step
Rudder
Locker
Hanging Locker
Daggerboard

3D Sectioned View:
Port : CL+3350

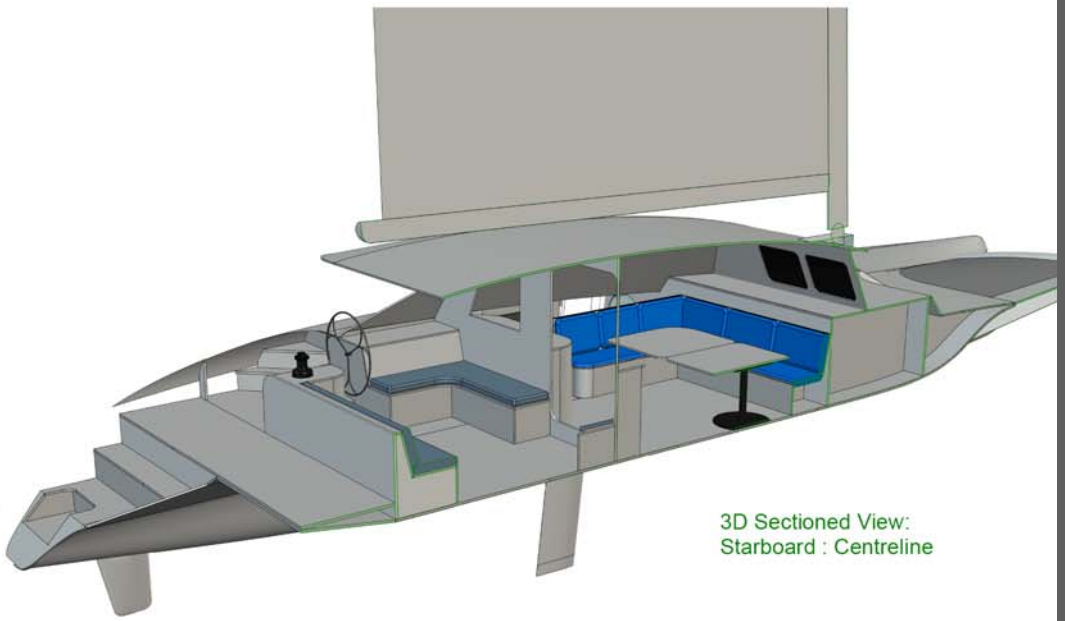


3D Sectioned View:
Starboard : CL+3350



