Frequently Asked Questions - Answers by Woods Designs
www.sailingcatamarans.com

Many people ask me the same questions. I have listed the most popular here, which I have divided into sections to try to make it easier for you to find the answers you are looking for.

Note: This list of FAQ's was first uploaded in 2001, but has been edited and added to over the years

Contents

How much does it cost?

It's Not Rocket Science

Load Carrying

Simple Boats

Trailable catamaran and trimaran comparisons

Where Do I Moor My New Multihull?

Weight and displacement

Interior and Comfort Questions

How big are the bunks?

Real-Life Comfort Comparisons between monohulls and multihulls

Which is better, a "Galley up" or "Galley down"?

Questions about Specific Woods Designs

History of the Flica 34/35/37

History of the Strider

How do you trail a Strider?

How roomy is a Strider hull?

S African built boats that are not actually by Woods Designs

Safety Questions

Access forward

Are multihulls dangerous?

Open Transoms

Picture Windows

Sink or Swim?

The Pitchpoling Myth

Wave Heights

Sailing and Performance Questions

Another car speed comparison story

Alternative Rigs

Balestron or Aerorigs

Bridgedeck Slamming

Forward Cockpits

How long does it take to assemble a trailerable boat?

How well do catamarans sail to windward and tack?

Low Aspect Ratio (LAR) Keel Design

Performance Comparisons with Other Multihulls

Rig and Sail area considerations

Vertical Bows

Which steering system should I use?

Why Predicting Performance is an Imprecise Art

Some quick notes on selecting deck gear

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Building in sections

Although some of my larger designs, like Gypsy and Romany, can easily be built in sections, the large bridgedeck cabin boats can cause problems if building away from the water. It is easiest to use foam sandwich rather than wood if building a boat in sections. Rather than make longitudinal joints (which always complicates joining beams) I now think it might be easiest to make transverse joints.

In other words, build the complete boat and then cut it into three sections ACROSS the boat. Eg one cut between the aft cabin bulkhead and saloon seats, and another in the anchor lockers. These joints will be easy to remake and, just as important, to hide and will not cause any real structural problems. The resulting sections should then be able to be transported legally (with a wide load escort of course).

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Buying a Used Rig

As a designer I say "buy everything new" but as a home boatbuilder myself I don't take any notice of that!

You can certainly use second hand spars on most designs, as aluminium doesn't really wear out, just check for corrosion under fittings and at the heel. Compression failures usually occur near the gooseneck, so check that area carefully. Our Pixie, Quattro 16, Strike 15 and 18, Chat 18, Romany, Gwahir, Strider, Wizard and Gypsy all had used spars.

On the smaller boats (under 25ft) you can use a beach cat mast, but it should be kept as a rotating, not fixed mast because of the profile shape. Most beach cats use the same mast sections, so although choice is limited, you should find something that fits one of my designs.

If you use a monohull mast it is best to have an untapered one because the bigger roach on the mainsail makes the masthead bend more. And you'll need a mast from a longer monohull as multihull rigs come under more loads. For example, the (8m) 26ft monohull I raced had the same mast section as used on a Strider - despite the fact that it was tapered and 40ft (12m) long

When choosing a used mast pay attention to the gooseneck height, the sail feeder and the forestay take off positions. You can usually modify their placement fairly easily, but it's best to have as few holes as possible.

You may well need a one off tabernacle/mast foot. Used booms are never a problem, but check the gooseneck matches the mast.

You should be able to find a genoa that will fit a catamaran. Most monohull mainsails are too full and have no roach, so aren't ideal for a multihull. A beach cat mainsail tends to have an 8ft foot length, which is a bit short for anything larger than a Strike18, Chat or Acorn. It is never worth having a used sail professionally re-cut, just keep looking. But you can modify sails yourself on a domestic sewing machine up to about the 30ft size range.

You can use ex beach cat rudders on most of the trailable designs (we used old Tornado rudders on both our Quattro 16 and Wizard). You may need to modify the rudder stock and tiller to suit the extra freeboard and aft beam position.

Self tailing winches are so much easier to use than the non self tailers that the latter are usually very cheap to buy used. Like winches, deck hatches will fit on any boat so I have often bought them well in advance of starting to build.

Hunting around on ebay usually gets good bargains, I buy a lot of deck and electrical gear there and, although I have had a couple of problems, ebay or my credit card company have quickly sorted them out in my favour.

As always, if you see something that looks suitable ask me and I'll try to help

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Can I build in steel?

No, is the short answer. It's just too heavy. A typical 10m catamaran might be built in 9mm ply. This weighs about 1lb/sqft. In comparison, 4mm steel plate - the thinnest you can use for boatbuilding, weighs about 7.5lbs/sqft! Clearly a boat built in steel will be far too heavy for any normal boat. However, some large catamarans (say over 45') have been successfully built in aluminium.

Having said that, most people want a wood interior while condensation is a problem on all metal boats. Thus significant extra non structural weight is added to the shell which compounds the problem. Also don't forget that the cost of the hull shell is only about 30% of the total cost, so any material savings will only have a small impact on the total budget.

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Foam sandwich and vacuum-bagging

Over the years I've built several foam sandwich boats, but always as an amateur rather than professional builder. That means I haven't had access to lifting gear, a large work force, sophisticated heated workshops etc and I only use tools that anyone might have at home.

There are several ways to build a foam sandwich boat.

The conventional way is to set up complete frames upside down, add timber battens at approx 150mm intervals. Then add the foam, glass the outside and finish it. Then release from the frames turn over and glass the inside. This is easy and quick. However the unsupported hull will be floppy until the inner skin is made, so can easily distort. Also glassing the inside can be tricky.

So another building option is to make a split mould, with a join on the hull centreline (along both keel and deck, as the deck can be included). Using this method the inner skin is laid up first, then the half hull/deck released from the mould, outer layer glassed (which is easy to reach) and the two halves joined. The disadvantage of this method is making the two halves exactly the same and making the glass joint inside, especially near the bow. You have the same length of joints to make, so there is no weight saving.

The third system which high tech race boats use is to make a complete male mould including a skin. Then this mould is smoothed, covered with release agent and the inner skin laid up. Then the foam core added using a vacuum bag and finally the outer skin laid up. Without doubt this last method gives the best results, but is also the most labour intensive and most expensive. It is also the only method that requires the use of a vacuum pump.

All three methods can be used with the plans I supply and the finished boat will be equally strong and approximately the same weight whichever system you use. (The vacuum bagged method will probably be the lightest as it tends to use the least resin. But we are only talking about a few Kgs, so any saving is academic really, especially when you consider that the shell weight is probably only half the all up weight.)

Airex foam is still the only sensible choice for double curved areas, eg the hull bottoms as it can bend at room temperature. But it softens in even moderate heat (eg from the sun). So a rigid pvc foam is necessary for the decks and topsides. I have found Divinycell to be the best foam, partly because it has smaller "pores".

Divinycell make a lightweight bonding paste for their foam, but other companies make similar products which I have also used. The main problem with foam sandwich construction is that although you can stick glass to foam its hard to stick foam to glass. Because of the huge area you need lots of pressure.

People tried sandbags etc to weigh the foam down, but it doesn't work as you can't get an even pressure. Its also lots of heavy sand to move! That's why about 25 years ago people started using vacuum bags. But they found there were problems in getting all the air out over the whole panel. It was possible to suck the air out near the outlet and then the polythene sheet would stick down hard and so prevent any more air being sucked out. So builders then started laying plastic mesh fencing between the laminate and polythene. That made channels for the air to run through. But it was messy as the resin stuck to the fencing. So people then developed bleed cloth which seemed to do it all. But of course its expensive as its a one time use only material. Also it's time consuming to stick down.

Using a vacuum does suck up some of the resin and remove most of the little air bubbles. That makes a stronger, lighter laminate but to be honest I don't think the savings really amount to very much and are only important on a racing boat. And the bond is still only on the surface of each foam skin.

Instead of using a vacuum bag, I prefer using "contour foam" or scored foam, which is like end grain balsa in the sense that it is cut into small squares (about 11/2") and stuck to a thin glass backing. The squares mean that not only will the foam fold round a curved hull but also it can be laid down one row of squares at a time. Thus each square is in effect put down individually. Furthermore the bonding paste oozes out through the squares so you can see that its properly bonded, and also the squares increase the bonding area. I admit the weight is a bit higher, because of the extra bonding area, but its quick, reliable and needs no disposable materials. You can also do it alone. All the Sagittas, Elves, Flicas and Banshees were built that way. It's also how I built my Gypsy and Eclipse. I haven't had any reported problems with core failure over the years.

I hope the above helps explain the alternative "low tech" foam technique I prefer.

The glass I like to use is +/45 deg "Biaxial" glass bonded to a chopped strand mat backing for stability and inter-layer adhesion. That is, instead of the glass strands running along and across the roll ie 0 deg and 90 deg (0/90) they run at 45 deg to the length. Its harder to make and thus more expensive, but has three advantages. One is that it isn't woven, but two layers laid one on top of the other. That makes its stronger as the woven glass tends to try and straighten the rovings which is weaker. Two, the bond to the substrate is better and it looks neater as the glass is flat. Finally, the impact strength is increased. That's because the energy from an impact runs the length of the glass strands and then "explodes", as it were, at the ends. So the longer the strands the better. That's one reason chopped strand glass isn't very strong. Obviously the longer the glass lengths the better. Glass at 45 deg is 40% longer than at 0 or 90 deg.

If you build in epoxy resin instead of polyester then you don't need to use the mat backing. However I suggest making a few test samples as some glass cloths are more "drape-able" than others. That is a good thing on small complex mouldings but a real pain to lay down onto a big hull.

The newest construction technique is to use resin infusion. I am not going to say any more about it here. In part because I feel that if you need to know the basics about it then probably you should chose an easier building system. In other words, it is for experienced builders.

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How do you strip plank a hull?

When we first started drawing strip plank boats, back in the early 1980's, we drew and built them using a "male" mould. Ie we set up frames that looked like upside down bulkheads, and then strip planked over them. So the frames are set up in exactly the same way as one would do when building a conventional stringer frame or foam sandwich boat.

This way has the advantage that it looks like a boat so is easy to fair and it takes up the minimum of space. The disadvantage is that after releasing and turning over the hull is relatively floppy until the inner glass skin has been laid up. Also it is not possible to add furniture or bulkheads before glassing the inner skin.

These disadvantages have led many people to use the "female" mould system. This means the boat is built "insideout". Instead of having "bulkhead shaped" frames the frames look like the bit of plywood you'd normally discard. The advantages are that you're working on the inner side of the hull skin, so you glass the inner skin first. It also means you can add bulkheads etc before releasing from the frames.

The disadvantages are that more space is needed. What you're building doesn't look like a boat while it is in the frames, so it is potentially harder to fair. There has to be a join down the centreline which is hard to make especially at the bows - possibly the most important part of

the boat to make strong.

As far as I am concerned, the jury is still out, so at present I will continue to draw boats built with the male mould system until I'm convinced otherwise. However, whichever way the boat is built, the final result will be the same. There is no difference in strength or weight between the two systems, it's only the way the boat is built that is an issue.

NOTE: The same arguments apply to the two similar systems for building foam sandwich boats as well.

When I first started drawing strip plank cedar boats good quality western red cedar was readily available. Now it isn't, which means it can be very expensive. But there are cheaper alternatives and your timber supplier can advise. Currently the most popular is the lightweight, quick growing paulownia. I do not recommend balsa as it rots so easily.

Fortunately it is also possible to build the strip plank cedar boats using double diagonal plywood instead. The Merlin uses 2 layers of 3mm (1/8th in); larger boats use two layers of 4mm (3/16th in).

It is probably best to build the hard chine ply versions of Wizard and Sango rather than try to cold mould their hulls as they are very curved and using two layers of plywood will be tricky to do. The disadvantage of the cold moulded stringer/frame system is that you have the stringers and frames inside, rather than a clean interior. However there is probably a weight saving over strip cedar, especially on the smaller boats.

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How long does it take to build?

I've written about this elsewhere, but feel I must keep going on about how complex boats can be to build. I know that building the hulls is usually the first step and its natural to want to make that as simple as possible, but in fact building the hulls is always the easy bit.

The last two large boats I built have been the Gypsy and Eclipse. I was day sailing my Gypsy after about 1000 hours work, although only 4' longer I've done more than 1000 hours work on the Eclipse since first sailing it and its still not finished.

