

Schionning Designs

Radical Bay 8000



Study Plans

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ABOUT US...

Hello and thank you for showing interest in our multihull designs. We would like this opportunity to introduce ourselves and to give you some information on our backgrounds so you may better judge our ability to design your boat.

I was born in South Africa in 1946. My father was from an engineering background and had a very competitive spirit. He raced motorcycles, power boats and finally designed and built racing dinghies which he and I both sailed competitively. So I grew up in a boat building environment from an early age and enjoyed working with boat design and building with my dad.

From school I trained as a land surveyor and enjoyed the combination of outdoor work, complex mathematics and high accuracy levels, whilst continuing to design, build and race yachts in my spare time. I was drawn back to serious boat building and started a yard (Lucky Bean Boat Yard - Knysna, S.Africa) specialising in cold moulded and composite yachts, building a number of boats between 20' - 45' feet. Having built some smaller cats and finding the concepts very exciting I bought and rebuilt an old 34' trimaran with the help of my family, adding new styling and engineering. We lived aboard her and sailed many thousands of miles up and down the fairly treacherous South African coast and the Cape of Good Hope.

I specialised in multihull deliveries and repairs and looking to follow this interest and seek a more peaceful ocean and country, I emigrated to Australia in 1984. Here I met my wife Lorraine who personally has made many ocean crossings and has years of live aboard experience. She adds that feminine touch often left out in yacht design. She also handles the business and administrative side of things.

My two sons Craig and Brett both completed apprenticeships in boat building with me, both qualified with Honours. They both grew up on a boat from an early age, with saltwater running through their veins, so to speak, this built up their experience.

Notes From The Designers

We started off building a number of Aussie multihull designs, then designed and built my own, which led to the development of the design range you are now looking at. The success of these designs I feel, stems from the practical commonsense approach of a boat builder, coupled with many years of live aboard experience and 50 - 60,000 sea 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.

My eldest son Craig has joined the design office and is now running the business. Craig has been building and sailing for many years now, he is also very passionate about multihulls and design. He knows our designs, engineering and construction very well so this was a natural progression for him.

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.



Jeff, Lorraine, Ben and Brett Schionning

NOTES FROM THE DESIGNERS...

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

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.

One of the first steps in changing this 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 the same to

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build overall. Designers' estimates of materials are often inaccurate and sometimes minimised to lead one to believe their boat 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 offers you good backup 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; daggerboards 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 a lot sooner.

WHAT MAKES A GOOD MULTIHULL?

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 understood.

The basic principles of good design should all be present in the boat you're considering building or buying. These will be blended to produce the best boat for the intended use.

THE BASICS ELEMENTS OF A GOOD DESIGN:

- Good Engineering
Our boats are well proven.
- Flat Decks
The flatter deck lines have a number of advantages. Secure footing while reefing, anchoring etc. in rough conditions, life lines are at a sensible protective height instead of set down a level. A flat deck is great for socialising, sunbathing or as a kids playground.
- Buoyancy
Buoyancy distribution is the placement of buoyancy in the hulls. Our designs have between 50 and 60 separate buoyancy tanks built into every shell so they are almost unsinkable. Most old designs hobbyhorse a lot making 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 nosediving. Coupled with a lot of reserve buoyancy higher in the forward hulls this adds an enormous amount of safety and gives you confidence off the wind.
- A soft 'V'd entry, quickly picking up reserve buoyancy with high reserves higher up is ideal.

Notes From The Designers (cont)

- Bridge-deck Clearance

High Bridge-deck 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.

- 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 out run 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 as per our designs, it's easy to run the cats up on any old beach. 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, giving the best of both worlds.

"Sailing ability is important. We feel that good performance in a sailing cat is a real safety feature."

- Low Drag

This 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 and increases anxiety in the skipper and crew and have a demoralising effect on all concerned.

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ADDED SAFETY FEATURES

A lot of the features mentioned above, we consider to be essential for safety. Besides these, the following are extra features you'll find in our designs.

- Escape hatches, one in each hull accessed from inside and out.
- Flat safe decks and semi-enclosed cockpit. (Great for small kids)
- Food is set in dry, mid height, lockers. Water tanks do not lose water if inverted and by simply switching outlet and breather, full easy access is possible.
- Daggerboards and kick-up rudders are designed on all my boats. I feel this is a safety feature in case of collision with floating or submerged debris (and fish traps) and when raised they allow the boat to side slip in storm conditions which is a good safety feature so she won't 'trip' over her keels and flip over.
- A Storm eye is built into the forward beam for the Para-anchor brindle.

New materials have brought very strong light boats into everyone's reach. The epoxies and cores are easy to use and a home builder can easily produce the same product as a professional boat builder.

Also important is the feeling of security one has in a boat. Cats' are very noisy at sea, we've found that carpet damps down sailing noise and a little attention to detail like stopping daggers rattling etc. will add to one's psychological sense of security. Confidence in your design helps a lot too and I feel you'll find this in my designs.

Our plans are easy to follow and being builders as well as designers we have tried to make the building process as painless and simple as possible. We are continually improving our plans and our new CAD plans are among the very best in the World. We offer a continuous backup service to help builders and remain interested in your project to the end.

Good luck with your project and decision. I believe we have the best possible designs and backup service to offer and hope you find something in our design range to turn your dream into reality.

Please feel free to contact us with any questions you may have.....regards, *Jeff and Craig.*



Design Profile & Description

LOA	8 metres
BOA	5.76 metres
DRAFT	0.300 metres
Headroom – Hulls	1.7 metres
Mast Height (two of)	8.35 metres
Sail Area.....	41 sq metres
Payload.....	300 kilograms
Displacement.....	1100 kilograms
Immersion Rate	66 kg/cm
Fuel Capacity	20 litres
Water Capacity.....	50 litres
Bridgedeck Clearance.....	0.68 metres
Rec. motors	8-10hp OB
Motor Speed : cruising	5 knots
top.....	8 knots
Sail Speed : cruising	12 knots
top.....	20+ knots
Building Hours (kit/self-cut) .	1500/2000 approx
Cost Of Materials	\$33,000 estimate
complete: basic, but ready to go.	
Waterline Beam to Length ratio	14.5:1

For the Radical Bay 8000, we have chosen a simple hull form, with a vee section forward to stop slamming running aft to a flat exit to reduce hobby horsing. The asymmetric hull shapes as used on most of our designs benefit the boat in a number of ways.

Firstly, the internal space is far more useful as the galley tops, lockers etc are set to the side out of the normal walkway. Secondly, the bunks are much wider because of the chamfer type panel. Thirdly, this panel is carried right forward adding large reserve buoyancy forward to prevent the bows being driven under. Mostly though, a fine waterline beam to length ratio is maintained giving very low drag ratios making for a very fast boat. The flared inside panels also give reserve lift in rough seas and breaking bars, which help keep the beams well above the surface eliminating slamming.

The layout is surprisingly comfortable for such a small cat especially with speed being a primary focus: the fwd bunks are more a 3/4 size and could easily sleep two friendly people lowering the bunk can increase the headroom but you will reduce width. We have added a cockpit in each hull, the cabin offers some protection but mostly to have a comfortable sitting position with good visibility protected from those annoying unexpected splashes that sneak up through the tramps now and again. A dodger can be added.

The cross beams are simply alloy tubes to keep costs down and also allow the cat to be dismantled for transport.