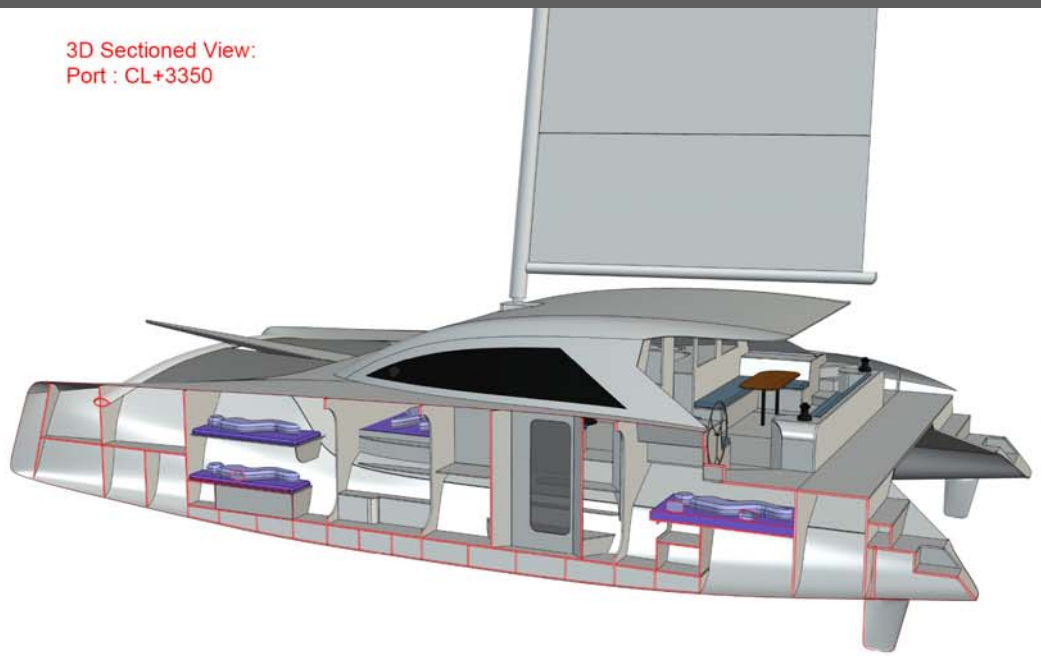


3D Sectioned View:
Port : Centreline

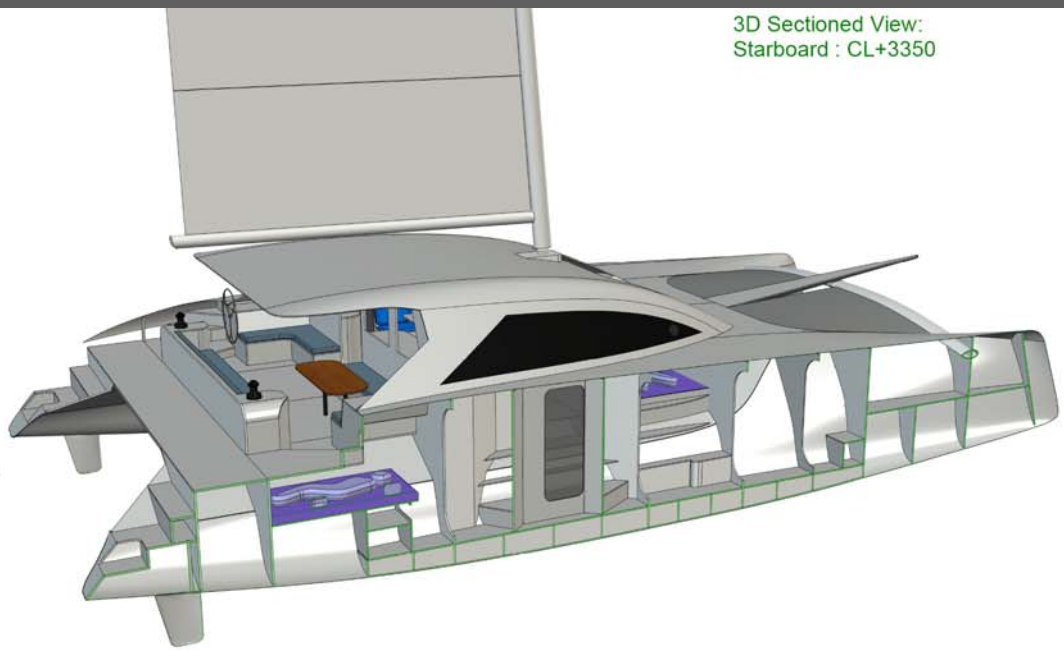


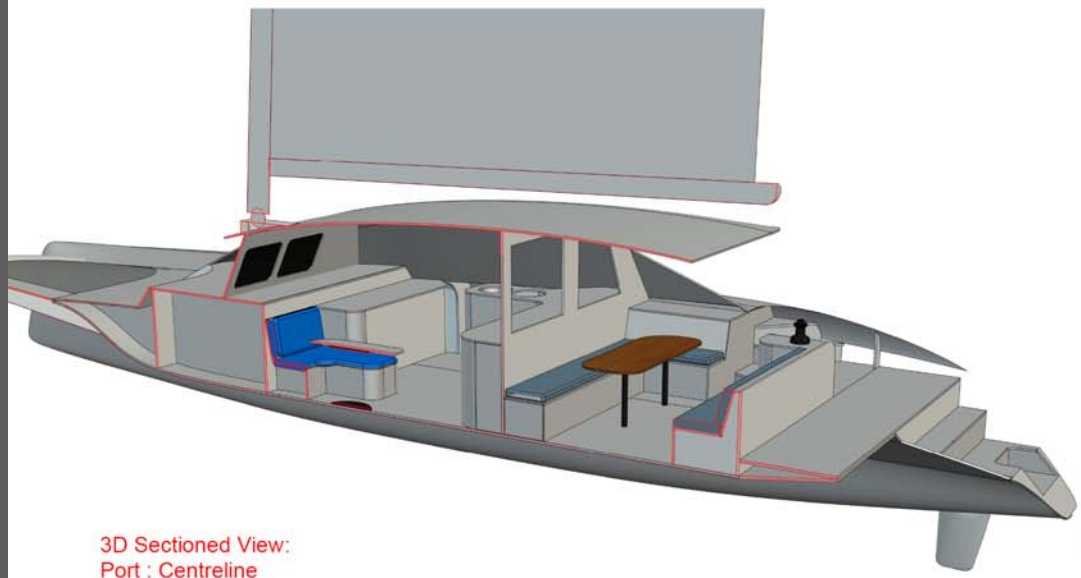
3D Sectioned View:
Starboard : Centreline