One small example, which may sound a minor, silly point, but all these little extras soon mount up. My Eclipse has 23 interior lights, Gypsy had 6. Lights need wiring, conduits, circuit breakers, switches etc and all to be planned before building has progressed too far so that it can all be neatly hidden.

At least 30% of a monohull's displacement is a "go out and buy, then stick on the bottom" lump of steel or lead. On a multihull ALL its displacement will go through your hands. That means on

a 40' cat you'll end up handling 5-6 tons of material. An Eclipse 3 tons, a Gypsy 2 tons.

Don't think that a slightly longer boat is not much more to build. Surface area (laminating, painting, sanding etc) goes up by the square of length. Weight (material that you have to handle, carry up ladders etc, eg timber, plywood, glass, resin) goes up by the cube.

If you really want an "easy build" boat the answer has to be - leave it out. Use an outboard engine not inboards, a tiller not a wheel. Don't fit a freezer or a shower. Keep the electronics to a minimum. Accept open fronted lockers, not drawers etc

By and large, boat building is not profitable, so when a boat is sold for £100,000 that means most of that money goes on materials and labour. Typically I'd suspect that 25% would be on materials. You don't get anything for nothing in life, so you will have to earn that remaining £75,000 by putting in the hours. Typically you work 2000 hours a year at your job. Think back over the last 3 years and work out how much you're done at work. Then think about spending 5-6000 hours building a 45' cat. Also think what else you could be doing in that 5000 hours, (have a social life? watch your kids grow up?).

On a 40' cat 5000 hours probably equates to 35,000 miles sailing. In other words, you will have to sail nearly twice round the world before you spend more time sailing a 40 footer than building it. I have built 18 boats in the last 20 years (all but two for my own use). I know first hand how hard it is to keep going on a project. The Eclipse has taken up most of my life for the last two years, I know I couldn't cope mentally with building anything larger.

Much worse than having a boat that's too small for you is spending years half building a boat and then giving up. So, please think very carefully about the length of time you are really prepared to commit to your boatbuilding project. I will say it again and again, there is no need to have a catamaran much over 35 feet for normal family sailing, while even a charter boat need not be more than 40 feet. Don't be seduced by the glamour of big boats unless you can afford to buy one complete or employ people to help you.

Update 2015: Here are some rough times based on the boats I have built. So are for someone who knows what they are doing, to a basic fit out ready to sand/paint

Beach cats 120hrs

Strike 18 - main hull 150hrs

Janus 350 hrs

Strider/Shadow/Gwahir 550hrs

Wizard/Skoota 20/24 800 hrs

Sango 900 hrs

Surfsong/Windsong 1200hrs

Gypsy, Saturn, Skoota 28 1500 hrs

Mira, Mirage 2300 hrs

Romany 2500hrs

Vardo, Eclipse 2700 hrs

Flica 3000hrs

Bigger than that and I'll just say "a long time"

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Ikea Boats

For years boats had an interior full of curves - curved seating, bunk ends, tables and so on. Not necessarily practical, but at least you didn't bruise yourself too easily.

However in the last couple of years the trend has been for "simple, straight line" interiors. Much like flat pack Ikea furniture in fact.

So why is that? Well I think it is simply because most production boatyards now use CNC machines to cut out their interior furniture, which are then bonded with fast setting epoxy glues in an oven. The traditional boatbuilder fitted the furniture as he went along, but these days its all made off the boat.

So it seems that it is speed of production that is, more than ever, controlling the design of boats these days. It also means that many boats look bland and souless and it's hard to tell one from another.

Fortunately the home builder and small production yards can be more imaginative with their designs. Whatever the sailing/motoring performance of your boat might be, many people still want to have a cabin more like a "country cottage" than a "Hilton hotel lobby"

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Plywood/grp/foam sandwich comparisons

In principle any flat panel hulled catamaran, like a beach cat, the Gypsy or even a Meander, can be built using solid grp panels. Having said that I have found that you cannot "torture", ie compound curve, a grp panel like you can a plywood one, for, unlike plywood, grp doesn't stretch.

Boats are usually strong enough, it is getting enough stiffness that is usually the problem.

Adequate stiffness is easiest to achieve by making a thick hull (and that comment applies whatever material is used). Solid GRP is thin, typically a 30ft catamaran hull need only be a few mm (say 3/16in) thick to have enough STRENGTH, after all GRP is as strong as steel for a given thickness. But it wouldn't be STIFF enough. So you need to use either a number of bulkheads and stringers, or a cored hull. The alternative is to use a very thick grp hull, as in the early "chopper gun" grp boats from the 1960-70s.

I have built large solid grp paneled boats, but I found that adding the stringers, necessary for the stiffness, was time consuming and also heavy. So I decided that even when building on a budget, a foam core was preferable, especially as it resulted in a cleaner interior.

For a good rule of thumb is that you save about 1/3rd of the weight by using a foam core. So, in imperial units (to keep the numbers easy) say your typical 8ft dinghy/yacht tender used a solid laminate of 3oz/sqft. If you built the same boat in foam sandwich you could use 1oz/sqft on each side of a core for the same strength. You'd be lighter and also stiffer. However the 1oz skin would be very prone to impact damage (which is OK on a racing dinghy that is looked after and handled gently ashore, but not for a hard-used yacht tender) So a thicker skin is often needed for practical reasons and thus there is a sensible minimum skin one can use, typically 11/2oz.

If you built a 24ft cat hull in solid glass the laminate would be about 6oz/sqft (again in imperial to keep the numbers easy). If you use a foam core (say 1/4in-3/8in foam) then you'd use 2oz each side (so pretty close to the recommended minimum thickness).

You would save about 5oz/sqft or roughly 30lb per hull. But, as you'd also need to add stringers on a solid hull (adding say 10lbs) you'd maybe actually save 40lbs per hull by using foam. So not a lot, but maybe a worthwhile saving, especially when you add in extra factors like extra buoyancy, reduced condensation, more space because no stringers or frames are needed.

Clearly as boats get larger (say over 30ft) the advantage of using a foam core becomes more obvious as the skins become thicker and the weight savings are much greater.

A compromise to solid grp on a smaller boat, like the Strider for example, is to use Coremat as the core. (This is a product that looks something like thick blotting paper - it isn't to be confused with Corecell). However it uses a lot of resin and, surprisingly, I haven't found that it bonded as reliably to the skins as when using foam. In fact early production Striders were built in Coremat, but when we changed to foam on later boats we found they were lighter, stiffer and also no more expensive, as less resin was used.

The only time I recommend using a solid laminate is when the panel size is narrow. Typically the Gypsy hull bottom, for example, or the Romany lower chines. These panels become extra stiff once the chine joints are completed while it is easier to make a joint if the panels are solid glass rather than cored. And of course abrasion is more of a potential problem on the hull bottom than it is on the topsides.

Solid grp is always heavier than plywood (it sinks, it's specific gravity is 1.2 at best). So plywood is the lightest/stiffest for small boats (it floats, specific gravity 0.6 at best). And because it is thicker than grp it is stiff (and as I said at the beginning, achieving enough strength is rarely an issue). 1/4in ply weighs about 20lbs a sheet, or 2/3 lb/sqft. You have to be a good laminator and use a lightweight foam panel to get anywhere near that weight using grp, while a 1/4in thick solid grp hull would only be used on boats over 35ft long. Typically a 35ft plywood hull would be built in 9mm (3/8in) plywood which weighs about 1lb/sqft. But you need stringers and frames as well of course.

It makes no sense to me to build a foam sandwich beach cat if a tortured ply one is lighter, cheaper and much quicker to build, yet still stiff and strong enough. Only the Olympic standard Tornado sailors can tell the difference between a high tech resin infused foam hull and a tortured ply one. To everyone else a Tornado is a fast boat! And, despite all that extra cost, time and skill required, the hulls are no lighter than the 4mm (3/16in) plywood Quattro hulls.

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The cost effective 50ft boat

This comment has actually nothing to do with the length of the boat. Rather it means that I build boats that look good from 50ft away!

If you have to come on board to see imperfections then to me that means you built to a "boat-show finish", something which takes VERY much longer to do. Furthermore however long you spend, you still have to be a good boatbuilder (something I am not) to achieve a finish like that. Of course if you come on board and complain about my build quality you don't get asked again!

If you can see imperfections from more than 50ft away then it is a pretty roughly finished boat, although it doesn't mean it isn't strong and seaworthy.

So, as I prefer sailing to boatbuilding, I feel that the "50ft boat" is a good compromise between quality and building speed.

And while I'm on the subject, although fancy graphics or clever details may look good on the shop floor remember that people - even you - actually see your boat from some distance away. I know it is hard to visualize a boat from a distance when you cannot step back, one reason why I prefer to fit windows and hull stripes after moving the boat outside. Fortunately these days it is easy to "Photoshop" a photo of an existing boat to see how your ideas will work in practice.

And because of this wide variation in the cosmetic finishing time any building time I quote will be "ex finishing".

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Using Tape to Attach Windows

Fitting windows is messy, time consuming and expensive. They can easily take a full day each to fit. So I have long looked for a simple, clean, quick and cheap way to fit them. I knew that many vehicles use tape to fit their windows - so why not do so on boats? So I did some basic research and then contacted 3M, and this is what they replied:

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Thank you for contacting 3M, the innovation company. Our VHB tapes are suitable for bonding plexiglass windows to a fiberglass boat. A similar application bonding windows in motor homes is currently utilizing VHB tape.

The VHB 5952 family may be a good choice, but we prefer tape 5962,which is the same product except thicker (62 mils thick). The extra thickness helps fill any gaps between the plexiglass (perspex) and the fiberglass to help insure a tight seal, plus the thicker tape will expand and contract more. The VHB tapes will expand lengthwise three times the thickness of the tape.

Another tape that is an option is VHB 4979F. This product is also 62mils thick. The core of the tape is gray, but the top and bottom surfaces are black (you can only see the gray at the edges).

With both products, it would be best to use Adhesion Promoter 111. Plexiglass can have a variety of coatings, such as anti-glare,anti-fog, or scratch resistant. Some coatings are a bit slick. AP111 helps insure the tape bonds well.

If the window has square corners, a small dab of sealant may be needed right at the corner seam to help make it water-tight. Our 4000UV sealant is an option.

Regards, John Dritsas jdritsas@mmm.com

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So we ordered a roll of 5962 and a small can of 111. We fitted the windows inside a shed with air temperature about 10C (50F). Our Skoota 28 is plywood with glass/epoxy sheathing which was well sanded.

We were amazed how quick the windows were to fit. One line of tape, pressed down, lift up the window and push into place. Maximum 10 minutes a window and no mess! With conventional "goo" you spend more time than that just putting masking tape on to try to contain the excess.

The day before launch it was snowing, then midway through our summer cruise the cabin temperature reached 40C (that's hot!). So a big temperature variation, yet no leaks so far in the first 12 months.

So I would strongly recommend that those of you fitting big windows investigate these 3M products. The only reason I say "big windows" is that the rolls are long - even after fitting 6 big

windows on our Skoota 28 we have half a roll left. And I do not think the rolls come in shorter lengths

So we are using what left to fit wood trim etc inside. It doesn't move! (but of course it is relying on the interior paint/wood bond as we are retro fitting the parts onto a painted surface)

Update! We found the 4000UV sealer was not UV resistant. It broke down quickly. So I recommend regular black silicon instead.

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What does PAR timber mean?

PAR means "Planed All Round" ie the wood is planed rather than rough sawn. So it's ready for use. However the planing removes some timber. So, in more detail, if the nominal size is 2" x 1" (say), which in millimetres would be 50mm x 25mm, then that means the thickness BEFORE planing. The planer takes about 3mm or 1/8" off each side.

Thus a "planed all round" (PAR) 2" x 1" is 6mm or 1/4" less in total. Thus it is 1 3/4" x 3/4" or 45mm x 20mm (approx, because planers vary a little) So to sum up, 2" x 1" is approx 45mm x 20mm, 3" x 1" is approx 70mm x 20mm, 4" x 1" approx 95mm x 20mm etc

And so it is the PAR size that you use, not the nominal sizes. The plans make allowance for the planing loss, so notches are 20 x 20mm for example

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What is KSS?