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We have offered a composite mast beam option, which will do away with the striker under the mast and cruise owner want a hard deck between the mid and aft beam, the cat can still be demounted. There is a central hard deck station, carrying the winch, clutches and motor brackets.

To keep costs down as much as possible, there is only one winch, this tends to halyards, outhaul and reefing lines. The halyards will use a simple downhaul purchase to get luff tension: the main sheet is a 4:1 purchase because the booms are fixed to the mast (but still removable), this alleviates the need for a mast rotation system. The booms are built in composite and are engineered to handle the leach and foot loads from the sail meaning that travellers for the mains are not required. The loads on the mainsheet are light and easily managed.

There is an option to run a spinnaker or screecher between the masts, being able to be pulled from side to side, also fully adjustable on deck from side to side.

Steering is by tillers connected with a link bar, the tillers are handy to the cockpit. Rudders are our usual kick-up type with the blades set under the boat to increase efficiency and avoid aeration as much as possible. Shafts can be stainless steel or carbon. Daggerboards are used to achieve the best windward performance.

The forward area is all tramps, connected to the fore-beam.

The twin carbon un-stayed masts can be built yourself with plans included in the construction plans. These are built with pre-bend included in the shape, giving the inherent strength to the masts and improving stiffness. The section shape is round at the base and develops into a 'D' shape at the tip. This tip shape acts as a "self dumping" system when in strong gusts. These masts are very stiff, only flexing about six inches in gusts. With reefings we've found it very easy if running before the wind, it is a simple case of bearing away until the leeward main collapses. Then you are free to reef while under-way. Each main has one reef point. First reef is with one sail reefed, second is with both sails reefed and third reef is with only one sail up. We have found this works extremely well, with third reef you could sail in almost any conditions.

The motor is a little different and has been well proven on our 10.3m racing cat. It uses a bracket made from 100mm tubing, one end has a 19mm ID tube about 400mm long welded crosswise to form a hinge, this is pinned to a composite fitting under the central hard deck. The tube is about 2 metres long and on the other end is

Design Profile & Description (cont)

transom on which the motor is clamped. The motor is lowered to the correct height and retained with two wires fixed to the underside of the aft beam. There is a canvas type cover to protect the motor from spray. The tricky bit is that not only does it store the motor high up when sailing, the tube is the fuel tank holding about 10 litres of fuel.

CONSTRUCTION OVERVIEW

The “kit” consists of 2400 x 1200mm sheets which are supplied with factory cut scarf joints. Once joined (in sheet form) and set, the holding tags keeping the cutout pieces in sheet form are cut to release full length panels and bulkheads. The bulkheads are stood on the strong-back and the full length hull panels are fitted over these bulkheads and glued in position. All joints only need taping as panels and bulkheads have been pre-glassed at the factory. Unlike a lot of “multi-chine” designs, the Radical Bay have a small section of strip planking on the hull/deck curve. This is easier to build, softens the appearance making the chines almost invisible.

Once the two hulls have been assembled and taped (individually), they are turned over and taped inside and the bulkheads taped as well as extra reinforcement below the waterline. The hulls are aligned and the major bridgedeck bulkheads fitted. The bridgedeck floor follows this step and you have a complete open shell. At the same time you could be making your strip planked cabin roof, forward beam, daggerboards and cases, rudders and targa bar. The strip planked decks are done on the boat using the bulkheads and a couple of added temporary moulds. The rest of the decks follow along with cockpit, furniture etc. The Cabin roof moulds are supplied pre-cut in the Kit (or full size plots in plans only) and this is strip planked, as is the forward beam.

Easy to follow sheets on composite fittings are supplied in the plans. These save money and give the finished product a very classy, up to date look. Composite chainplates are extremely strong, look good (painted) easy D.I.Y. and no leaks!

The furniture fitout is made easy with the stiff, light and easy to work with Duflex honeycomb. Tips are included in the plans on how to form complex attractive curves quite easily.

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The Radical Bay can be built in separate pieces if transportation or space is an issue. That is, 2 hulls, bulkheads, bridgedeck and accessories (daggerboards, forward beam, rudders etc). This allows you to build at home and finish near the water, saving money on rent and time travelling.

We have carbon mast plans available to any Schionning design builder and if you build it yourself, the saving is very worthwhile and you end up with a better product. With all composite fittings and Jeff’s new webbing attachment system, you don’t have the associated problems and maintenance of ‘bolt-on’ type fittings. We have contact details of several insurance companies very happy to insure boats with our masts. Plans are included for a boom, this again saves money and suits a bolt rope to accept the popular ‘stack-pack’ zip up type sail cover.

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

COMPONENTS

Hulls: 1450 H x 1350 W x 8000 L

Pre-cut Interior & Bulkhead Kit Options

Some of our designs offer the option of having bulkheads and furniture pre-cut. This is proving extremely popular with owner builders as well as Professional builders because the labour time is very much reduced as is the 'thinking' and planning time that is inevitable when building an interior from scratch.

Logan Tabuteau of Tabuteau Marine absolutely loves the pre-cut option saying it is so simple and also accurate. The material quantities are more accurate as it has all been computer nested. Logan said of the Wilderness 1480 kit, "if it doesn't fit together perfectly first up, it is always my builder doing something wrong, the kit is 100% accurate every time".

How the pre-cut kit works:

The kit is supplied in the specified size Duflex or Durakore panels, with every piece of furniture pre-cut and held in place in the 2400 x 1200mm panel by small tags. The full size panels are scarfed ready to join and once glued and dry, the tags are cut to release the individual pieces. A set of plans is supplied for the pre-cut furniture showing the assembly of each cabin (see example image - page 7).

ADVANTAGES OF KITS

- **SPEED**
This is the quickest method to build a one off boat! The panels are pre-glassed and pre-cut. The panels are taped together with pre-cut (width) tape. A Wombat Junior wet-out machine (cost approx. \$500) eases this process further.
- **SIMPLICITY**
There is no doubt, building a boat does not get any simpler than this. The computer generated pre-cut and pre-glassed panels just fit together perfectly.
- **HEALTH**
Because of reduced handling of epoxy and cloth, your exposure to hazardous chemicals, fumes and itchy dust is very much reduced.
- **EASY TO HANDLE**
The furniture can be assembled on the floor in the workshop and then when dry, taken on board and fitted in position, this makes the job much easier.
- **LESS WASTAGE**
The computer nesting ensures maximum use of material and minimal wastage.
- **QUALITY END RESULT**
One of the major pluses of using the DuFlex panels is that being pre-glassed under strict factory conditions, they maintain the correct resin to cloth ratio and so maintain the required and desired strength and weight.

Pre-cut Kit Options

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DESIGNS OFFERING PRE-CUT OPTIONS:

Kit sets not shown below can be supplied for any design upon request. Please contact us for further details.

Wilderness 930: no kits.

Wilderness 1030: Bulkheads, Hull Panels, Interior, Cockpit, Targa Bar.

Wilderness 1100: Bulkheads, Hull Panels, Interior, Cockpit.

Wilderness 1320: Bulkheads, Hull Panels, Interior.

Wilderness 1480: Bulkheads, Hull Panels, Interior.

Wilderness 1620: Temp. Moulds, Bulkheads, Hull Panels, Interior, Cockpit, Targa Bar.

Cosmos 930: no kits.

Cosmos 1100: no kits.

Cosmos 1160: Temp. Moulds, Bulkheads.

Cosmos 1250std: Temp. Moulds, Bulkheads.