3D Sectioned View:
Port : CL+3350

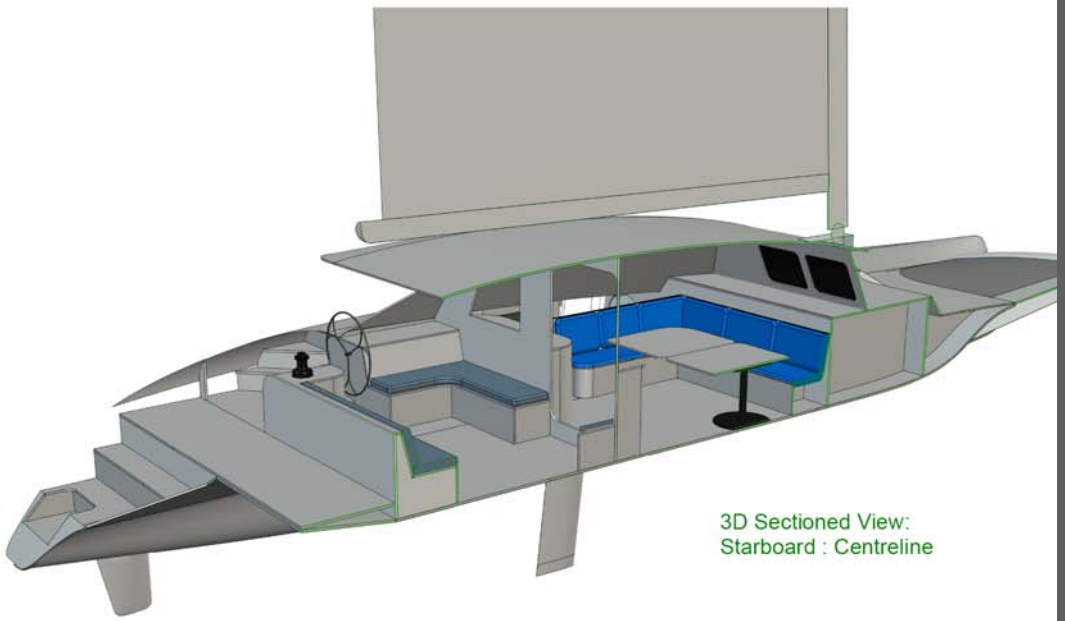


3D Sectioned View:
Starboard : CL+3350

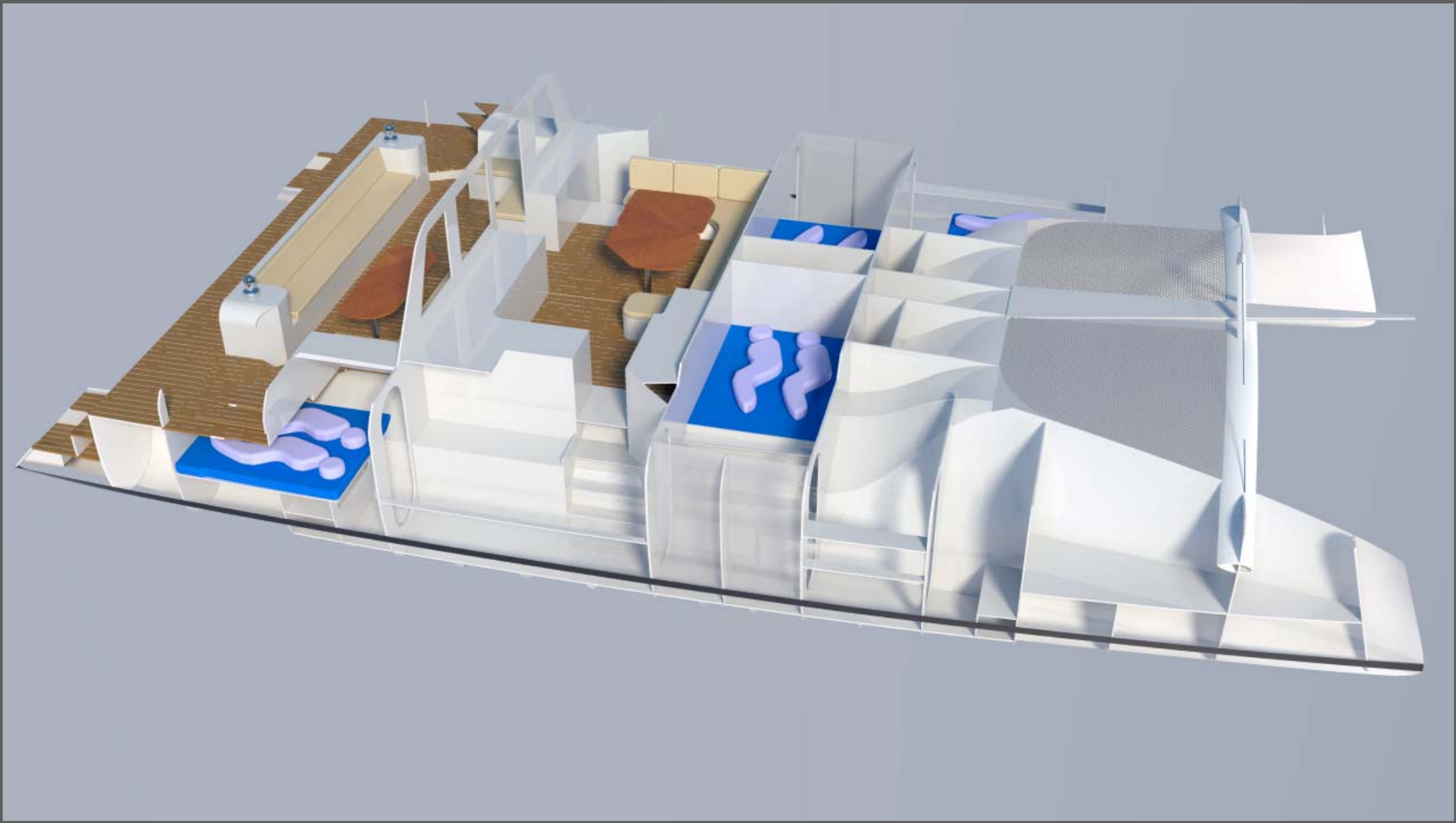


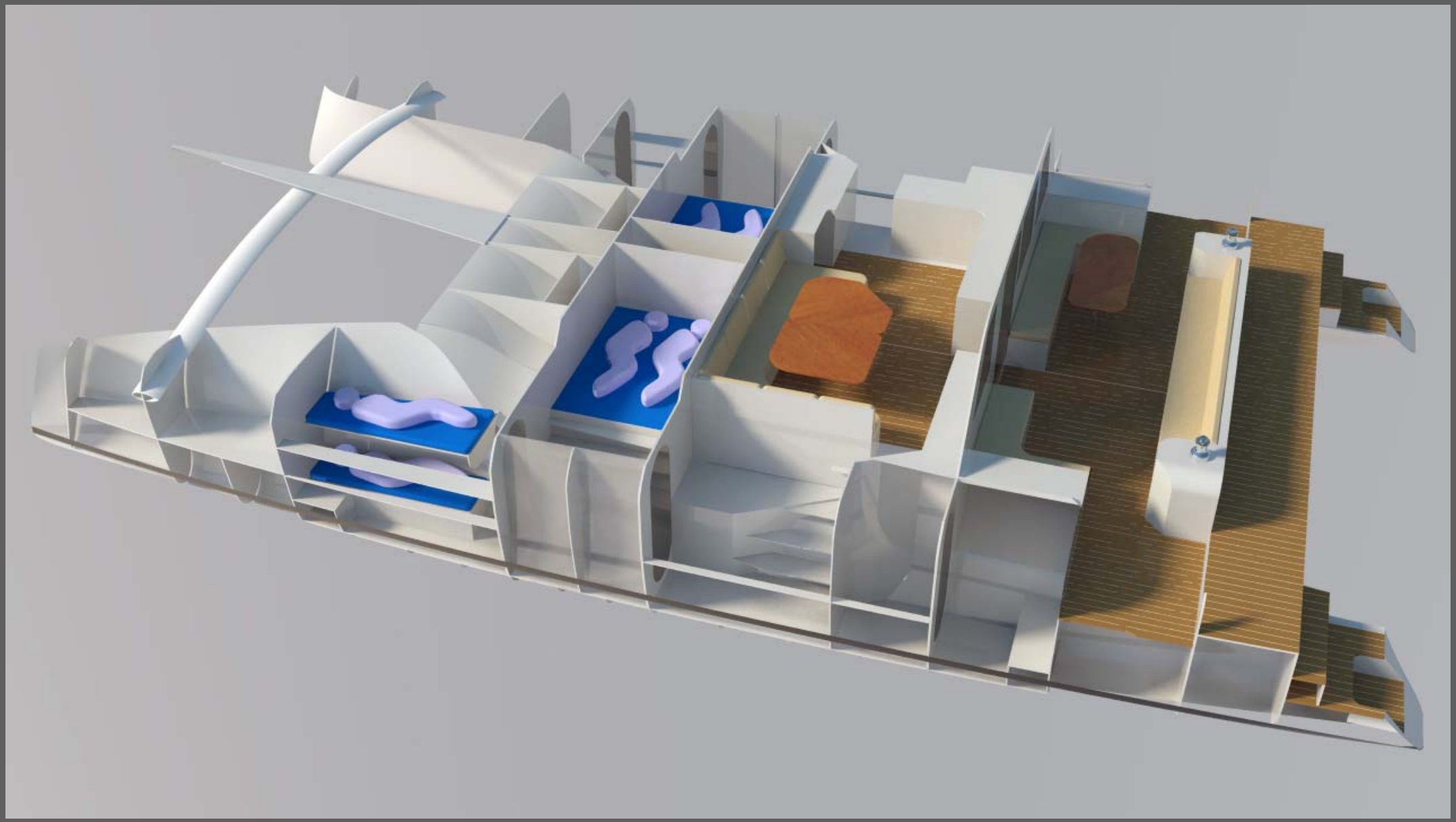


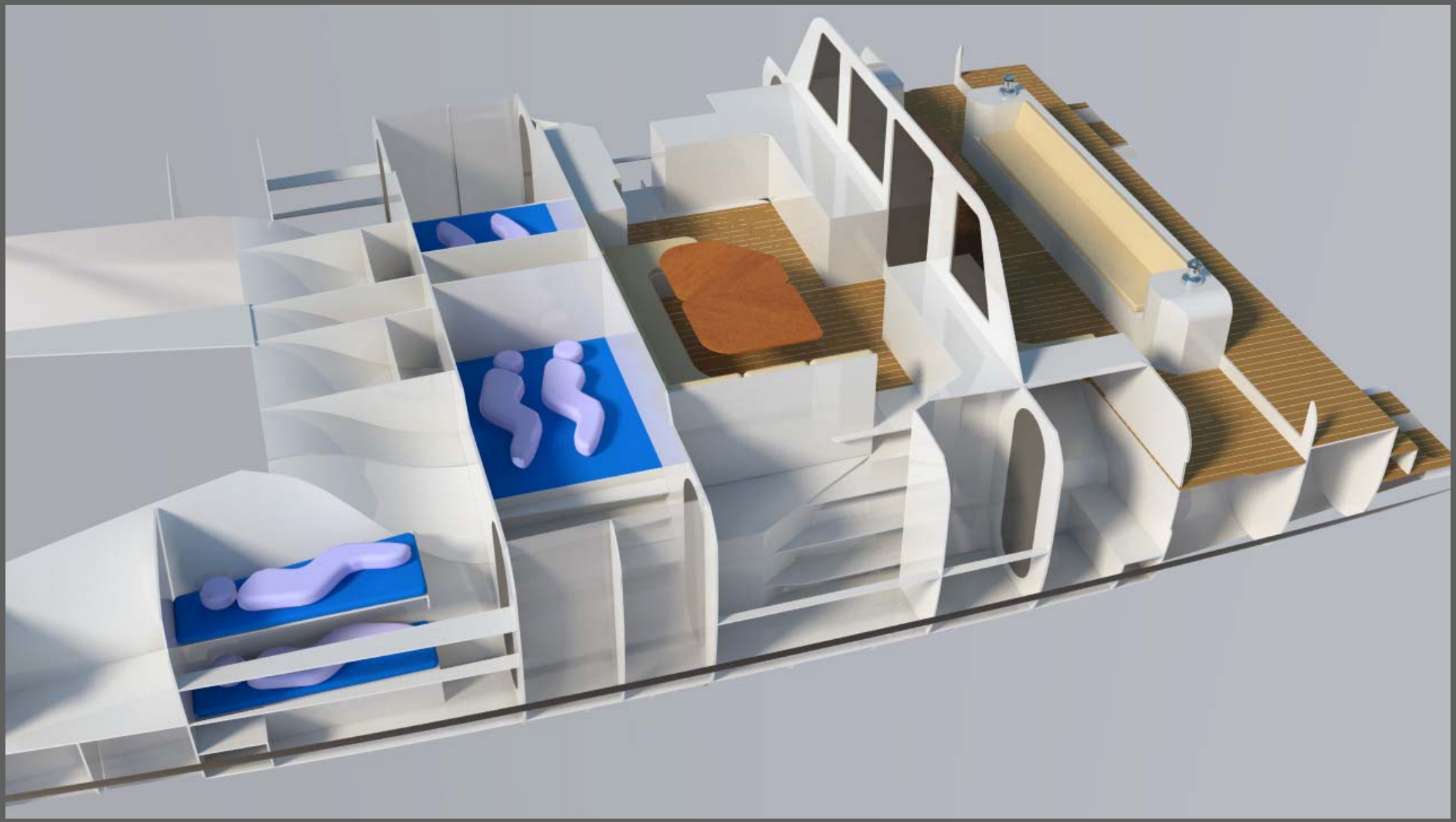
3D Sectioned View:
Port : Centreline

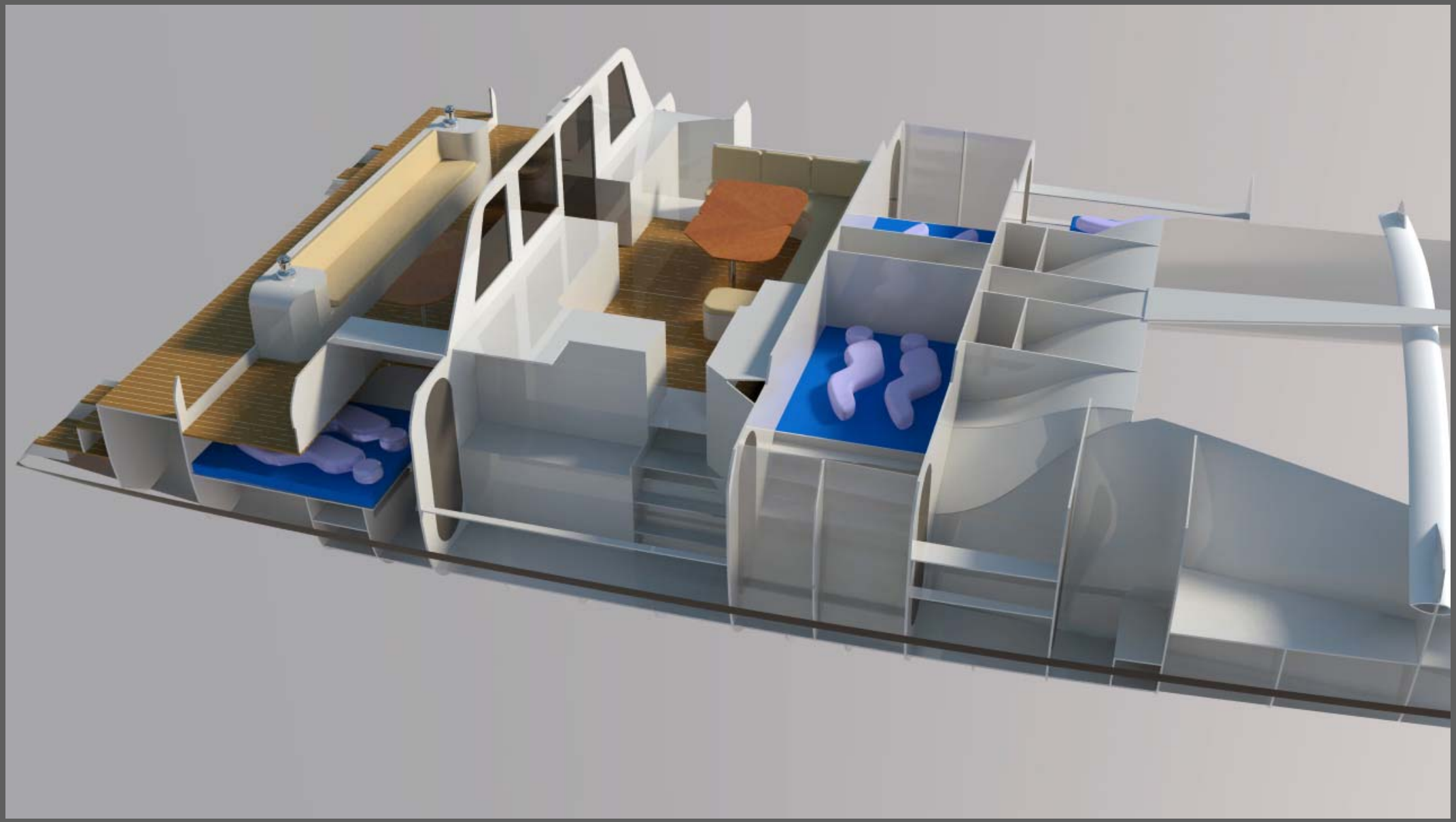


3D Sectioned View:
Starboard : Centreline









Our designs are based on cored composite construction techniques using 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, Gurit and other good quality epoxy resins for their high strength, adhesive values and higher (HDT) heat distortion values. It also fully protects the boat against water absorption and it can't develop the dreaded Osmosis. Having worked closely with the ATL Composites team and their products for many years, we recommend their materials and service highly.

Cloths

We recommend Colan brand Australian made cloths for their excellent quality being easy to work with and having low resin absorption but prices can be quite high. Be aware that cloths vary a lot in the way they are made, some cheaper cloths use more resin to wet out and make it hard work, and they can be difficult to layout around corners and curved areas. 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.

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 as a core. 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 by adding at least double the reinforcement on the outside to spread that compression load over more core and we need a tri-axial type of cloth 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 mould for control during construction, this takes more time and is slightly more expensive.

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

Paper Honeycomb Featherlight (50kg/cubic metre) is very efficient and lighter than other core choices. This can be used for external use but needs extreme care to prevent water penetration so we don't recommend this. Ideally it is used for internal furniture. 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.