The KSS method could be one of two things. Either it's just the now standard way of building flat panel foam sandwich boats (I used flat panel foam sandwich to build my Gypsy). Or its Derek Kelsall's own system of making a big panel that includes both sides and bottom in one piece which is then cut, tapered and pulled up round the frames.

The problem with the latter system is that you make a VERY big panel. That leads to several problems. Unless you are several experienced laminators working together I would not recommend making a panel bigger than 15' x 5' in one go. Its just too much hard work. You would also need a very big flat table (and large shed to fit it in).

My Gypsy panels were built in a garage 15' x 14' so I made them in two pieces. That way they fitted in, but it also meant that I could make a panel in an evening (3 hours). I also built the complete cuddy, cockpit, beams, bulkheads etc there so I could work at home and make a complete kit of parts before moving to the boatyard - a great saving in time and money.

Folding up the hull seems to be a rather hit and miss system, again because of the size of the panel. Unless you have several people to help it will be impossible, even then it will be difficult

as it will be very floppy and hard to keep square. Cutting and joining will mean a lot of bumps that need filling later. I don't honestly think it is a time saving system in the long run.

Remember that building the hull is the quick part. Don't be tempted by claims of speedy building - no method is. But it IS easy to design a boat that is hard to build! The best way to have a boat on the water quickly and in budget is to build the one that you need rather than the one that you want. Also go easy on the services (plumbing, electrics etc.) as they take forever to fit.

Building a flat panel boat (steel monohull or deep V cat, or a dory - it doesn't matter) compromises the shape you would ideally like from performance, seakindliness etc. Making a KSS shape must compromise it even more. For example, you really need Veed sections forward if you have an offshore boat. The KSS system is usually used on wide flat bottomed hulls. Although my Gypsy is flat bottomed it is Veed forward to reduce slamming.

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Which plywood and timber should I use?

The quality of plywood is dependent on two factors. First the type of bonding glue and second the wood used. Both "weather and boil proof" (WBP) plywood and "marine" plywood use the same rescorcinol-type waterproof glue. Other types of ply, with one exception, don't use a "waterproof" glue so must not be used for boatbuilding.

The exception is possibly the "best" plywood you can get, the Dutch made Brynzeel. Even though it doesn't use the "correct" glue and therefore isn't classified as marine ply it actually has a guaranteed life when used for boatbuilding far longer than most other plywoods.

In some areas, notably N America, it is possible to get marine grade softwood ply (usually douglas fir). Otherwise the choices are usually "Far Eastern" (meranti) or Gaboon (also known as okoume). Of the two I recommend gaboon as it is significantly lighter than meranti. It may not be as strong, but it is maximum stiffness and minimum weight that are the main requirements for plywood, generally all boats are strong enough.

As a general rule, if you are not sure how to judge the quality of wood, choose marine ply, but if you are able to inspect the wood, or can get it from a reliable source then WBP is usually OK for decks and interiors. But I'd still use the real thing for hulls that are kept afloat 24/7 (even if glass/epoxy sheathed) and beams. That is because one of the differences between marine and WBP ply is that although the outer veneers will be essentially the same for both standards, the WBP inner veneers can be in several pieces, have gaps and be of less good quality.

The choice of timbers appears at first to be more confusing, but can really be broken down into three main types.

First there is timber used for strip planking. By far the best wood is western red cedar. It is

lightweight, easy to work and durable. However it has a short grain and is soft so should not be used for structural timbers. Sometimes this wood is unavailable and so you should consult with your timber supplier for the nearest alternative.Paulownia is currently the favourite option (although I have not used it myself). But be aware that you boat is likely to be heavier if you use a different wood.

Second there is the timber used for general framing, stringers etc. The species of timber you can use for these applications appears to vary enormously, but in fact they generally all have similar properties and so are equally suitable. You are looking for a lightweight timber with a long grain that is easy to work, as knot free as practical, and that glues easily. Usually the softwood pines and firs are the logical choice. Douglas fir, yellow cedar, sitka spruce, are typical examples. Again, your timber supplier can advise you further.

You want to use "joinery quality" or better as that standard has the least knots. Unless you are sure of your supplier it is best to inspect the wood yourself, and certainly be allowed to reject any you feel is unsuitable. Generally though you can cut out and discard sections of poor timber. The only exceptions to this are gunwales and, in particular, beams, which must be best quality throughout.

Finally there is timber for cosmetic uses, including outer gunwales, galley trims etc. For these you want a hard wearing and "pretty" wood. So teak, iroko or other hardwood is the logical choice, unless you want painted trim of course.

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Can I lengthen the boat?

The quick answer is NO! The answer is also NO if you want to change the rig, or add a central rudder or lots of other modifications that you would like to see. Like all designers I spend a long time deciding on the initial concept of the boat and then even longer on working out all the details.

I know it's easy to add an extension to a house when you need more room for a growing family. But houses don't have to sail to windward, and it doesn't matter where the centre of gravity is - a house will always "float" level.

If you have a small car but would like it a "bit bigger" you don't go to your local garage and ask them to "add a bit in the middle". If you want more performance you don't just fit a bigger engine. You know that you would have to change the steering, brakes, chassis etc as well. So you either accept what you have or trade it in for a larger or faster one. So why, when it comes to boats do people think that they can have what they want, rather than what the designer drew?

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Charter boats and Specifically the Norseman 43

In general terms: I would not buy a charter boat to live on. Charterers are only on the boat for 1-2 weeks and they tend to eat ashore and not sail at night. Usually there are 6-8 people to help with anchoring, sail handling etc. So there will be little stowage, no bookshelves, small galley, no chart storage area etcetc.

I would definitely NOT go for a scheme where you buy a big charter cat for 50% down and leave it with a charter company for 5 years. If you want a new Mercedes would you go for a scheme where you paid 50%, and then lent the car to a taxi firm for 5 years before being able to use it?

Charter boats are business assets, so owners want the maximum return for minimum investment. In other words, charter boats (like hotels) go for maximum bunks and lounging space (by the pool in a hotel, on deck on a boat) at minimum cost. Would you choose to live in a hotel?

I have owned cruising catamarans from 35ft to 28ft and lived on board and sailed multihulls up to 63ft. I have also worked on charterboats up to 70ft in the Caribbean. I have found that a 35ft cat is plenty big enough for a couple to live on. Bigger boats need more cleaning and maintenance, the sails and anchor are heavier etc.

If you only plan to day sail and holiday on the boat I'd recommend 32'-35'. If you want to live aboard then 38' is about the maximum for a small crew. The problem with smaller cats is the load carrying. I have lived on a Windsong and a Gypsy, but it's a bit like camping. A 32' boat is like having a caravan or RV. It's not until you get to 34-35' that you have the carrying capacity to live like you do in a hotel or house. Over 40' you have to take your servants with you (ie crew).

Specifically regarding the Norseman 43. I sailed it 4100 miles between Capetown and Rio and lived on it for 4 weeks with 5 other men. So I have probably sailed one more than the designer or builder. It was unstable. The bows are very fine, vertical and have no flare. So there is no reserve buoyancy.

I have pushed catamarans hard in races over the years, but until sailing the Norseman never had any worries about nose-diving. In a squall we had the rudders out of the water and the bows under until the maststep was in the water. After that we sailed very cautiously. We found it made a lot of leeway, tacked very slowly and only sailed 120 degrees between tacks even in ideal conditions.

The saloon seating was VERY uncomfortable. When I sat in the cockpit my feet would not touch the sole, so that was uncomfortable as well. The chart table was very small and the bookshelves tiny. There was little space for personal effects apart from one bag of clothes each (ie fine if you're a charterer). The bunks were very awkward to get into. Bridgedeck slam was very pronounced, even downwind. But there was 7' headroom in the saloon so why the low

bridgedeck?

The deck layout did not work well. It took 5 fit men 10 minutes to hoist the mainsail, the mainsheet traveller didn't work properly, the stoppers were badly placed, the helmsman seat was poorly positioned etc. But in general the boat was well built except for the fact that the interior was gelcoated throughout and there were no headlinings. This means it would not be usable in the UK or most of Europe because of condensation. Also all the deck fittings are tapped into aluminium plates. So there is a potential corrosion risk. Also its impossible to add or change any deck fittings. Electric cables are run in the laminate so cannot be changed and again no extra lights or electrics can be fitted (again not a problem on a charter boat)

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Crossbeam Design

There are two stages in creating a successful catamaran crossbeam solution.

First you must DESIGN the structure, only then can you CALCULATE it. The former is usually the more important and certainly the one most people get wrong.

There are several factors to consider when designing crossbeams:

First, you need stiff crossbeams, not just strong ones. Fortunately stiff beams are nearly always over-strong. By stiff I mean one without any obvious deflection. Engineers normally consider that to be 1-2% of length.

Why a stiff beam? Well imagine crossbeams made out of rubber. They would never break, but would be so flexible you could never keep the two hulls in line and the mast would fall down as the rigging flexed.

How can you make a stiff beam? Well, actually it’s not just the beams that you want stiff, rather it’s the boat as a whole. I’ve found that the best way to do this on an open catamaran is to have two crossbeams plus a separate one to take the mast loads. The actual positioning of the beams is also very important.

Although crossbeam size and placement is often complicated by rig and accommodation considerations, the beams must take priority! If they are too near the middle of the boat then the bows can flex up and down and you cannot keep the rig tight. If too close to the ends (especially to the bows) there isn’t enough boat to take the loads and, furthermore the beam cantilever is longer.

Having the first crossbeam almost at midships was the most spectacular mistake the Team Phillips designer made. Pete Goss and I are members of the same sailing club and other members were upset when I expressed concern about its design. After the breakage they

realised what I was on about.

Once you've designed the structure it's really a trivial problem to calculate the necessary scantlings. If you use a strain energy analysis you'll find that the loads will dissipate quite quickly into the hull. Indeed it's extremely rare for beams to break off the hulls. Usually the problem is the beams themselves breaking.

Fortunately it's very easy to check the strength of catamaran beams once you've built them. You simply jack the boat up with a support under each bow and each stern. Then take one of the chocks away. The boat shouldn't move appreciably. It looks scary, and is certainly a load that you wouldn't get at sea. But is very reassuring all the same.

You can see a photo of our Merlin Tucanu surviving this test on the "Review of 2007" page. The Merlin and the similar Strider design use two aluminum tubes with inertias around 500cm4. I usually use ply and timber beams as they are easy to make and to attach to the boat (and of course to attach boat to them), but they are heavy (approx 1.5 x the weight of aluminum tubes).

It is not just open deck boats that need good crossbeams. Unlike most designers my bridgedeck catamaran designs also feature big beams. Apart from a big netting beam there will be one under the mast and one under the aft end of the cockpit. I design the anchor lockers and forward end of the bridgedeck to act like another beam. By adding theses beams I ensure that the boat is extremely stiff and that it is not a problem fitting big deck hatches or large companionway doors. I have seen many production bridge deck cabin catamarans that rely solely on the hull/deck mouldings for strength flex, and even crack, bulkheads because they are simply not stiff enough.

On a large, say 40ft, 7ton boat, beams that are strong enough may weigh 400kgs. Ones that are too weak will still be heavy - they may weigh 300Kgs. It's NEVER worth trying to save weight in your beams. Carbon beams may weigh 250Kg at a huge cost. Is it worth spending that much to save 150Kgs at best? I'd rather spend the extra money on better sails and deck gear.

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Hard chine hulls versus round bilge

Although my Strike 16 and 18 trimarans both have hard chine hulls, when I started developing a new racier small trimaran design I initially drew a round bilge main hull. However I thought it would be worth comparing it to a hard chine hull shape, as obviously the latter is much easier to build and trail.

Fortunately a computer makes it very easy to modify existing hulls. A couple of mouse clicks changed the spline tensions and converted a round bilge hull into a hard chine one with no other input from me, (although I did need to adjust the draft slightly to keep the total

displacement the same)

I was very surprised by the results.

As I had kept the length and displacement the same the Slenderness Ratio stayed constant, as did the Prismatic Coefficent. These are two of the main factors affecting wave drag. The other major factor needed to reduce wave drag (and thus to increase top speed) is a high LWL/BWL ratio.

So my first surprise was that the WL beam of the hard chine hull was less than for the round bilge hull, hence the LWL/BWL ratio is higher/faster. Much more surprising was the fact that the wetted surface area was essentially identical, and WSA is of course the main factor affecting low speed drag.