Cosmos 1250sv: Temp. Moulds, Bulkheads, Interior, Cockpit.

Cosmos 1320: Temp. Moulds, Bulkheads, Interior.

Cosmos 1430: no kits

Cosmos 1750: Bulkheads, Interior, Cockpit, Targa Bar, Temp. Moulds.

Waterline 1000: no kits

Waterline 1160: no kits

Waterline 1320: no kits

Waterline 1480: Temp. Moulds, Bulkheads, Interior.

Waterline 1620: Temporary Moulds

Waterline 1750: Temp. Moulds, Bulkheads, Interior, Cockpit.

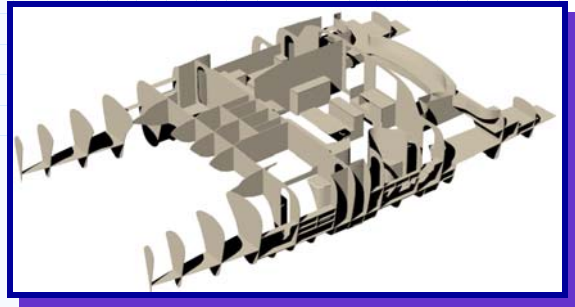
Line Honours 1220: no kits

Line Honours 1400: no kits

Growler 1150: no kits

Radical Bay 8000: Bulkheads, Hull Panels, Interior, Temporary Frames

Radical Bay 1060: no kits



Prowler 4000: no kits

Prowler 7000: no kits

Prowler 1100: Bulkheads, Interior, Cockpit.

Prowler 420: no kits

Prowler 580: Temp. Moulds, Bulkheads, Cockpit.

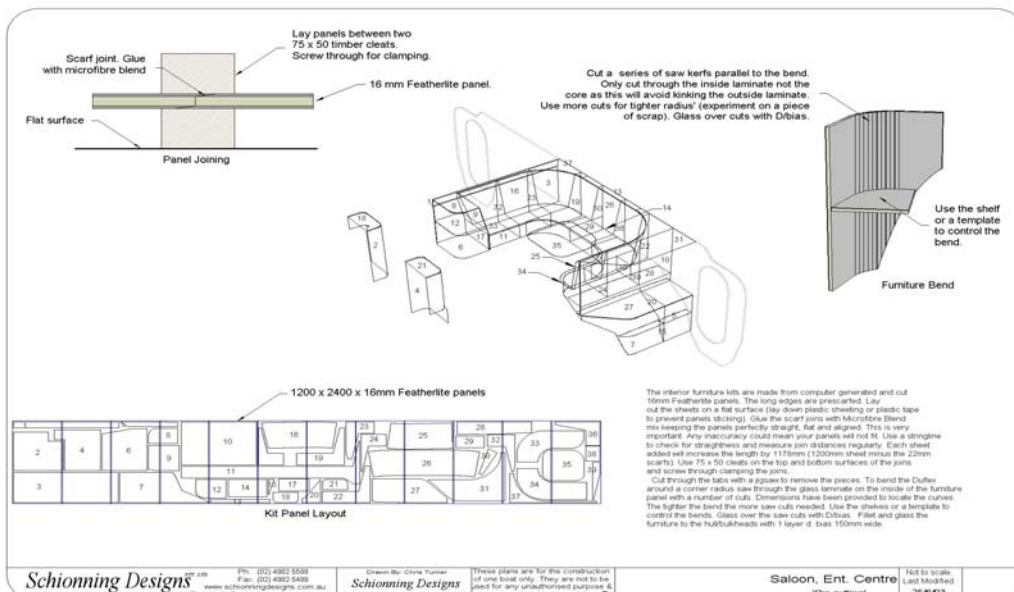
Alaskan 390: Temp. Moulds, Bulkheads.

Alaskan 460: Temp. Moulds, Bulkheads, Cockpit.

Aquaplay 1100: no kits

Aquaplay 1250: no kits

A-Class: Temp. Moulds, Bulkheads.

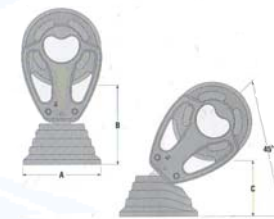


Basic Materials List

(to approximate shell stage)

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<u>PLANKS, PANELS & TIMBER</u>		<u>POWDER MODIFIERS</u>	
9mm Durakore Planks - 2400 x 300mm		20 Litre Microfibres (403)	4 bags
	15 Planks	20 Litre Microspheres (411)	3 bags
10mm Duflex Balsa 1 x 600gm Biax each side		20 Litre Microlight (410)	4 bags
	33 sheets	<u>SUNDRY ITEMS</u>	
13mm Duflex Balsa 1 x 600gm Biax each side		Precutting and scarfing of kit	1 kit
	4 sheets	Precutting and scarfing of furniture kit	1 kit
16mm Featherlite Interior Foam 1 x 600gm		Precutting of temporary frames - 18mm MDF	1 sheet
	6 sheets	Aluminium Beams	
Western Red Cedar		6m 152.4mm dia	
50mm x 150mm	3 lin m	4.8m 203.2mm dia	
18mm MDF - Temporary Frames		6m IM12L extrusion	
	1 sheet	We recommend only West System epoxy resins and associated products be used to build our designs.	
<u>CLOTH & TAPE</u>		We have engineered our designs using these specifications, no responsibility will be taken if other resin is used.	
Fibreglass Cloth		No wastage has been allowed for.	
400gm Double Bias 1.27m x 75.3m	2 rolls	Due to owner preferences, we do not have a materials list for chandlery etc but we do have a catalogue ordering service, offering huge savings. Please contact our office for catalogues.	
460gm Unidirectional 1.25 x 70m	1 roll		
Fibreglass Tape - cut strips			
400gm Double Bias 100mm x 50m	10 tapes		
400gm Double Bias 150mm x 50m	10 tapes		
<u>PLYWOOD - MARINE GABOON</u>			
6mm Ply	6 sheets		
10mm Ply	1 sheet		
<u>FOAM</u>			
Klegecell			
25mm sheet	1 sheet		
40mm sheet	4 sheets		
<u>BALSA - END GRAIN</u>			
25mm sheet	1 sheet		
<u>RESIN</u>			
ADR 246 and Hardener - 22.5 kg	1 pack		
R105 and Hardener - 24 litre	4 packs		



For anyone who has sailed a monohull and is contemplating a multi, in particular a catamaran, it must be a very difficult transition and also a sharp learning curve.

Here are some advantages of a cat:

ROOMY

The main advantage is space, which naturally comes with the very wide beam that a cat has, making the bridgedeck cabin a very spacious part of the boat. The downside to this is the windage this creates, so it is important to keep the cabin as aerodynamic and low as possible. There is always a balance between bridgedeck clearance and keeping the height of the cabin down but to achieve comfortable standing headroom in the hulls, this sometimes becomes a challenge for the designer. We feel in all our designs we have achieved this balance, with the cabin size moderate in length, leaving plenty of hull overhang for safety.

SPEED

Cats are fast, there's no doubt there but we still get people saying "Isn't that dangerous?" or "Won't you capsize?". This is not the case when you have a good design that's built light. This combination makes for a very seaworthy boat because when in an unexpected situation and get hit by a bullet or a strong gust, the boat will simply accelerate, whereas a heavier cat will become over-powered and the rig will try to overtake the boat, this is dangerous. We feel speed is safer if trying to avoid weather patterns or getting out of a system. Something a mono sailor may not be aware of, is that a multi can make apparent wind, this means achieving speeds greater than wind speed. A well-designed performance cat can be a lot of fun to sail in the right conditions! (Note: Not ALL cats are fast.)