Foam Core (60kg/cubic metre) Featherlight Panels We recommend this for our interiors. It is light, has no water absorption issues and when backfilling cut-outs doesn't absorb as much filler and resin as the Paper Honeycomb Featherlight. The foam Featherlight is slightly more expensive than the paper honeycomb Featherlight.

These are the reasons we prefer Durakore and Duflex Panels for our home built designs. The price in Australia of balsa panels is less than foam. For a technical engineering comparison and more information on the foam/balsa core choice, see a document in "Resources" on our web site or email us.

Kit Overview

G-Force 1500C

The G-Force 1500C is built using a Pre-Cut Duflex Panel kit, with some strip planking to achieve the curved areas. This kit can be supplied from Australia or Germany.

Duflex panels are 1200mm x 2400mm and come with scarf joins on the long edges. The panels are made with either foam or end grain balsa cores, and 1 x 600gm Biaxial cloth with epoxy resin on each. After removing the peel ply and resin sealer coating has been applied, you glue the scarfs together in the required order. When glued, you'll see the full size boat parts are cut but left in place in the panels held by tags which when cut release all the parts which are now ready for assembly.

The two hulls are built separately and upside down over bulkheads which are set in place on a strongback. The strongback material is not supplied in the kit.

Once the hulls are joined and fully taped and any additional glassing underwater is done, the hull bottoms are faired and then turned. You then align and level the hulls before fitting the major cross bulkheads, bridgedeck and forward beam, voilá a catamaran! Well not quite but you're well on your way. After this furniture, cockpit and cabin continue the construction until the shell is complete. The cabin is also built with Duflex and is assembled separately over temporary frames which are supplied in the kit, then fitted on the boat.

Construction plans are detailed and we supply a building manual that although has been written around our original Wilderness design kits, it has all the information you need from basic how to use the materials, what tools you need to tips on fairing, fittings, doors, everything and with loads of photo's too. As well as this, we are available via email or skype/phone support if you get stuck with anything or want to be sure.

Shed size needs to be 2-3m wider than the boat, 4m longer and ideally, the height should be 2.5m plus the boat height.

For more information on construction and kits, see our web site www.schionningdesigns.com.au and look for "Our Kits" tab.

www.catbuildingblog.com is the site by Christian Loehr showing his Arrow 1200

"Our kit is coming along very well and I'm glad to say we have all the port side bulkheads up and 5 side panels are all dry fitted and will be glued in place in the next few days. The kit is fitting together very well".

D. Moore, Arrow 1200 (Malaysia)

Construction (Various Designs)

G-Force 1500C

A Note From The Designer

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 Note From The Designer

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?

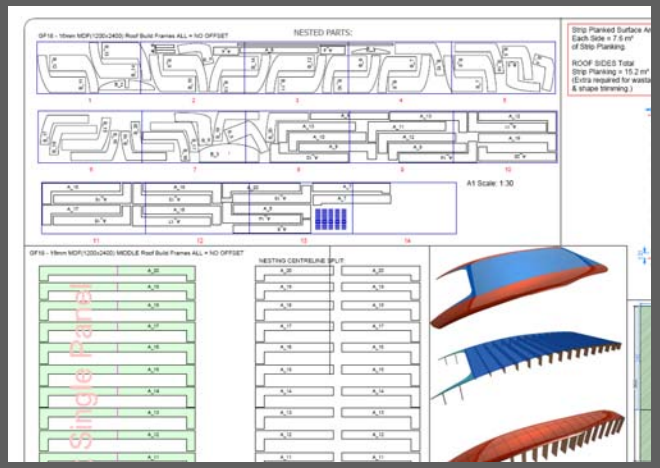
One of the first steps in changing your dream into reality is figuring out whether you can afford the boat (or more likely, how much money you 'don't' have!). Two realities here are, firstly, two similar sized boats with similar displacement, built of similar materials, will cost much the same to build. 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

G-Force 1500C



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

COST OF PLANS:
The G-Force 1500C CE Approved Plans are AUD$24,000.00. Standard Cruise plans are AUD$20,000.00. 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.

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