So the implication is that a chined hull will have similar speed to a round bilge hull in light winds, and be faster in a blow.

As I say, that was for a small hull drawn essentially by the computer, not by me (so obviously the final design still needs my input). However logic says that these comparisons will also apply to larger boats. And it did show that a hardchine hull is better than people think, and that a double chine hull (as used on Flica, Romany etc) is better still. Certainly it has convinced me to use it for my new racing trimaran.

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How much does it cost?

It is a natural question for people to ask as cost is usually the main factor in deciding what boat to build. Unfortunately it's not an easy question to answer - different people want different levels of fit-out while obviously different countries have wildly different material, labour and overhead costs. So the best I can do is make comparisons between different boats and to give an idea of costs when building in the UK.

But before I do that it's worth pointing out that building a 10m, 3T boat with 50 sq m of sail (or 33' x 6000lbs x 500 sq ft) will probably cost the same whatever designer is chosen. That's because sail and rig costs are independent of design, as are glass, resin and plywood as they are sold by weight or area. So too are cookers, anchors, lights etc etc.

You can make a similar sort of comparison with cars. The steel in a Skoda costs the same as in a Mercedes, but the latter is ten times the price of the former! And the difference in price goes into the builders pocket and into the general public perception of "I want one of those!" So, don't be misled by those who say "my boats are cheap to build". Having said that, it is certainly possible to find designs that are expensive to build. Ones that need special one-off fittings, or use exotic materials for example.

What is really important to homebuilders though, is the resale value. I know that's not at the forefront of your mind when choosing a new design, but you will want to have your work valued by others. I read recently that someone was complaining about the high price of second hand Woods Designs compared to other designers. Now that may be bad news for those trying to buy a cheap boat, but it has to be good news for the original builder.

It's been well publicised that my Gypsy cost me £5000 to build in 1995-7. But in fact that figure was for a sailing shell and was so low because I was very lucky to get a complete second hand rig for £200, about a tenth of the new price. Even so, I actually spent nearer £10,000 when things like engine, electronics, ground tackle, fridge, boom tent etc etc were included. Most UK builders reckon on spending around £12,000 for a complete Gypsy. I later sold my Gypsy for the asking price of £25,000. So that meant that I earned around £10 an hour while building it. And that's the sort of figure I would hope everyone would expect as a minimum when costing out their labour. A 10 year old wood Sagitta was recently sold for £45,000, again making it's builder about £10 an hour

So my guide for prices are as follows (in 2000): Strider etc £4-6000 (resale £8000-10,000) Wizard/Sango £6-8000 (we sold our Wizard in 1995 for £19,000) Surfsong/Windsong insist that the beams, for example, are bought, clearly they are considered too hard for amateurs to build.

Having said that I know I decided that I would not sell hull plans of the Transit. Builders have to buy those. But that is not because they are hard to build, rather because big boats take so long to build and I feel life is too short for boatbuilding. That's also why I no longer design boats over 40ft, but that's another subject.

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Trailable catamaran and trimaran comparisons

These comments, below, refer specifically to trailable trimarans with accommodation and, I hope, help explain why I think trailable catamarans are better. However I do think that open deck day sailing trimarans have great advantages, which is why I have designed several under 20ft. See my Strike design pages for more

Some one sent me the following email:

I am an aircraft engineer currently working on composite aircraft design and stress analysis. I am also an amateur boatbuilder. I recently built a 22ft trimaran and I am sailing it as much as possible. I enjoy racing and cruising.

I did a lot of racing in the past on the Fireball dinghy. I built 8 of those in ply-epoxy and love the material, but for the trimaran I went full composite.

This my first multihull and this is a pleasant change from monohull sailing. I enjoy the speed and

trailability.

Since I almost never sailed on multihulls before, I thought that they were more or less equal, like most monohulls are. I read books on the subject and surfed the net for information. I now realize that a trimaran has a lot of bad features that maybe the catamaran does not have.

Let me start, in the order that they appear on my notes:

1-When raising the rudder to clean it from weeds, the boat broaches almost instantly. A cat has 2 rudders so they can be cleaned one at a time to keep control. This is important when broad reaching fast in big waves and you just crashed into a big weed patch.

2-The boat flip-flops from side to side when the waves come from the side, and the floats slam the surface of the water. This is very annoying, as well as dangerous. The float can wack on the head a man swimming around the boat. I experienced that myself when swimming in a dead calm when a motor boat cruised by. When you prepare the fenders, you fly up in the air and down in the water, all that with no lifelines, over and over at each wave. When the wind is light and you are steering the boat from the weather float and a motor boat makes a big wake, beware of the slamming and the spray!

3-The tiller extension is in the way constantly and there is no convenient place to store it.

4-The boat pitches a lot (hobbyhorsing). The floatation plan inertia is small compared to the overall boat moment of inertia. This is annoying and pulls the propeller out of the water in waves.

5- When steering from the cockpit you need to bend your neck at 90° upwards to see the sails. On a monohull, the cockpit is usually wider and because the boat heels it is easier to see the sails. When you steer from the nets it is easy to see the sails but you are exposed to all the spray and float slamming plus you cant see the compass. I guess I could mount compasses on the floats...

6-There is no privacy when using the toilet or getting changed.

7-The floats are useless volumes. They are always at 100% humidity inside and are almost impossible to inspect.

8-It is impossible to turn the tiller to make sharp turns when you sit in the cockpit with your hand on the outboard motor throttle.

9-It is impossible to open the pop-top when the mainsail is lowered on it. You have to remove the boom and sail and store them on the nets.

10-It is impossible to walk all the way to the float bows to jump on the dock, install fenders, mooring lines or fix a bridle to the anchor line to prevent the boat from sailing at anchor. This

could be solved by using more nets, but they are really expensive. I could go on and on it seems.

Tell me, do cats have all these undesirable features?

In my mind right now, the only 2 advantages of small trimarans over catamarans are: 1-Folding ease 2-Wider cabin for equivalent weight and cost.

I replied:

"You seem to have got most of the drawbacks on your list. Drawbacks that don't usually apply to catamarans. I haven't sailed the design you built, but I have sailed extensively on Farrier and Dragonfly trimarans. (I have also sailed Fireballs, but not for years. Peter Milne sailed with me on my Sagitta)

1) I agree weed is a problem. We got into a real tangle at 2am when racing a F31R in the VanIsle 360 last year and we hit weed just as we were hoisting the spinnaker. On Tucanu we have a strip of cedar about 1.2m x 100mm x 10mm profiled like a rudder that we use to clear weed. It has a hook on the leading edge. It has far less drag than a boathook and works well. I prefer semibalanced rudders over dinghy style ones. The latter I use on Wizard, Strider and Janus. Of course they are easy to kick up when sailing to clear them. The semibalanced rudders can be lifted when sailing , see my FAQs page for more. So yes 1) is a win for catamarans.

2) Also a win for catamarans. I guess you have seen the Costner film Waterworld. There is a good shot in it of the outriggers flopping from side to side. It is also very dangerous in a big sea of course.

3) Also a win for catamarans. I usually use two telescopic extensions (made from telescopic boathooks, much cheaper than the real thing). I can steer from either hull so have a good view of the sails (or dock when coming alongside under engine) or from in the cabin.

4) This will vary according to the design. The Dragonfly is a much nicer seaboat than the Farrier, possibly why they are more popular than Farriers in Europe. Poorly designed catamarans can also pitch and hobbyhorse. Usually because the Prismatic Coefficient is to low (some people think it should be the same as a monohull, it should be much higher)

5) This is getting boring, another win for catamarans. Also the tri cockpit is very small and it is very scary getting out to the nets when it is rough. Seeing the sails is very important to me, that is why I prefer tillers over a wheel and don't like a Bimini. On my new Romany I will be fitting a bimini as we will be tropical sailing. But only over the central cockpit area and wheel. There are two tiller extensions fitted so I can disconnect the wheel, steer and view the sails from the hulls. The best of both worlds.

6) The cuddy used on Wizard and Sango and also the removable one I fitted to Tucanu makes a HUGE difference to comfort on board. I recently sailed Tucanu as an open deck boat for 2 days in the rain. We'd sailed with the cuddy for 4 weeks earlier in the year. I don't know how I

managed on an open deck boat before (maybe because I was younger) You can see more on my Plan Updates page and videos.

7) agreed

8) And there isn't really room for two people in the cockpit to handle engine and tiller separately

9) You can see from the Tucanu and Wizard photos that we can use the poptop with the boom in its normal position. I have drawn the boom cocked up on all my recent designs. More headroom aft, more space for a tack downhaul and the topping lift and lazy jacks automatically loosen as the sail is hoisted.

10) and the nets can trap water

So overall, a big win for catamarans

The Wizard/Sango/Tucanu style cuddy solve most of the folding problems on small catamarans and, because you can also sleep/cook/toilet in the hulls, they have a lot more room and privacy than the equivalent trimaran

It takes about 40 minutes for 2 people to have a standard Strider ready to sail from trailer. (A test was done in front of a magazine reporter). The Wizard is a bit quicker than that (ditto)

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Where Do I Moor My New Multihull?

One common reason people use to not buy a multihull is because they say "they cost too much in a marina" or "there's nowhere to moor it"

Over the last 35 years I have sailed multihulls in over 40 countries and I have never had a problem finding somewhere to moor. So a five word answer is "it is not a problem".

Mind you, that has only been with boats up to 38ft long and 23ft beam. I know that travelhoists that can lift boats over 24ft are few and far between. Certainly if you plan to buy (or build) a big multihull you should investigate where you will lift your boat out (or in !) before committing yourself.

Having said that, there are multihull friendly boatyards, obviously the Multihull Centre is one, another is Jaynes Marine in the US, both can lift any size multihull.

When you have a multihull you have a different mind set. No one likes rolling at anchor, but multihulls don't roll. They can be beached or dry out at low tide. Monohulls, by and large cannot. So there much less need to visit marinas than there is if you have a monohull.

If you do find a marina that looks too small see if there is an "end tie" you can use or maybe an area that is too shallow for monohulls.

My home port of Millbrook is home to maybe 100 multihulls, but only five monohulls. The reason is that the creek dries out completely at low water

When cruising I usually phone or call a marina on the VHF the day before. If they ask for extra money, which occasionally they do, I say I'll go elsewhere and they always relent. As multihulls have become more popular marinas no longer turn them away, they cannot afford to.

We left our Skoota 28 powercat in a US marina for the 2013/14 winter. when i phoned them they first said "We're full, sorry" then they said "How long are you" "28ft" I said. "Oh, we have lots of space for small boats, it's berths for over 35ft boats that we don't have". So it's length that is often a problem, not width

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Weight and Displacement

There is always some confusion between what is meant by the "weight" of a boat and by it's "displacement". However the differences are actually quite simple.

The weight of the boat is exactly what it says, how heavy it is when lifted out of the water by a crane.

The displacement is the volume of a boat floating to a specific waterline (remember Archimedes) and so varies depending on the actual hull draft of that specific design.

A boat in fresh water will displace more than in the sea, yet it is the same weight. That is because salt water is more dense than fresh. Look at people floating in the Dead Sea, they float much higher than in a bath, yet they weigh the same.

These days I specify the displacement for the designed WL (DWL), ie the one you see on the drawings. So that displacement will be a combination of the weight of the boat plus the load it carries to make it sink down to that waterline.

In the past I would calculate the empty weight of the basic bare boat carefully, and then give a maximum loading, which might mean the boat floated deeper in the water than what is shown on the drawings.

In other words I gave my early, pre CAD designs a weight estimate and also a maximum safe loaded weight which may or may not be the one that matches the DWL. My newer CAD designs have a total weight of boat plus loading to match the DWL. But I assume that some people, including me, will overload their boats so that they sink deeper in the water.

So, as an example. The weight I give for Skoota is based on our own boat. If you look at the just

launched photos you will see it is floating with the antifouling line about 120mm out of the water. We put that line at 40mm above the 2.3cu.m line (or 2300kgs for easier visulisation). So checking the lines plan I found that it related to about 1700kgs boat weight when empty. Right now we are pretty much exactly on the 2300kgs line.