UNSINKABLE

A lot of people don't realise that our cats are unsinkable. When building out of core materials, the core material is usually buoyant enough to keep the boat from sinking but with our designs we have separate buoyancy compartments situated throughout the boat. The compartments usually run from the bow all the way to the front of the bridgedeck cabin. They are also in the sterns and full length under the soles, which means you could puncture every compartment under the soles and still get home safely.

CONSTRUCTION AND ENGINEERING

Early cats and tris certainly didn't start off with a good name, design had a lot to do with it. Hobby-horsing was common, leading to problems at sea with pitch-poling etc as there was not enough buoyancy in the bows. Another contributing factor was the materials available and engineering know-how. Nowadays, with high-tech composite materials and cutting-edge engineering coupled with a good design, cats are becoming extremely popular, no to mention look great!

STABILITY

Cats don't heel, they have a quick motion that makes getting around and living aboard a real pleasure. Often people who get seasick on a monohull won't on a cat, and yes, you really can leave your coffee up on the table when underway in most conditions.

Material Choice

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Our designs are based on cored composite construction techniques using epoxy resins and knitted fabrics.

RESIN

We use epoxy for its high strength and adhesive values. It also fully protects the boat against water absorption and it can not develop Osmosis. We choose ATL Composites resin systems as they are the highest strength and quality at the best dollar value.

CLOTH

We prefer Cotech brand cloths for their quality and low resin absorption.

CORES - Which one to use?

The core choice is usually quite confusing. Cores have different capabilities and are used I feel in their best application in our designs. A quick look at their abilities:

Balsa end grain (150 kg/cubic metre) has exceptional qualities, very high compression strength, very good sheer capabilities and very good 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 tip of your finger. Balsa is far stronger than Foam (80 kg/cubic metre) in compression. Foam is stronger than honeycomb both paper and 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 it has failed in sheer. The amount of stretch you feel before the core shears is sheer stiffness. To compensate for sheer weakness the core is made thicker. So 13mm Balsa may be equal in sheer to 19mm Foam.

Paper Honeycomb (50 kg/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. Paper Honeycomb has similar strength and sheer ability in the vein lines and about 80% across the veins compared to Foam. Plastic Honeycomb is about 1/2 the value of foam and of similar weight

Our hull skin thickness is quite thin, we therefore find the core works harder and its 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.

COMMON SENSE SUMMARY

Core Weights: Balsa End Grain	150kg per cubic metre
SuperLight Balsa	80kg per cubic metre
Foam	80kg per cubic metre
Paper Honeycomb	50kg per cubic metre
Plastic Honeycomb	80kg per cubic metre
Western Red Cedar	360-380kg per cubic metre

Material Choice (cont)

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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.

Foam. 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 1/2 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 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 moulds to achieve this.

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 for home built cats.

SECONDARY ISSUES

1 Water penetration into the cores

Balsa can absorb water. It needs extreme neglect to rot (very unusual). Water soaks along the end grain quickly. It travels very slowly across the grain. We use balsa under the waterline especially because of its high compression strength for beaching etc, any core type must be sealed. Damage to all cores results in the same sort of repair. Notice a damp spot when drying out to anti-foul.....simply grind back the surface glass exposing the core, dry it out and re-glass - it's that easy.

2 Cost

Timber cores are cheaper than foam in most cases.

3 Resale

A light, high tech cat returns a far better (often 2 - 3 times) resale than lower tech materials. Often saving 10k on materials initially, loses 200k on resale - a serious reality.

Our boats can be built using Balsa, Foam or Western Red Cedar. Combine strength, stiffness, lightness and cost, with ease of use - it just makes good sense!

End-grain balsa, we think, has far more going for it than against.

It is strong, about 150kg/m³ in density compared with most PVC brands of foam being around 80kg/m³. This equates to a much stiffer and stronger structure. We can and do help customers who prefer foam for one reason or another with laminate schedules. Usually we will add up to twice the laminate in areas subject to impact, such as hulls and underwater sections to reinforce for beaching.

When it comes to a tough cruising boat that can take its fair share of punishment, balsa is the only way to go. In a minor impact situation foam will generally absorb the damage and depending on the force, leave the inner skin intact. However, if the force is more severe it will puncture much easier than balsa, through both skins. Balsa on the other hand, will resist damage of the outer skin up until impact will break through both skins but will take much more impact to achieve this and the downside there will be more damage than foam.

Looking at the normal operational life of a cruising boat, taking into account general wear and tear, the odd bump into the jetty, beaching, rafting up etc, we feel it's far better to engineer a boat for this application. Damage is something to be avoided no matter the material used.

We have hands on experience with these materials, building and sailing our designs and also repairing in some cases. This has been invaluable in designing, as we are not just looking at lists of specifications but have a feel of how these materials can be blended and maximised in their use.

As with any core material, keeping moisture out of the core is essential, balsa is no exception. We specify squeegee sealer coats be applied on all surfaces. This doesn't add much extra weight but guarantees the life of your boat. Another important procedure with any core material is back-filling. This is done by removing the core exposed in any cut-outs through the core material and replacing with epoxy filler, such as hatches, windows, through-hulls etc. It all comes down to care and attention when building. Being builders ourselves, we have seen varying degrees of build quality, often the material choice has nothing to do with problems suffered during the life of the boat, most repairs we have seen are due to bad build quality.

Back-filling applies to deck fittings too. In this case, wherever a fastener enters the core, this hole must be back-filled with epoxy filler. This way, even if one of these fittings leaks, it won't damage the surrounding material.

In summary, we feel end-grain balsa is a great product. Coupled with Durakore and DuFlex panels, your boat will be strong, durable, stiff and lightweight.

More about DuFlex...

Developed to reduce construction time and to optimise structural weight, DuFlex Composite Panels minimise the experience required to produce a high performance composite structure.

Time-consuming laminating, coring and vacuum-bagging steps normally required to fabricate high performance composites are avoided, and material waste, labour and tooling costs are greatly reduced.



The concept:

- High fibre fraction composite materials possess superior mechanical properties.
- It is safer and less expensive to make such a composite by automated means.
- Flat and developed shapes can be post formed with little or no tooling.
- Cutting is more accurate and less expensive by CNC equipment than manual processes.
- Design allowables are tightened and a greater percentage of project costs are fixed.

The Material

Standard DuFlex panels, 1200mm x 2400mm (Export size 1200 x 2400mm/47 inches x 87 inches), are available with rigid end-grain balsa, structural linear or cross-linked foam, and phenolic impregnated paper honeycomb cores laminated with a high performance epoxy resin reinforced with multiaxial E-glass or carbon fibre, and peel-plyed.

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Unique Features

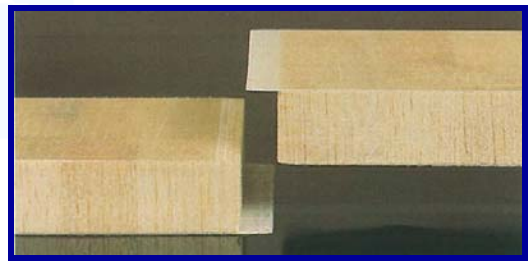
- Strength
- Durability and Damage Tolerance
- Economy
- Expandability
- Kits

Panel Manufacture

The core and laminates are co-cured in a hot press, a method that consolidates the laminate under pressure increasing the fibre volume and therefore the strength of the finished panel. The fibre content is approximately 62% by weight with E-glass in the finished DuFlex panel, compared to 15% by weight with spray-up and 25% with hand lay-up processes using chopped strand mat. Core, fibre orientation and ply schedules are based on design or engineering specifications to best meet weight targets, stress and impact loads, and other design parameters.