The drawbacks to overloading are obviously that the boat is slower and less comfortable to sail - more bridgedeck slap and the boat ploughs into waves rather than rides over, so it's a wetter ride. But it isn't a structural problem as I always design in enough strength to take a large overloading. As a result, in 35 years I have only once had a structural beam failure, but the owner then admitted he deliberately made the beams undersize to save weight.

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How big are the bunks?

People often ask for "queen sized", or even "kingsize" bunks, basically bunks as wide as the double bed in your house. However a bunk that wide is often not feasible, or even desirable, on a boat. For one thing most bunks touch the hull on at least one side. That means you cannot fall out, unlike your bed at home. So the bunk can be narrower, yet still be comfortable. I've found that 1.1m, 3ft6in wide is about the minimum for a double while a 1.2m, 4ft width is comfortable.

Another point is that your bed at home doesn't move! If you sleep when passage-making you'll find you probably prefer a narrower bunk so that you don't roll around.

I prefer to sleep aft when at sea, as the motion and noise is less, even if I move to a forward bunk when at anchor. Indeed, if I am skipper on a boat I prefer to sleep in the saloon, so I can access the cockpit quickly. That's one reason for drawing straight sided saloon seats, and why I often draw the longest one wider than the others.

The jury's out as to whether its better to have bunks that run lengthways or ones that go across the boat. I've slept in both types, but some people find transverse bunks uncomfortable at sea, so I normally draw fore/aft bunks

Even on my smallest boats I always draw bunks with sitting headroom for at least the first third of the length. That means you can sit up in bed to read, or turn over easily or even do "adult stuff". Too many boats have "coffin berths", or bunks pushed under cockpit seats, so the "headroom" over at least half the bunk is more like "stomach room".

Apart from anything else, such bunks get very hot, even in temperate climates. Think about the real 3D space when you're looking at the drawings of a boat you plan to build. Of course it's best to go on a sistership to check it out, but I know that often isn't feasible.

And a final thought - how do you actually make a bed and tuck in a sheet if it's too low to get to

the foot end?

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Real-Life Comfort Comparisons between monohulls and multihulls

I thought the following email from a friend of mine might be useful as it compares sailing on both a monohull and a catamaran and is written by someone new to sailing and thus someone with no pre-conceived ideas or prejudices.

It was written after a 2007 passage on a monohull from the Galapagos to Costa Rica. Marilyn had previously sailed on Rush from the UK to Canaries, the same Crowther designed 33ft catamaran I sailed across the Atlantic in 2006/7. (Marilyn got off Rush in the Canaries and I got on for the trip from Canaries to Panama).

Personally I found Rush to be just about the most uncomfortable catamaran I have sailed. Certainly much much worse than my similar length Eclipse. Anyway, this is what Marilyn wrote about her monohull trip:

The wind erred on the lighter side so we rocked and rolled for a large part of the trip! The good news - no I did not feed the fish, not once. I was amazed I didn't get seasick. It was bad enough just trying to sleep and stay in the bed! That was a feat on its own. The lee cloth certainly helped but it didn't stop my head from rocking side to side. I tried sandwiching myself in with cushions and while that worked for comfort I was so hot I had a bath in my own perspiration.

I found the last part of the trip extremely tiring as my back started to ache or I felt like I had been punched in the chest, I think caused by the balancing act while I was sleeping. It was very exciting, cooking meals on a stove that is weighted to stay level so as we rocked, the stove moved. . At least I wasn't rocking and rolling around the place and that I could handle.

The day we arrived here (in Costa Rica) was such a gloriously sunny day, the sea hardly a ripple on the surface. I lay down for a couple of hours, absolutely exhausted. I had my book on my chest and didn't move a muscle for 2 hours. I died and went to heaven for a short while I am sure. The rocking and the rolling has finally stopped. At the moment all I want to do is relax and get some good sleep.

This trip has truly been a new learning curve in my life. I thought the motorbike tripping around S America was hard, I think this has been harder. How easily we forget though. I have learnt heaps about sailing. I know I can cook excellent meals with camping equipment and limited tools! I can sleep eventually while rocking and rolling when exhaustion takes over! I did arrive safely and there are times when the seas are kind to us!

Monohulls versus catamarans!

Well is there a choice!! I mean to say, a choice where everything is tied down, even straps to tie

me in the galley, coffee cups 2/3rds full so it doesn't spill, being flung from side to side versus a full cup of coffee, sitting or lying in comfort outside and not being flung out of bed.

There is nothing worse than your brains racing from side to side in your head when you are lying down. That in itself answers any doubts in peoples mind regarding the state of my brain. If I had more brains, I maybe wouldn't have been to sea in a monohull!! More brains might have meant less space to move around in!!

You know, it could have been worse, there is always worse. I have bumped around in Rush at times too but then the seas were a lot worse than we encountered on this trip. Pity help it if they had been worse, I can now see why so many monos motor sail. At least to get a break from the constant motion. "

And then another cruiser with experience of both multihulls and large monohulls wrote:

"I don't think that people ever change back as such. There are pros and cons each way of course. Usually once people switch to Cat's they stay that way - however, plenty of people try one but don't buy one...

My experience has been on cats ever since I was about 4 years old. My father bought one by "accident" while setting out to buy a trimaran... We eventually traded up a few times and bought one of Richard Woods boats, a 35 foot Banshee. We had a lot of fun on that and took it down to Spain a few times. Your range and reach is expanded so much when you have a boat which is capable of "nipping down" to the north of Spain in under 5 days from the South coast (frequently under 3 days door to door actually).

We were a little irresponsible with it though (sorry Richard!), and occasionally had full sail up in force 8 or so.... As someone earlier pointed out, these things are so solid that it's sometimes very easy to just leave things up because they simply go faster and faster! We were doing in excess of 20 knots in the situation described above.

So I had my first chance to sail on a 65" ex Challenge race boat a few days back. They made us wear oil skins! Yeah I know! I mean I do own a set of my own, but on the cat I think I have worn the trousers only twice EVER in my life and the jacket perhaps a dozen times! Usually I just sail in a jumper and perhaps a waterproof over jacket! OK, so the 65" race boat was a shock because it seemed to need lots of people to handle the sails, it was quite slow (we only did around 7 knots down the solent), there was not a lot of space, and the darn thing tipped over!

In comparison my folks now have a 43 foot Privilege cat which can easily be sailed by one person. You can tack it single handed in probably less time than a moderately experienced race crew can tack the monohull... It has 5 double cabins (but only 4 of them have on suite shower and toilet...). And to be fair you do know when the weather is getting rough - for example my folks gave me a ring a few days back as they sailed up from Indonesia to Singapore and said that they had been in a severe thunderstorm, strong winds and even (drum roll) one of the photos

had fallen off the shelf around the main table... (Yep, when it gets really rough the washing up bottle jumps off the side into the sink as well!)

Possibly this is the easiest way to describe the difference between cats and monohulls..."

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Which is better, a "Galley up" or "Galley down"?

That might sound a strange question but what it means is: should the galley on a conventional bridgedeck catamaran be up on the bridgedeck in the saloon, or down in a hull?

As I have said elsewhere, the majority of productions catamarans built these days are for the charter market. Charter catamarans are "floatels" and are not really lived on. Most charterers eat out as much as they can, just as hotel guests do. So a small galley is sufficient for the breakfast and snacks charterers cook.

Liveaboard and coastal cruisers, on the other hand, will need more worktop space and a lot more stowage room. They are probably going to cook underway, so being able to brace oneself is also important. Thus a corridor style galley (ie one in the hull) is ergonomic and also an efficient use of space.

If you do fit the galley on the bridgedeck then what do you put in the hulls? On a charter boat a pair of back-to-back shower compartments makes sense, but on a liveaboard boat they aren't necessary, so this part of the hull tends to become an unusable space. Meanwhile the saloon seating area is much smaller than it otherwise would be.

There is another problem as well. You have to move around the boat, so passageways have to be left clear to get down into the hulls, get to the seating areas or chart table, never mind work in the galley. All of which is wasted space.

So unless the boat is large (say over 45ft) I do not recommend a "Galley Up" design for any application. It's all another reason why you shouldn't chose a charter boat as a live aboard cruiser.

Note: The "cuddy" catamarans, ie Wizard, Sango, Gypsy, Saturn, Romany etc do have galleys in the cuddy and they work very well there. (I have lived on and cruised extensively on both a Gypsy and Romany and also done a lot of coastal sailing in a Wizard and some in a Saturn)

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History of the Flica 34/35/37

The hard chine Flica 34 was one of my first cruising designs. I keep it in my portfolio because it is still a great cruising boat. Stable, lots of room and comfortable to sail and live aboard, with a good load carrying hull shape. In fact I like it so much that I used a similar hull on the later

Romany and Mirage designs. It is possibly the most sailed of my designs, certainly there have been dozens of ocean crossings (one Flica has made at least five Atlantic crossings) and a good number have been used as charter boats.

In the mid 1980's, when Palamos Boatbuild wanted to develop some larger designs, we used the Flica 34 as a basis of a new design that would be more cruising orientated than the performance cruiser Banshee being developed at the same time. That way potential customers would have a choice. If they wanted performance they bought a Banshee, more comfort a Flica. 25 years on it is important to remember that the original buyer was offered a choice in boats. If he chose a Flica it was because he didn't want performance, prefering comfort instead.

The Banshee was 35ft long and as we planned to use the same hull for both boats the new production Flica became a 35fter. As a result all the dimensions were slightly larger, so there is more headroom on the bridgedeck, a bigger heads, more room for engines and generators etc.

The first ten or so boats were Flica 35's but, later, transom steps were added to lengthen the boat to 37ft. The rig and general layout remained the same, except that the Flica 35 (like the 34) had a deep cockpit and the 37 a raised cockpit.

This was done for two reasons; first to give extra room below so that the aft bunks could be awthartships, and thus be in "cabins" rather than just bunks. And second because people didn't like the deep cockpit as it was hard to see forward over the cabin top. Of course by raising the cockpit some people then felt exposed and vulnerable to waves from aft (but the aft platform did offer reassurance). It was a compromise choice, but in the event once the 37 was on the market no one bought a 35. So clearly people prefered the raised cockpit.

Palamos ceased trading in 1989, but people still wanted to have a Flica 35/37. So I modified the production boat drawings to suit home builders. Originally these home built boats had strip plank cedar hulls and plywood decks but later I added details so people could build in foam sandwich. But the round bilge boat is harder to build than the sheet ply original and, because it started life as a production boat, the 35/37ft plans are not quite as comprehensive as the 34 plans. Thus the standard Flica plans I sell are for the 34ft hard chine plywood version. But the 35 and 37ft versions are still available to special order if requested, but please note these only have round bilge hulls, not chined.

Probably the one disadvantage of the Flica is that it has a relatively small rig, so performance suffers in light winds. Having said that, I do have a bigger fractional rig drawn for the 35 and 37 versions which adds a big boost to performance.

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History of the Strider

Striders have proven one of our most popular designs, for good reason as they are good all

rounders. Enough accommodation for coastal cruising, race winning performance - especially in light winds - and readily trailable. The original 1982 version was for home building in ply and featured daggerboards and a semi trampoline/hard deck area.

This version was first built in grp in 1984. It proved to be a popular race boat, holding the course record for one leg of the offshore fully crewed Three Peaks Race, coming third in the 1985 World Micromultihull Championship and 1st and 3rd in the 1989 and 1992 UK Championships respectively. Several different rigs were drawn to suit individual owners specific needs, the big rigged boats have a wider overall beam and usually an all trampoline deck area. Such big rig boats are sailed on Lake Kariba in Zimbabwe for example.

In 1987 Palamos Boatbuild wanted a budget boat that would be a good introduction to cruising catamaran sailing. We had found that many people did not want performance, just a big open deck, simple to sail dayboat with the option of occasional overnighting. Most of these owners only wanted to take a boat home at the end of the year and so designing the boat for regular trailing was not important. As a result the Strider Club was developed which proved very popular during 1988 and 89 with about 40 grp boats sold.

This version of Strider had low aspect ratio keels, a small rig and a solid cockpit tray. All making the boat easy and comfortable to day sail. It was this version that three of us sailed singlehanded in convoy to the Soviet Union in 1989. In the same year Palamos Boatbuild went into liquidation and only a few new boats were built in the 90's before the moulds were broken up. However, the plans are still available for both versions if you wish to build in plywood or strip plank cedar. The home builders version of the Strider Club is called Shadow.

To learn more about the different versions view the video "A Day Sail to Russia" which features the Strider Club, or "Multihull Sailors Have More Fun!" which features sailing shots of both versions.

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How do you trail a catamaran?

My trailable catamarans fall into two styles. Those that fold (Wizard, Sango and the Skootas) and those that demount completely.

The Wizard and Sango hulls fold under the central cuddy for trailering. To assemble, the trailer is simply backed into the water and then, as the hull sterns begin to immerse, so they open out. The more the trailer goes into the water the more the boat opens until it is completely assembled. Let the water do the work, no lifting or jacking! Even my mother could assemble a Wizard (assuming she could back a trailer in a straight line!). Retrieval is the opposite, again no lifting is required, gravity does it all.

The Wizard and Sango masts are stepped into a deep mastfoot so will stay up without shrouds

attached, simplifying things enormously. It is also possible to lower the boat from the trailer onto the ground. Incidentally, most trailerable trimarans (eg Farriers) must either stay on the trailer or in the water and it is very difficult to get them off a trailer when on-shore. That can often make life difficult when making repairs or even when antifouling the main hull. And of course, how do you initially get the boat onto the trailer without actually launching it?

The major disadvantage of the folding boats is that the hulls have to be under 4ft (1.2m) high so they can fold under the central cuddy for transport yet still be a legal width - typically 2.5m (8ft6in). To help offset that problem I have drawn optional removable hull cabins which clamp in place after opening out and which store in the cockpit when on the trailer.

I suggest using a telescopic trailer if you want to quickly assemble the other designs. 2 people (who had done it before) once assembled a Strider from trailer to sailing in 40 minutes, watched by a magazine reporter.

Many other trailable catamaran designs also use telescopic beams. But that means that the overall beam is restricted as otherwise, when opened out, there is not much crossbeam left in the hull, compromising strength. Furthermore, to allow the hulls to be pulled apart, the beams have to have some slack, so they rattle and squeak when sailing.

You know how hard it is to pull out a sticking drawer, imagine two of them 5m (16ft) apart, each weighing 200kgs (450lbs)! And that is when they are new, add in sand and general salt corrosion and you can see why I don't like telescoping beams. Instead I prefer beams that drop in place and are held by metal straps over them. No holes in the beams and a system proven over the last 35 years.

If you don't have a telescopic trailer then it is quite feasible to assemble the boat on the foreshore as each hull can be manhandled individually. For a drawback to the telescopic boat is that it can only be moved as one unit, which of course is going to be much harder as its more than twice the weight.

Before deciding on your trailer there are several basic things to consider. First - how often will you trail? If you only trail once or twice a year (as we normally do) then a flat bed trailer (maybe hired for the occasion) and launching trollies work well. They also are good if you are launching on a beach (like I do in Cornwall and also in Canada).

The trollies that came with our last trailable catamaran (a second hand Merlin) were very basic and I modified them by fitting turning front castors (when we got them they were fixed which made steering almost impossible). Even so, I wasn't able to get suitable big tyres so it didn't work too well in sand.

As always, a twin axle trailer is better when driving. Different countries have different towing regulations, the US is much stricter than the UK regarding towing capacity. Not sure why, probably from truck makers input trying to make people buy oversize cars. So I can only discuss

trailers in general terms. Neither can I really draw a specific trailer as a) I am not a trailer designer/manufacturer and b) every country is different. So all I can do is make sketch suggestions.

I have also used a telescoping trailer with Striders and Gwahir. That does allow one person to assemble the boat and is best suited for those who trail often as it is obviously more expensive than a flat bed. However overall boat beam is a problem (the Turbo Striders were marginal) as the trailer had to be road legal with the arms in and yet have enough arm remaining for support when they were out. The inner hull supports are removed before launching to allow the forestay bridle to clear them. Chocks on the trailers take the crossbeams, low down to save lifting and lower the CofG.

To simplify final assembly and reduce weight the original Strider and Janus had part tramp/part solid cockpit floors. However many people didn't like the "soft world" and prefered a solid cockpit. Those classic designs (and the Gwahir, Merlin, Skua) also had small mast beams. But in practice a deep beam, as used on the Shadow, Eagle etc is more reassuring and results in a drier boat. So many people prefer it. I do, and I accept the extra weight and trailering compromise.

Two of us did once assemble a Strider Club by ourselves. However the one piece grp cockpit/mastbeam (originally designed to keep costs down) was challenging to lift in place. Few owners actually trailed theirs (although we did).

The last time I assembled a Strider Club from a trailer it was on launching trollies on a slipway. Three of us did it no problem. 2 men and one pregnant woman. The Shadow, like the Eagle, has a separate mast beam and two part cockpit floor. The mastbeam is similar to that used on the Merlin. Jetti and I could fit that ourselves, but the offset CofG (because of the anchor lockers) made it awkward, just a warning.

Assembling a standard Strider/Merlin/Gwahir is easier as there are more parts, so each is lighter. So I expect an Eagle to be between a standard Strider and a Strider Club/Shadow.

Having said all that, the quickest I have ever got a Laser rigged and in the water is 10 minutes (I arrived very late for a race), my brother who has sailed one 3 times a week for 30 years usually takes 20 minutes.

For remember most of the time taken is not assembling the hulls but raising the mast, attaching nets, sheets, rudders etc. Boats with bigger rigs take longer to raise the mast - one reason why I prefer smaller boats for trailering.

A standard Strider mast can be raised without using the boom as a lifting pole which saves a lot of time. See my website for a safe mast lowering system. I have also helped assemble Farrier 24/28's. They aren't as quick as Farrier implies, in part because the mast raising is harder with a tall mast.

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How roomy is a Strider hull?

Although the Strider and Merlin look very similar on paper, I know, from having owned and sailed both designs extensively, that the couple of extra inches on Strider's hull width makes a huge difference.

However even on Merlin there is still room for a snug single berth in each "corner". The forward ones are comfortable for weeks at a time, the aft ones are narrower and have less headroom, so are better for children or occasional use.

It is really important to have "a place for everything and everything in its place". This is especially true in the galley which can either fold onto the side of the hull or across the boat, even though the latter makes access to the bunk difficult. Side entrance hatches suit this accommodation layout, but mean you can't stow long items in the hulls (like the mainsail or boom when trailering)

Net bags on the hull sides make great stowage areas, while a Portapotti toilet is best positioned under the companionway hatch where also can be used as step down.

These comments also apply to Wizzer and Skua, although both have roomier hulls than a Strider.

The Youtube Day Sail to Russia video, shows a well laid out Strider hull when cruised and lived on for several months.

Of course a deck tent or cuddy transforms life on the open deck boats. A cockpit tent need not take long to put up, as another Youtube clip from the Day Sail to Russia video shows.

However it cannot really be left up when sailing and in any event is still a "tent". So the cuddy designs make a lot of sense. The Wizard and Sango have purpose designed cuddys, but the Plan Updates page shows one we retro-fitted to our Merlin. A similar one can be used on Janus, Strider and Skua.

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S African built boats that are not actually by Woods Designs

There are a number of production boats built in S Africa called "Woods Designs". Unfortunately the majority are not my design, in fact a few I cannot recognise at all.

The ONLY Woods Designs catamarans built in S Africa that are pure Woods Designs are the earliest Sagittas built by Heritage Manufacturing in the early 1990's. The early Elf's are near enough to be called Woods Designs, but no others. So be warned!!

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Access forward

The last two live aboard cruising boats I have owned were Eclipse and Romany. The Eclipse is a conventional bridgedeck cabin boat. So going forwards means either a clamber over a high cabin or walking round the edge, and thus walking close to the gunwales.

The Romany, on the other hand, has a central cuddy with walkways on each side. So going forward is much easier, with nothing to climb over and the hull acting as a deep bulwark between crew and the water. Of course this advantage also applies to open deck boats, but they don't have the extra room and comfort of the cuddy.

So despite the disadvantage of the three separate cabins (which has the advantages of increased privacy and of being an efficient use of space) the deck layout and working the boat feels much safer with a cuddy design.

Having said that, it is still important - even on an open deck design - to have hatches with washboards.

The most dangerous design is one where there is only a deckhatch for access. Not only is it difficult to open and climb in (and remember that when on top of the cabin you are in effect standing on top of the bulwark) but also it is much further to climb up/down when in the hull itself.

That can be very dangerous in a seaway with a great risk of falling overboard or slipping and injuring yourself during the climb out. It is all too easy to fall overboard, however experienced you are. Both Rob James and Eric Tabarly died that way. So a good boat design should include features that make moving around the boat safe and easy.

While on the subject of hatches the smaller boats often have the choice of a side opening (as on the Romany) or an aft opening hatch. The side opening divides the interior nicely into two ends and as explained above, is a safe option.

However the aft hatch makes sense on trailable boats as the sails, beams and boom can be easily slid into the hull for transport. Furthermore it is easier when steering to grab items from the hull with an aft hatch - but that only works on a small boat when the tiller-steering helmsman is near the hatch.

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Are multihulls dangerous?

The following question was posted on the Multihulls Magazine bulletin board: *Can someone give me some ammunition to throw at a monohull owner who swears that catamarans are*

much more dangerous than monohulls. He owns a 42-footer. I want him and his wife to charter a 40-foot catamaran in the BVIs and they say no way, that catamarans are far too likely to turn over. I know this is ridiculous, but I need some help. Anyone?

I replied: "*Ask your friend to prove his assertion. Point out that NO cruising catamaran has ever capsized when under bare poles. Implication: cats that capsize have too much sail up - "driver error". Tell him about Bob Beggs - 4 Atlantic crossings in 26' open cats, yet capsized a Beneteau 38 monohull in Biscay and lost a crew member. Primarily you friend wants a SAFE boat, ie one that is not risky to sail. I feel the risks at sea are (in order): Personal injury, collision, rig failure, fire, structural failure, capsize.*

I once crossed the Atlantic in a monohull that we had to pump every 20 minutes - on the same trip we had a major (electrical) fire and broke the forestay. My cousin was badly injured when she was thrown across the cockpit in the Caribbean on her monohull. Multihulls offer "no bruisin cruisin".

It's very easy to fall overboard on a monohull (eg Eric Tabarly); very hard on a multihull. If he won't charter get him to go to the Multihull demo days so that he can try out some cats for himself. Ultimately one cannot answer someone with uninformed prejudice if they don't want to listen."

Remember that most charter boats in the Caribbean are now catamarans. Charter companies would not risk letting people (especially those who are inexperienced) sail dangerous boats.

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Open Transoms

One of the modern multihull fashions is to fit vertical or ram bows - which I write about elsewhere. Another is to have open transoms with big transom steps, often with a big cut out in the inner hull side.

Clearly the idea is to make it easier to board from a dinghy and to use as a swim platform. That maybe OK on a charter boat, but not one used for serious sailing. Open transoms are also used on racing monohulls to save weight and reduce windage, more important, they make the cockpit properly self draining.

Now, I like transom steps, they do indeed make boarding easier, and not being able to fit them is a major drawback to canoe sterned boats. However I only draw small steps and I always like a completely surrounded cockpit, even if it makes access harder. Boats are for sailing - they aren't swimming platforms!

So it's the big steps I object to on ocean going boats. There are several reasons why open transoms are not a good idea:

It's very easy to slip and fall backwards out of the cockpit, especially as a catamaran has a deceptive motion. Just because it sails flat doesn't mean you don't need to hold on, as the boat will bounce around - just like when walking down the aisle on a bus or tubetrain. Many catamarans built for charter have very big cockpits with few handholds.And it's not just worries about the crew, "stuff" can roll out, even pet dogs and cats (which actually happened on a boat I was sailing last year)

Of course, the worst place to fall overboard is at the stern, because you are immediately a boatlength behind the boat and have no chance of catching anything to save yourself.

Long raked transoms also shorten the useful deck area, making a smaller boat. The same is true inside of course, the accommodation has to start further forward. Marinas charge by length, not interior volume. Often so do cruising permits when travelling abroad, and regulation changes are usually based on length.

There are possible structural problems on a boat with big open steps as there is no real boat behind the cockpit to hold the hulls together

The aft sections lack buoyancy (especially true if the inner hull side has been cut away). A cut out on the inner hull side might be OK in flat water, but as soon as there are any waves (or as soon as the boat is pushed hard when the lee hull begins to bury) the sea washes over the lower cutout step. In other words, there is then no boat there. So no reserve buoyancy to help stop pitching, and no added waterline length to increase speed. It cannot be fast!