By using epoxy rather than polyester resin as the matrix in DuFlex, a reduction of laminate thickness is achieved while improving damage tolerance. Epoxy exhibits better core adhesion, moisture and fatigue resistance, and has superior strain capabilities which provides DuFlex laminates with greater impact resistance than polyester/E-glass laminates that are up to 3 times thicker.

Greater stiffness allows wider frame spacing, while further reducing weight and building cost. Total weight savings can reach 50%. For boats and motor vehicles, this has a follow on effect for power and fuel requirements. Toughness and durability



More about DuFlex (cont)

Radical Bay 8000

of the panels reduce general maintenance costs, and there is no chance of osmotic blistering occurring in the epoxy matrix.

Expandability

To offset their individual size, DuFlex panels can be supplied with both long edges pre-machined to facilitate joining. This Z-joint is structurally effective and achieves a smooth and fair surface profile.

The joint is analogous to a weld in aluminium structures and has mechanical characteristics that can be accommodated in an engineered design.

The Z-joint transforms DuFlex panels, on-site into large monolithic plates.



To streamline the joining process, a Z-Press can be used. The press applies heat and pressure to cure the epoxy adhesive used to bond the Z-Joint. Joints are fully cured in 4 minutes and panel length can be increased at a rate of 1.2m lineal metres per join.

The Z-Press is designed for rugged practicality from rectangular hollow section steel, and is shipped in a 'ready to assemble' form.

DuFLEX Balsa Panels	Code	Core Thickness	Nominal Weight
DuFLEX Panels (Rigid end-grain balsa 150kg/m ³ / 9lb/ft ³) - 1 x 600g / 18oz Biaxial E-glass either side of core	DP1010C6	10mm - 13/32in	3.8kg/m ² - 0.77lb/ft ²
	DP1013C6	13mm - 1/2in	4.2kg/m ² - 0.86lb/ft ²
	DP1016C6	16mm - 5/8in	4.7kg/m ² - 0.96lb/ft ²
	DP1019C6	19mm - 3/4in	5.1kg/m ² - 1.05lb/ft ²
	DP1025C6	25mm - 1in	6.0kg/m ² - 1.23lb/ft ²
DuFLEX Panels (Rigid end-grain balsa 150kg/m ³ / 9lb/ft ³) - 1 x 600g / 18oz Biaxial E-glass either side of core	DP2010C6	10mm - 13/32in	6.0kg/m ² - 1.24lb/ft ²
	DP2013C6	13mm - 1/2in	6.5kg/m ² - 1.33lb/ft ²
	DP2016C6	16mm - 5/8in	6.9kg/m ² - 1.42lb/ft ²
	DP2019C6	19mm - 3/4in	6.4kg/m ² - 1.51lb/ft ²
	DP2025C6	25mm - 1in	8.3kg/m ² - 1.70lb/ft ²

Alternative skin laminates available on request.

DuFLEX Foam Panels	Code	Core Thickness	Nominal Weight
DuFLEX Panels (Core-Cell foam 80kg/m ³ / 5lb/ft ³) - 1 x 600g Biaxial E-glass either side of core	DF1010C6	10mm - 13/32in	2.8kg/m ² - 0.58lb/ft ²
	DF1013C6	13mm - 1/2in	3.1kg/m ² - 0.63lb/ft ²
	DF1016C6	16mm - 5/8in	3.3kg/m ² - 0.68lb/ft ²
	DF1019C6	19mm - 3/4in	3.6kg/m ² - 0.73lb/ft ²
	DF1025C6	25mm - 1in	4.0kg/m ² - 0.83lb/ft ²
DuFLEX Panels (Core-Cell foam 80kg/m ³ / 5lb/ft ³) - 1 x 600g Biaxial E-glass either side of core	DF2010C6	10mm - 13/32in	4.9kg/m ² - 1.00lb/ft ²
	DF2013C6	13mm - 1/2in	5.1kg/m ² - 1.04lb/ft ²
	DF2016C6	16mm - 5/8in	5.4kg/m ² - 1.10lb/ft ²
	DF2019C6	19mm - 3/4in	5.6kg/m ² - 1.15lb/ft ²
	DF2025C6	25mm - 1in	6.1kg/m ² - 1.25lb/ft ²

Construction Photos

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Pre-cut pre-glassed panels with peelply.



Standing the bulkheads



Bulkheads up and ready for hull panels



Hull panels are fitted and taped



Hull is faired below waterline before turning



Turning the first hull



One hull up and the second hull ready to turn over.



Bridge-deck goes up



Decks are strip planked



Forward webs ready to strip plank.



The pre-cut cockpit goes together.



Almost a shell.



Building the catwalk, note beam hanging on wall. Small items can be built early.



Cabin roof is strip-planked.



The completed shell.

Payload Explanation

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Payload seems to be something that is largely mis-understood so we'll try to clarify this as much as we can.

Generally, payload is anything surplus to the working of the boat. In other words, the boat can still be used and will remain seaworthy with rig, sails, motors, anchors, deck gear etc.

So to elaborate, here is a list of what's included in the payload as we see it:

- 1) Fuel
- 2) Water
- 3) Crew weight, usually working on an average of 4.
- 4) Food
- 5) Alcoholic beverages (usually heavy!)
- 6) Personal belongings i.e. clothes, books etc
- 7) Galley equipment i.e. pots, pans, cutlery, crockery etc
- 8) Spares i.e. for motor, ropes, fenders etc
- 9) Diving gear etc
- 10) Navigation equipment i.e. charts, rulers etc

People always ask us "Can I have bigger water or fuel tanks?" or "Can I have a gen-set?". What we tell them is yes, if you are willing to compensate in another area but this is usually not the case, they want extra in addition to our standard list, which can't and won't work. There is only one DWL (Design Waterline), this is where the boat will float when fully loaded, any extra weight will compromise the design i.e. structural engineering calculations can be upset, bridgedeck clearance is reduced, reserve buoyancy is minimised, the inertia or motion of the boat is more exaggerated and your boat speed will suffer.

In our calculations, we always allow a safety margin for overloading or a bad/heavy build, which means if you achieve a nice light build weight, it is possible for you to load the boat more but we suggest to wait until you know this is definitely the case.

There also seems to be some confusion as to what the term 'displacement' means. The displacement figure is referring to the fully loaded weight of the boat and the water it will displace, the displacement will always include the boats payload.

In conclusion, we suggest to keep the boat as light as possible during the build and fit-out, also keeping your equipment simplistic, you can always add weight and gear later if you find you've come in under-weight.



Steering Options

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Steering positions are a very personal thing. We all have preferences that suit our personality and style of sailing.

We personally like the symmetrical central wheel giving a balanced view when docking and it is out of the way while sailing and socialising. I don't spend much time steering, I prefer to kick in the auto-pilot as soon as I clear the mooring or marina. When racing or on those perfect days when it's fun to steer, the central wheel again suits me best. I sail mostly short-handed and prefer to leave one destination and arrive at another, I am not much of a social day sailor.