Most serious, there is nothing stopping the boat from being pooped. Pooping happens either because the boat is driven backwards when it sailed up/into a big wave, or because a breaking wave comes in from aft when running downwind. It seems this is one of the causes of a recent abandonment of a new catamaran. At any rate, it certainly had big open transoms and was pushed backwards by a big wave.

The rudder stocks have to be short so there are more loads on the hull and a tiller bar is hard to fit. That makes emergency steering difficult and means relying on continuous cables (which can be very long, making it hard to get the right tension) or hydraulic steering, which is usually horrible on a proper sailing boat.

So what many builders have done to solve those problems is fit the rudders forward, and the engines behind them. True that gets the noise and smell out of the accommodation, but makes for very scary steering in reverse, when the prop thrust goes onto the back, not front of the rudder. It's then very difficult to stop it overbalancing. And of course engine maintenance is harder than even with an outboard - there's no room to work and you're stuck at the back of the boat, head down in an outside locker

Also of course big transom steps make it much easier for unwanted "guests" to board the boat -

whether with 4 feet or 2.

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Picture Windows

I've written elsewhere about modern fashions in bow shapes and interior layouts. Now it's time to talk about "picture" windows.

Once again it seems to be a charter-boat led design feature, as obviously charter guests want to look out at their beautiful anchorage. But cruisers don't always want to look at the big waves when at sea, and certainly you'll find it hard to sleep when on passage if there's too much light below.

Furthermore, people can see in, especially in a marina and at night with the saloon lights on. It doesn't do much for personal privacy and makes it easy for thieves to "case the joint"

Stowage space is always at a premium on any boat. You cannot fit lockers in front of a window! Nor even a cup hook or a small shelf. It's the same in a house of course, kitchens tend to have fewer windows than other rooms, so you can fit more eye-level cupboards.

Most houses have double glazed windows to reduce condensation, heat loss and noise. But boat windows are single glazed and tend to be fitted at an angle rather than vertical as in a house. So the "greenhouse effect" is another problem, which is why many catamarans fit louvered screens or "eyebrows" on the outside of the windows to act as sunshades. One of the most popular places for crew to sit when on deck is leaning back against the saloon sides, but those eyebrows make it too uncomfortable to do that for long.

All of that might be acceptable, were it not for the fact that boats move and flex when underway. Indeed everything does - look at a plane wing - if you dare - next time you fly. I am of a generation old enough to have flown in the ill fated Comet jet. Originally this had "picture windows" so that passengers could see out easily. Unfortunately these large windows not only caused the fuselage to fatigue but they even cracked in flight. After four fatal crashes the picture windows were changed to smaller ones and, despite all the advances in structural design since then, small they have stayed.

Typically a 1/200 movement is acceptable, which is too small to notice. Even trees (and tall buildings!) will sway in strong winds. Clearly that doesn't mean they are about to break. But what it does mean is that there is a slight movement across the structure. In practise that means that if the boat has big windows the join between window and cabin side is going to come under big sheer loads. So, as with the case of the Comet, that means that at best, they'll leak.

It's important to have a stiff structure, for it helps keep the rig tight, so sailing performance improves, furthermore the interior doesn't squeak while underway - disconcerting at best. But

if the windows are leaking then they are not properly dissipating the loads across the boat, so the boat flexes more and the windows leak more. A downward spiral.

Bottom line: On some boats it's the (big) windows that are holding the boat together. Some designers acknowledge that, and fit extra structure to compensate - which adds weight of course. But many do rely on the window joints being intact.

One of the other fashions I don't understand is the picture windows in the topsides, these days they are frequently seen on powerboats and monohulls, not just catamarans. Maybe I'm just incompetent, but I have frequently misjudged leaving a berth or a fuel dock and scraped, even banged, the topsides. It's a more common problem in the Med and N America which tend to have marinas with concrete walls and pilings rather than floating pontoons, because there is generally little or no tidal range.

As proof that it's not just me, I watched a Lagoon chartercat having its topside window refitted after it had fallen out while sailing from Martinique to Grenada - not a good start to a charter holiday! And think of the consequences if it fell out when far offshore.

Finally, if you're building you own boat don't underestimate their weight, nor the time and cost to fit a window, each one can easily take a full days work - and that's without finishing the inside edges.

So now you know why I try to keep windows small!

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Sink or Swim?

Or put it another way: Self righting or unsinkable - which is better??

One of the perennial arguments between supporters of multihulls and monohulls is "Is it better to float upside down or sink?"

Notice I used the phrase "self-righting", not "capsize" for **ALL** boats can capsize. It is only recently that one specific type can self right after a capsize (providing it doesn't flood and sink first). Yes I'm talking about monohull keel boats with external ballast.

Many will be surprised to learn that they are the newest of all sailing vessels, for 150 years ago they didn't exist. Multihulls on other hand sailed for thousands of years in the Pacific and Asia, while all European voyages of discovery and trade from the Phoenicians onwards have been in non self righting boats.

However history isn't relevant to those who say it is better to sink than stay upside down.

I know I won't be able to change people's opinions in this short article, but what I hope to do is to encourage people not to just make glib statements but rather to decide what the real

chances of either sinking or capsizing are.

Let's be specific.

A monohull will sink if holed or if flooded by a large wave. What are the chances of that, and what can the crew do to prevent it happening?

A multihull can capsize if blown over by the wind or if overcome by a large breaking wave. What are the chances of that, and what can the crew do about it?

Despite the advent of GPS there are still many collisions with rocks or shore as boats cut corners as they blindly follow their chart plotter.

Running aground on a monohull is considered a stranding often leading to ship wreck. Whereas multihull sailors will deliberately dry out on a beach - to escape bad weather or even just for fun, say for a BBQ. If the worst happens you are more likely to survive running ashore in a gale on a shallow drafted multihull than a deep keeled monohull.

Whales have sunk many monohulls, but they aren't the only floating objects out there. People are a bit coy about reporting facts, so the estimates vary widely, but between 2000 and 10,000 shipping containers are lost each year. Whatever the true number, it is certainly in the thousands. Not all sink immediately, some have been know to float for over a year (those filled with TVs packed in polystyrene/Styrofoam float longest).

Of course, you don't need a container to hole your boat; even a log can do that. I write this in British Columbia where every year even ships are damaged by "deadheads" or floating trees, while I once saw a fridge floating off the coast of the UK. Race boats are constantly reporting being damaged by floating objects. In a recent Cape to Rio race a monohull hit a container when 1000 miles from land. It's crew were rescued just before the boat sunk by a CATAMARAN which took them to Namibia.

And what can the crew do to avoid such a collision?? Well, to be safe they shouldn't sail at night, nor sail fast, and obviously there should be someone on the bow on watch at all times. In other words, however careful or prudent a monohull sailor is, he is ALWAYS at risk of a sinking EVERYTIME he goes to sea.

And what about the large wave problem? Few people actually cruise flush decked boats with no cockpit or hatches, even though they know such boats are safer (I'm thinking of boats like Jester and early Colin Archers). Why? Because they are so impractical as live aboard floating homes.

So most monohulls, especially when sailing to windward, and thus well heeled, have large openings very close to the water. And chances are that someone will open a hatch at just the wrong moment, so in fact it doesn't need that large a wave to get water below. Obviously if it is easy to get a little water below it is also possible to get so much below that the boat is

swamped.

A multihull can capsize if blown over by the wind. What are the chances of that, and what can the crew do about it?

Weather forecasts are now pretty reliable, and getting better all the time. So 90% of sailors know what the weather will be for their sail. And 90% of the others never get in really bad weather. So the chances of getting "caught out in a blow" are now pretty small for the majority of sailors.

And even if you are, there is plenty a seamanlike crew can do. Reef for a start. Throughout the history of multihull capsizes it seems the vast majority are either pushing too hard when racing or are monohull sailors not used to sailing multihulls. In other words most multihull capsizes are the crews fault, not the boats. And of course the vast majority of multihulls don't ever capsize because most crews are sensible and reef early.

A multihull can capsize if overcome by a large breaking wave. What are the chances of that, and what can the crew do about it? The wider the boat the safer it is in waves. In fact you are just about uncapsizable until the wave height exceeds the beam of the boat. That is a proven, undisputed fact of basic naval architecture. Lie ahull in a catamaran and you'll just bob up and down. Do that in a monohull and you're likely to "roll your guts out".

It is extremely rare for a cruising catamaran to capsize in waves with no sails set (trimarans are a different matter) because despite what the media say, waves over 20ft high (the average beam of most ocean going multihulls these days) only occur in F10 conditions or more. Even then you are only "at risk" of capsizing. It doesn't mean you actually will. I know, for "I've been there done that". Not many people can truthfully say, as I can, "then the wind moderated to a F10". Even in horrific conditions (in a 32ft catamaran) the saloon carpets stayed dry. I once crossed the Bay of Biscay to windward in a gale in a 37ft catamaran. We kept the spare toilet paper in the bilges - it stayed dry.

And before anyone asks, yes I have had my fair share of being close to sinking on monohulls. Pumping for 20 minutes every two hours when seven days sail from land isn't much fun.

Having said all that, it isn't the boat that is important, it's the crew. Few people survive a sinking, especially if well offshore, while a large number don't even survive a knockdown even if the boat does (the Fastnet 79 and Queens Birthday storm proved that). Whereas most people do survive a capsize.

And of course I also have to mention the fact that keels still keep falling off monohulls. And it's not just a problem on race boats, it also happens on production boats. Well known brands like Contessa, Sigma, Bavaria, Oyster and J boats have all had failures and lives have been lost. One problem is that the keel cannot be easily inspected, so any failure is always unexpected. In

comparison a multihull crossbeam, say, can be inspected daily.

Nor have I started on the fact that you are far more likely to fall overboard or be injured on a monohull than a multihull, while I suspect that most emergency call outs are as a result of damage to the (single) rudder or engine failure. Most cruising catamarans have two of both.

But discussion on that is for another time.

In fact to me the real question is "why don't monohull sailors demand unsinkable boats"? It isn't as if they weren't available, the Belgian yard Etap has made them for years, so too did Sadler in the UK.

Finally, let's put the risks of sailing any boat into perspective.

According to the official 2001 US Coastguard figures, nearly 500 people died when boating. 350 were in open motor boats, 100 in kayaks/canoes, 50 in personal watercraft. So I guess no one drowned when sailing in 2001 in the USA. In comparison 24 people were killed skiing in British Columbia in the 2008/9 winter, while over 30 people drown each year in their cars in the UK.

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The Pitchpoling Myth

I read it everywhere: If you make a catamaran wider it will pitch pole

Now where is the evidence to back that up? It seems to me that this is something someone wrote once years ago and since then everyone has just blindly repeated the dogma.

Probably they do so because at first sight it sounds logical. If a catamaran is made wider it becomes more stable sideways. Thus proportionately it must become less stable fore and aft, all other factors being equal.

But A) is that true? B) how many (besides me) have tried making a catamaran wider to see what happened?

The original writer was, I suspect, a promoter of early narrow English boats (like Prout and Sailcraft) worried about newer, wider designs. So it is ironic that one of the first pitchpoles was of a very narrow, low freeboard Prout 27 in Germany.

In practice catamarans tend to capsize diagonally, not cartwheel end over end. Indeed if they did go end over end then obviously the hull spacing would be irrelevant.

So it is the diagonal distance from windward stern to lee bow that is important. Clearly then, as a boat is made wider this distance increases and so it becomes more stable overall.

My 24ft Strider design has a 22ft WL and normal hull CL spacing of 10.6ft giving an overall beam

of about 14ft (so when it was designed over 35 years ago it was considered wide).

In 1986 I built an experimental Strider with a 14ft CL spacing. Compared to it's WL length that is wide! In fact it looks scarily so on paper, still wide in the boatyard but looked great on the water.

A number of these extra wide versions have been built since then. None have pitchpoled or capsized. Indeed I have always thought that these wider boats sailed better and were more stable than the narrower ones.

I guess if there was any truth in the rumour that wide boats pitchpole then catamarans would gradually be getting narrower. Instead they are getting wider. Even the last generation of Prouts were wider than earlier versions.

So I say it again.

It is a myth to say that just making a catamaran wider means it will pitchpole. There are many more important factors that determine whether a boat will pitchpole or not than just the hull spacing.