The good thing is that you're building a hand-made boat and can choose your ideal steering position.

Structurally, it is wide open. The saloon/cockpit bulkhead is basically a ring frame with additional support needed, the supports can be shifted around quite happily so long as the end result leaves enough support. We will guide you here with your choice so don't feel restricted by steering stations as drawn on our plans, there is plenty of scope to design yours to perfectly suit your style.

STEERING SYSTEMS

The ideal steering system is a direct positive one with a gearing of 1 - 1.5 turns lock to lock. This gives a similar feel to tiller steering and ideally gives some rudder feedback giving the helms person a good idea of how the boat is trimmed.

- The simplest is tiller and link-bar.
- Simple and cheap also, is the cable and pulley type. Use big sheaves (100mm minimum), make sure your sheaves are correctly positioned in correct plane and lead fairly to each other. Spectra rope, composite wheels, cheeks, sheaves and quadrants are easy to home build and the result is one of the best systems.
- Push/pull cables. There are quite a few of these systems on the market often used on power boats. They have a rack and pinion or worm drive wheel unit push/pulling two cables connecting directly to a short tiller set on the rudder shaft. They have lots of specialised end options and are very cheap to buy and easy to fit. Best suited to cats up to 35'.

Hydraulic systems. These are more expensive, easy to fit and very reliable. They tend to lack feel and often have 4 or 5 turns lock to lock giving a very 'mushy' feel that needs to be continually turned to maintain an ordinary course. There are available, selected systems and kits, coupling pumps and rams to give 1.5 turns lock to lock. These work very well and hydraulics suit dual helm stations as well. With the twin rudders in a cat, you need a balance valve to realign the rudders as they will go out of parallel with the creep that happens with hydraulics Adding 2 such valves is worthwhile as it allows one rudder to be used in case of 'O' ring failure in one ram.

Steering Options (cont)

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AUTO-PILOTS

These are very affordable luxuries that I hate sailing without.

The options are:

- 1) The 'ram' type. Usually used on tillers simply push/pulling the tiller. These are cheaper, simpler and have very quick recovered speeds. With the large composite wheel and direct gearing, these are ideal simply attached to a spoke or to the rim.
- 2) Wheel type. I find these are a bit slow in response time, they work well with a more direct steering system and work hard wandering about a bit on 'mush' type systems.
- 3) Direct type fitted to the quadrant or in-line in your hydraulic feed. These are more expensive but you get what you pay for and usually are reliable.

With all types, check power consumption. Some use quite a few amps to run and it's an item that runs all the time.



Above are examples of the different steering options available.

Galley Options

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Some people live to eat and others eat to live so the galley is one of those areas that is dictated by passion or is just a necessity that needs to be as convenient as possible.

The choice is very personal so I'll keep out of that side of the issue and comment on the practical aspects.

The main choice is galley up or galley down. My preference is galley down in all the smaller cats. I feel that galley up is only a sensible option from around 14m upwards.

The first misconception that is usually carried over from monohull sailing is the fear of sea sickness from working down in the galley. Multihulls are quite different. Firstly, sea sickness is often not an issue but besides this, the movement on a cat is worse the further you are from the water. They follow the surface because of their lightness and wide beam so the galley down has less movement, is mostly bigger and is more parallel allowing for more secure footing and the advantage of wedging yourself in against the opposite lockers. Ventilation is excellent with hatches above, ports to the side and open space into the saloon. You are part of the conversation from the shoulders up and yet have privacy while you work with the galley being out of view down below.



Example of galley down

Another important aspect is once the meal is over, the dirty plates and preparation mess is out of sight instead of right under your nose.

From a design point of view, in the smaller cats, the advantages of a galley down are: a big saloon/dinette up, a big galley down and a big useful cabin in the hull opposite the galley.

Galley up in a smaller cat encroaches in the saloon area, making a small saloon/dinette, a small exposed galley up and turns both mid hull cabins into dark tunnels closed off from the saloon. Besides making the saloon feel smaller and closed in, this interferes with any cross ventilation gained from hull ports and hatches.

Not a good choice in my view, perhaps acceptable for social weekend sailors but not sensible for live aboard and ocean cruising.



Example of galley up

Being a mix of common sense and passion, it'll remain a rather debatable personal choice.

Electrics

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This is a note from Jeff with some common sense suggestions for electrics to suit our cat designs.

I am not an electrician but have wired most of the boats we have built so have a practical working knowledge of the systems involved.

My concern is the amount of weight that accumulates with advice given by equipment suppliers. The result is good for the supplier but very bad for the boat and your bank balance.

Firstly, what do you need on a cruising cat?

Here is a list that will suit the 'average' cruiser.

- Refrigeration
- Depth sounder and log (Bi-data type is good)
- VHF radio
- GPS
- Nav.lights
- Cabin lights
- 12v TV
- Lap-top computer (can purchase TV card and eliminate 12v TV)
- Inverter
- Sound system (car type)
- Anchor winch
- Charger for torches, mobile phone etc
- Starter motors for engines

List of storage and charging items:

- Motor alternators
- Battery bank
- Solar panels
- Wind generator
- Gen-set



Typical nav. station set-up

Fifteen years ago, most cruisers camped on their boats with the bare minimum of home comforts. Now, the general attitude is we want all our home comforts. We also have so many more options available to choose from. I believe that somewhere in between is a sensible balance.

Because power is in limited supply, economy of use is essential. Lights must be turned off when not needed, TV etc is kept to interest areas only and not left on indefinitely as we might at home. Battery levels are monitored and managed well. Being frugal does not mean life is miserable, it is simply a new mind set to reduce wastage as much as possible and have power for the comforts one needs.

Refrigeration is one item that tends to run on auto and is usually our biggest power draw. Initial choice and installation impact on power needs. Good insulation, top loading and sensible use can halve compressor use. Compressors use about 4.5 amps per hour and should cycle in for 30-40% of each hour, this is about 1.5 amps per hour or 36 amp hours per day. From our output list some items are used only when sailing eg. GPS, log, radio. Nav. lights are needed only at night, where possible use a masthead tri-colour using 1 globe for 3 lights.

Electrics (cont)

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When sailing I don't have the radio on all the time and if in deep water, switch off the depth sounder and log as mostly I am using the GPS for position and speed. For ocean passages, I always stand watch and if well away from shipping, run without nav lights to save power, only switching them on if other lights are sighted. (I am not suggesting you do this but if power is critical, your radio may be more needed).

If in a safe anchorage or amongst many other boats, cats are usually well inshore of mono's and could do without the anchor light. Anchor winches are fantastic choosing a smaller size used mostly for dropping or retrieving the anchor, motor up on it to reduce winch and battery loads.

MY SUGGESTIONS FOR.....

OUTBOARD POWERED CATS

- a. Have poor motor charging ability (6-8 amps)
- b. Need bigger bank of solar panels (4 x 60 watt)
- c. Possibly add wind charger (they are noisy!)
- d. Carry a gen-set to boost batteries if no sun for a long period (Honda 450DC = 30 amps)
- e. Need Batman or Link 10 type monitoring system to manage power.
- f. Need bigger battery bank (300 - 400 amp hour)

DIESEL POWERED CATS

- a. Good charging capacity (2 x 60 amp alternator)
- b. Smaller solar panel bank (2 x 60 watt)
- c. Do not need wind generator.
- d. Do not need gen-set.
- e. Need Batman or Link 10 battery management system.
- f. Slightly smaller battery bank is required for 'house' (300 amp hour)

Diesel motors are already a heavy option so don't be tempted into adding items that are required if you have outboard motors, you'll only add more weight.

WIRING

This is the invisible monster that creeps in in the dark, especially weight wise. I estimate about 80kg for an 11m cat and I am horrified when owners say their 'lekky' has used 300kg of wire!
Why?

Solutions: Don't skimp, use tinned wire for all wiring. Be sensible with your planning. Place the batteries as close to the power needs as your trim sheet allows. It can be lighter to use a separate battery forward for the anchor winch than to run very heavy cables to distant items. The same applies to motor set far aft.

Batteries: The house bank needs to use a deep cycle type. The normal 'marine' deep cycle batteries have been used very successfully forever. Be aware of gasses being emitted when charging, have the area well vented. The newer fibreglass matt type are good if your budget extends to them but don't get pressured into expensive options by salesmen. This applies to equipment as well. If venturing offshore I would consider an HF important, a radar a handy luxury not for coastal cruising as much as its ability to be set on watch kicking in every 10 minutes scanning shipping or squalls.

If in any doubt about exact requirements, start with less, you can easily add an extra battery or solar panel as required. Don't panic when you flatten all your batteries in the first four weeks, give it a few months until you learn to manage your system, then consider what you need.

Engine Choices

Radical Bay 8000

In our cats we use both 4 stroke outboard motors and diesel inboard motor options.

OUTBOARDS

Outboards are an excellent option in multihulls, they have a very high power to weight ratio and the new 4 stroke type are extremely reliable and have excellent fuel economy similar to the inboard choice. We position these in wells where they're raised and lowered vertically on a track system with a simple block and pulley arrangement, led to the cockpit. When lowered the motors are in a similar deep water area as inboards, no cavitation, aeration or getting drowned. We use a nozzle around the prop and a plate fixed to the bottom that when retracted seals the bottom flush so there is no drag.

Blowers force-feed the engine compartment avoiding fumes, overheating etc. Motors are easily removed out of the deck hatch directly above the motor.

Outboards are an excellent choice for all cruising and sports type cats up to (50') 15m. Some examples of existing cats with outboards:

Waterline 1160 - 4000kg 2 x 9.9hp Yamaha outboards = 6 - 8 knots, uses 3 litres per hour cruising.

Waterline 1480 - 7000kg 2 x 50hp Honda outboards = cruise 12 knots, full speed 15 knots.

Charging can easily be supplemented with solar panels and small gen-set or add alternator to outboard motor. Hot water - use solar bag or gas heater, solar bag dumped into esky type tank and used with power shower works very well.

INBOARD DIESEL ENGINES

Diesels come in either straight shaft drive or sail drives. Sail drives are very easy to install but are heavier and usually end up further aft in the boat (not good). They also have the leg deeper under the boat making beaching more difficult and catching on ropes etc easier. Shaft drives are preferred, lighter less impact on draft and set further forward in the cat. They are simpler and more reliable and are usually in an easier position for maintenance access.

Diesels offer good charging ability and hot water can be made from the exhaust or cooling system. Both worthwhile luxuries. They're seen to be more economical and more reliable, this is true but to a lesser degree with the new 4 stroke type outboards.

Diesel engines come into their own in the bigger cats where one demands the luxuries of life. The bigger cats can carry the extra weight and are usually more cruising oriented not looking for high performance. Sensibly chosen, they can be used in the smaller cats understanding that they bite into your payload to some degree.

Tips:

- 1) Choose the biggest motor in the weight range.
- 2) Look at the torque curve to identify HP at lower rev's.
- 3) Look at HP and RPM when evaluating two motors, make sure the HP and RPM are the same.

Engine Choices (cont)

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Remember, a light cat will sail very well in light conditions and not need the motors often. Add motors for use when no wind or power is needed to get out of trouble or motor into a marina in 50 knots of wind. The motors should be capable of this, don't underpower your cat. Use good size motors but don't kill the boat with huge fuel tanks or you'll need a motor a lot as your light air performance is reduced.

Keep a sensible balance!

PROS AND CONS

This debate goes on forever but basically it just comes down to your personal choice. Here is some information that will hopefully help you with this choice.

DIESEL ENGINES

ADVANTAGES

- Reliability
- Economy
- Safe fuel
- Fuel availability in remote locations
- Heat exchanger for hot water
- High charging ability

DISADVANTAGES

- Leg or keel permanently in the water - increased drag
- Folding propellers on shaft or sail drives
- Increased draft
- Fixed rudders
- Propeller in the water requires more maintenance
- More expensive to purchase
- Heavy
- Smell of diesel can be a problem
- Access for maintenance
- Most installations in the accommodation area



When comparing shaft drives to sail drives, here are some considerations:

SHAFT DRIVES - ADVANTAGES

- No anti-fouling limitation
- Lighter than sail drives
- Cheaper than sail drives
- Shallow draft

DISADVANTAGES

- More difficult installation
- More vibration and noise

SAIL DRIVE - ADVANTAGES

- Easier installation
- Less vibration



Engine Choices (cont)

DISADVANTAGES

More expensive
Deeper draft
Heavier
Anti-fouling must be suitable for aluminium
More mechanical moving parts

OUTBOARD MOTORS

ADVANTAGES

Better power to weight ratio
Relatively low fuel consumption
Quite light
The cost is lower
Easier to maintain
No drag - motors lift up when sailing
Cheap and easy overall replacement
Kick up rudders
Shallow draft

DISADVANTAGES

Fuel availability and flammable nature
Very low charging capabilities
No hot water

NOTE: Installation of outboards VS Diesels is about the same.

COMMENTS ON 4 STROKE OUTBOARDS:

There are quite a few brands available
Some important considerations when purchasing one are:

- 1) Check the exhaust management in reverse. Exhaust should be diverted in reverse so prop can bite into clean, un-aerated water.
- 2) Check availability of high thrust gearbox and props.
- 3) Some brands are more compact and lighter.

RECOMMENDED MOTORS

DESIGNS UP TO 11 METRES or 4000kg displacement
9.9hp Yamaha/Honda or 15hp Power Head
Option of small diesels is possible on some models but outboards are preferred.

DESIGNS OVER 11 METRES
30hp Honda or 25hp Yamaha Outboards or similar sized diesels. Both options are OK. Popular brands of diesel motors are Yanmar and Nanni.

DESIGNS OVER 14 METRES
Outboards are an option on lighter displacement designs and high speed designs.
29-37hp diesel engines, popular brands are Yanmar and Nanni.

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**Outboard installation aft of
cockpit bulkhead.**

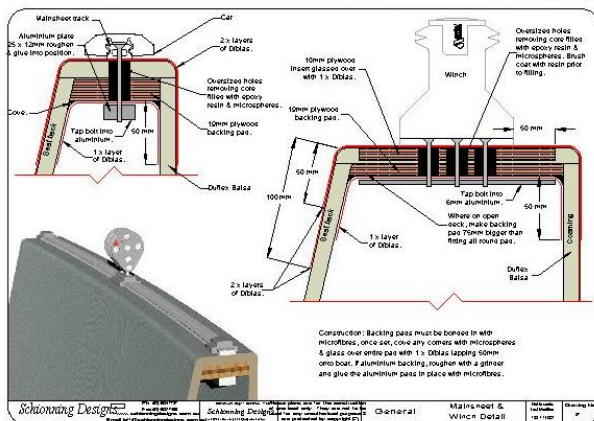
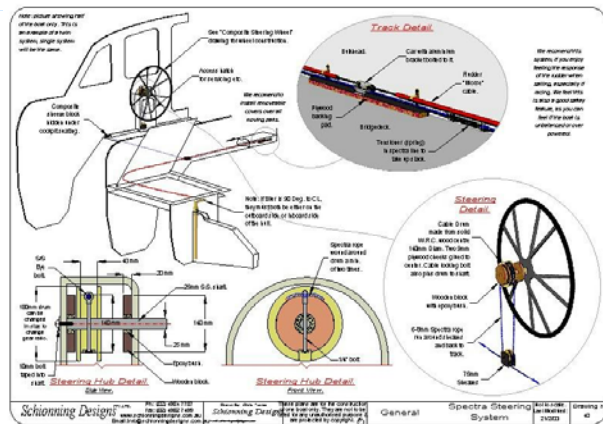
OUR CONSTRUCTION PLANS

THEY'RE WORTH EVERY CENT!

When comparing with other designers, remember this, 'you get what you pay for'. We are confident you'll get every cent's worth out of us.

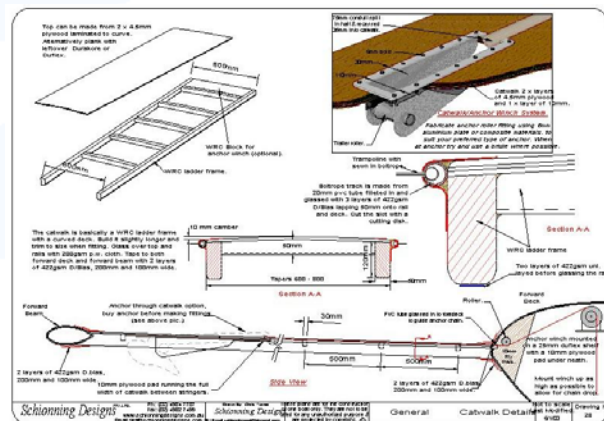
We support a permanent design office housing 7 people to take care of you and your project. CAD work is done in house as is plotting and colour printing. You'll find a warm and friendly welcome should you visit any time.

Included in our design fee is 100% design backup. This is by way of email or fax support as it provides a written record for both our benefits. If phone consultation is required from time to time, this can be arranged. We don't guarantee to visit every project but you'll certainly see one of us if we are travelling anywhere near you and can spare the time, we really do like to keep in close contact and hands on with our builders everywhere.



Besides the actual plans and the backup, it is most important to think about re-sale value of the end result. Lots of our designs are selling for MORE money, 5 years down the track than they cost new in the first instance! Now this sounds most unlikely but the demand for good quality, seaworthy cats is strong and certainly growing. Part of the reason for this is OUR strength in the marketplace, we are here and here to stay and that means support and stability for you. Our designs are continually upgraded to include new technology, materials and simpler ways of doing things.

I quite often reflect on the results of re-sale in our designs and wonder, does the builder think back to the \$5,000 or \$12,000 investment in plans in terms of the overall cost and sale result? In the big picture, that initial investment is crucial but very minor in terms of cost to you and the project.



Schionning Designs Pty Ltd

ABN 31 220 021 010



Purchase Agreement Order Form

Buyer' Details					Contact Person		Previous Agreement
Date	New	Alter	Cancel	Co/Dept	Customer No.		Yes/No

Buyer's Trading Name: _____

ABN: _____

SoleTrader Partnership Company

Name of Trading Entity: _____ ACN: (If a company) _____

Address: _____

Phone No: _____ Fax no: _____

E-mail: _____

Purchase Order

Description of Purchase: (Including any special instructions) e.g. Boat (describe number and type of Kit Boat) or Design Plans (describe number and type of plans) or other

If insufficient space please attach a detailed description of the services required

Purchase Date: _____ Delivery Date: _____

GST Inclusive

Price: A\$ _____

Number of boats which may be constructed from plans, please specify number: _____

Third Party Builder: Yes/No - If Yes please provide details

www.schionningdesigns.com.au

P.O. Box 42, Lemon Tree Passage NSW 2319 Albatross Marina, Lemon Tree Passage NSW 2319
Phone: +61 2 4982 5599 Fax: +61 2 4982 5499 Email: info@schionningdesigns.com.au

Terms of Sale

- 1) **Sale and Purchase.** In consideration of payment of the Price set forth in the attached Order Form, Schionning Designs Pty Ltd ("the Seller") sells to the Buyer the goods or plans (as the case may be) (hereafter called "the goods") described in the attached Order Form upon these terms of sale.
- 2) **Passing of Title.** Title to the goods shall pass to the Buyer upon payment in full.
- 3) **Delivery of Orders.** The seller must make the goods sold available for collection by or delivery to the Buyer at a date and time agreed by the Parties and specified in the Order Form.
- 4) **Risk.** The risk in the goods remains the Sellers until delivery of the goods to the Buyer.
- 5) **Copyright/Design Rights.** The copyright, design rights and all other intellectual property rights in the plans or boats or other goods sold pursuant to this agreement shall at all times remain the property of the Seller.
- 6) **No Reproduction.** None of the plans sold may be copied in full or in part by the Buyer unless specifically permitted in writing by the Seller to do so.
- 7) **Licence.** In the case of a purchase of plans, the Buyer may use the plans purchased for the sole purpose of constructing the number of boats specified on the Order Form.
- 8) **Further Payment.** If the Buyer wishes to use the plans for constructing more than the agreed number of boats specified in the Order Form then the Buyer must seek the Seller's written consent and further fees shall apply.
- 9) **Liability.**
 - (a) The plans or goods sold pursuant to this agreement are sold in good faith, having regard of the technical knowledge and information available to the Seller at the time of sale.
 - (b) So far as may be permitted by law, the Seller excludes any representations or warranties, whether expressed or implied, with respect to the plans or goods sold, including but not limited to any warranty of merchantability, fitness for the purpose or otherwise and will not, to the maximum extent permitted by law accept any loss, damage, or personal or other injury or liability, howsoever arising out of the sale or supply of the plans or goods sold pursuant to this agreement.
- 10) **Third Party Builder.**
 - a) If the Buyer purchases plans and engages a builder to build and or construct one or more boats pursuant to this agreement, the Buyer shall procure from the builder a covenant in favour of the Seller that it will not copy, sell or otherwise use the plans and specifications except as expressly permitted by the terms of this agreement and shall otherwise be bound by the provisions of this agreement in so far as this agreement applies to protect the intellectual property rights of the Seller.
 - b) The Seller may refuse to deliver the plans until after the Buyer has procured from the builder and provided to the Seller the covenant required by sub-clause 1 of this clause.
- 11) **Restrictions on Assignment.** The Buyer must not without the prior written consent of the Seller, which may be granted or refused absolutely or granted subject to conditions, transfer or assign his interest in the plans or goods sold pursuant to this agreement.

Please Note: Construction plans may NOT be returned for a refund due to obvious possible breach of copyright so please consider carefully before ordering.

Offer and Acceptance

Offer

This agreement is entered into in accordance with the terms and conditions above which the Customer confirms he has read and accepts.

Buyer's Signature:

Acceptance

Accepted by Seller :

Date: _____

Date: _____

Terms of Payment: Cash/ Direct Deposit/Cheque upon signing order please.

www.schionningdesigns.com.au

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