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Wave Heights

People often talk about sailing though a 2-4ft chop. But what does that really mean? How do people decide how high the waves are? Well, the Beaufort Scale is a useful indicator, but the Significant Wave Height is the "scientific" definition, and is "the mean wave height of the highest third of the waves".

I remember years ago sailing with a friend in some bumpy conditions. I thought the wave height was maybe three feet, the waves never came near the gunwale (we were motoring) and we only had light spray on deck. So I was very surprised to read in the log that my friend wrote down 4-6ft.

I also remember racing our Sagitta in a big Atlantic swell and have the sails go aback in every trough, as there was no wind there, only for them to be blown out with a crack at the crest.

Another time I left Plymouth and was surprised to see my fishfinder echosounder tracing a perfect sinewave with peaks of 13ft. I couldn't see the 40ft monohull sailing near me when I was in the troughs.

It's actually easy to gauge wave heights. A typical 35ft boat might have 4ft freeboard. So a 4ft wave will be as high as the gunwale, that's pretty high. Most people talking about a 4ft chop actually mean 2ft. Even a 10ft wave would wash over a bungalow. A 20ft wave is very scary, just imagine it coming down the road towards you (tsunamis are different again of course)

Of course an ocean swell might be much higher than that, particularly in the Roaring Forties say, but their long wavelength means they aren't a real danger. It can even be fun, as a big swell allows you to surf for miles. A bit like driving through rolling countryside rather than over a ploughed field.

The steepest, biggest waves I've been in were on Eclipse, where they were definitely steep, breaking and over 20ft high.

Apart from the scariness of big waves and the potential damage they can cause there is another major factor why it is important to know the height of waves.

That is because a boat (irrespective of the number of hulls or its ballast) is considered safe in waves whose height does not exceed the beam of a boat. In other words, if your catamaran is 20ft wide you are effectively safe from capsizing in waves until the wave height exceeds 20ft. I'm not saying that you will then capsize, just that you then become at risk of capsize.

So a wide beam power catamaran, for example, is much more seaworthy than most monohull powerboats

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Another car speed comparison story

I have written elsewhere about comparing cars to boats. So here is another car speed story.

Back in the early days of motoring, well before WW1, a wealthy car buyer asked for a car that would do the unheard of speed of 40mph. The manufacturers said "sure we can do that". After the car was built the test driver and customer went out for a trial. The driver started down a hill and accelerated. He got to 22mph and the, by then, terrified customer said "Stop, Stop! This is too fast for me".

Think about that when you ask for a fast boat, or maybe consider AC style foils. Do you really want to go that fast? are you a good enough sailor? is your crew/family equally capable?

When Palamos Boatbuild were building the cruising Flica 37s and performance Banshees the prospective owners always had a choice, fast or slow. Several wanted a compromise and asked that we put a bigger rig on a Flica. So, like the car manufacturer, we said "Sure we can do that". Twice the new owners came back after their first sail and said "sorry, can you change it back to the standard rig, the boat is too fast for us."

These days people looking at used Palamos built Flicas often say "they are too slow" but remember the original owner had a choice, he could have bought a faster boat but chose not to.

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Alternative Rigs

I write some brief notes about multihull rigs on the articles pages of my website. There I explain why the sensible choice for multihulls is the single mast bermudian rig, either masthead or fractional rig.

However many people want to experiment with alternative rigs so I thought these even briefer notes might help separate fact from romantic appeal.

Most alternative rigs are based on those used on various working boats in use round the world. However one must remember that, unlike recreational craft, which need to be good all-rounders, those boats didn't just sail, they fished, or traded. The actual voyage was just a means to an end.

The traditionally shaped gaff rig was often used by fishermen as it was easy to "scandalize" when dredging or trawling. It is still used today on the Falmouth working boats for that reason (they have to dredge for oysters under sail, engines are not allowed).

The Dutch trading boats used a short gaff and that is much more efficient, creating a simple "sawn off ellipse" shape. The resulting sail is very similar to the modern square top mainsails you seen on race boats and many multihulls.

The problem is that the gaff is much heavier than a batten. And the weight is in completely the wrong place so stability is reduced and pitching increases. The other problem is that to allow the gaff jaws to go up the mast it can only be stayed at the head, so it has to be a stiffer, heavier section with more air resistance.

The sail shape on a modern squaretop mainsail is designed in by the sailmaker, so there is nothing the sailor need do to control twist. On a gaff rig the vangs have to be adjusted, which requires skill and also more work for the crew.

The Bermudian rig came into being because the gaff rigs on racing yachts in the 1900-1920's became too big to be controllable with the materials available at that time. The triangular sail was much easier and had less loads. Even though people knew 100 years ago that it was in theory a less efficient shape the practicalities outweighed the theoretical disadvantages.

The Thames barge used a loose footed sprited mainsail. They used the sprit as a derrick when loading. The boomless mainsail could be brailed up when carrying lightweight but bulky cargo (usually hay for horses into London and horse manure back downriver to the Essex/Kentish farms). Few modern multihulls have to do that!

The Chinese junk rig was developed in part because they used split bamboo for sailcloth, which had little intrinsic strength.

Modern materials mean one can use different design techniques; it seems pointless to me to

try to replicate something that was designed before better materials came along. After all, who now builds the interior walls of their house in wattle and daub, when sheetrock/plasterboard is better and easier, never mind cheaper? "Horseless carriages" didn't stay that way for long, they quickly became cars.

The lug sail and other "asymmetric" sails (so including the Crab claw and Arab dhow lateen rig) were rarely used in conditions where short tacking was a requirement. For example, the "Looe Luggers" were fishing boats developed near to my home port of Plymouth. Fishermen would sail out from Looe on a starboard reach to the fishing grounds off the Eddystone. There they'd lower sails. In the evening they would hoist sails again and reach back home on port tack.

A friend of mine rebuilt a Looe Lugger and initially rigged it with a lug sail. He only used it one season and then converted it to a gaff rig. Despite being very strong and fit he and his wife said it was just too much work to handle on a yacht.

The Pacific islanders fished in a similar manner. Out through the reef in the morning on one tack. Lower sails to fish and then back home in the evening. So a proa made sense for them. They didn't have to short tack up the Solent or try to sail down the ICW.

While I am talking about fishing boats, as a slight aside, fishing boats were often deliberately designed to roll, thus making it easier to haul pots on board in the days before powered winches, and the boat was "self jigging". So why do people think fishing boats must make good sailing boats?

Catamarans can have some unique rigs, the bimast one being obvious. But from what I have heard tacking them can be a problem. Certainly they are not very practical, on a reach one sail will be over the deck, making life on board difficult never mind obstructing the helmsman's vision, while the other rig is hanging over the side, completely inaccessible (even worse than on a monohull). Remember, one of the great safety advantages of a conventional rigged multihull is that the boom and sails are always inboard.

If a bimast rig, or a crab claw really was "better" (in every sense, ie handling, cost, efficiency) don't you think you'd see more of them around?? Unless you have money to burn, or are trying ideas on model yachts, it really is sensible to stick to conventional ideas.

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Balestron or "Aerorigs"

Several people have asked me about fitting the Aerorig to their catamaran. The Aerorig is a trademark name for a unstayed mast where the jib and mainsail are attached to the same very long boom. The Aerorig is not patented as its been used for years by model boat enthusiasts. It was also used on the 70' Elf Aquitaine in the 1984 OSTAR.

It has also been used on several of my designs, most notably the Savannah 26. In October 2000 I

sailed this boat 1500 miles singlehanded up and down the eastern seaboard of the USA from Savannah to Annapolis. So I now have a pretty good understanding of how it works. As with all things there are advantages and disadvantages.

To my mind the advantages are:

Easy sailing: The sails are always working correctly, whatever point of sail. Maybe it would be better to say the rig works to 95% efficiency all the time. A conventional rig may work to 100% if you're an expert, but less if you're not. A conventional rig needs extra downwind sails, ie spinnakers. The Aerorig doesn't. There are only light loads on the mainsheet (but not as light as claimed), and once unrolled there is never a need to adjust the jib sheet. Self tacking, but of course that is only an advantage during the manouever itself.

The disadvantages are:

The rig is very heavy, leading to more pitching and less load carrying. You probably need to modify the cabin. The minimum "immersion" of mast into cabin is about 1 in 7 ie a 35' high mast needs 5' of bury. Also the cabin has to be wide enough to spread the load. Its usually OK with a conventional bridgedeck cabin (although you may need to add a nacelle). Impossible to fit on an open boat and a bit awkward on a boat with a cuddy like the Savannah.

A smaller sail area, especially in light winds and certainly when sailing downwind. That's because the jib is very small (only 20% of the total area) to maintain the correct balance. You can't motorsail safely to windward with both sails unfurled. It is possible to sail an Aerorigged boat backwards. A nice party trick, but about as useful as reverse on a motorbike. I discovered the hard way that the boat could sail backwards in a strong wind when I thought I was motoring forward. After a narrow shave when going under a bridge I always rolled up the jib before motoring. When reefing the jib must be furled first or the rig unbalances.

It's a very expensive rig. With the case of the Carbospars/Forespar rigs a lack of attention to detail and unfortunately a lack of customer aftersales service. I could recommend the concept to those cruisers who wouldn't dream of using a spinnaker, but unfortunately I can't recommend products made by either Forespar or Carbospars.

NOTE: This information is now largely academic as Carbospars have ceased trading, hence Aerorigs are no longer available.

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Bridgedeck Slamming

People are right to be concerned about bridgedeck slamming on catamarans. Having said that, it is usually a comfort problem rather than a structural one. Fortunately it is, or should be, a thing of the past.

Early catamarans had low freeboard, partly because of the heavy materials which were all that were available at the time, and also because low freeboard boats always look better. The latter is still true today of course, but people have now got used to seeing high boxy catamarans.

In an attempt to cushion the slamming, many builders, and Prout Catamarans in particular, developed the central nacelle. Prouts took this nacelle to it's extreme and their last designs were more like three hulled catamarans with the nacelle in the water at rest.

I have never believed this approach to be a good one. I always say that for offshore sailing one should be able take a conventional inflatable dinghy under the bridgedeck. I sailed the S Atlantic from Capetown to Rio in a Norseman 43. Its bridgedeck was very low (but it looked a very nice boat due to its low freeboard) and it was very uncomfortable living on board. A few years earlier I had sailed from the UK to the Canaries in another low bridgedeck catamaran (again not one of my designs). The slamming was so bad that we were unable to use the saloon table as plates would jump off as we hit every wave.

The Gemini 105 has a notoriously low bridgedeck, in part to keep freeboard hence weight hence costs down. We have been kept awake by the slapping from one that was anchored next to us, while this from one of my customers *"I was aboard a 105 last week in Waderick Wells, Bahamas, and was unsure if it was polite to break conversation whilst she slammed while on a protected mooring, or pretend it wasn't happening as I guess their dealers must?"*

While sailing in the Greek islands I saw a large (over 45ft) catamaran in a marina. From astern you could not see daylight under the bridedeck. Clearly it did not have enough bridgedeck clearance!! Yet the transoms were still out of the water, so the boat cannot be considered overloaded and had to have been designed with that amount of clearance.

A boat that size should have at least 600mm clearance - implying at least 500mm (18in) more freeboard is needed to make it safe and more comfortable. This is not a boat to take to sea, no doubt it was bought because the owners liked the space below and they never took it for a test sail before buying.

Much of this slamming is self inflicted. Imagine two hulls close together pitching into a wave. The water they displace has to go somewhere, and it piles up just as the bridgedeck sails over it. Clearly a wider hull spacing will turn a narrow high peaked mountain of displaced water into a low flat molehill. A wide knuckle and flared hull will also help reduce the size of the induced wave.

The best solution is to start the bridgedeck well back and have it low only where needed. That's why most offshore catamarans have nets or trampolines forward. The boats to avoid if you plan any offshore sailing are those with bridgedecks taken right to the bows.

Furthermore, the water that goes in at the bow also has to come out at the stern, for as the bows pitch out of a wave the sterns will pitch in. So bridgedecks should also be high near the

stern. Have a look at the stern of a Prout catamaran, you'll see there is very little space for the bows waves to get out. No wonder they are so noisy to sail - and the waves trying to force their way out must slow the boat down.

I do fit a nacelle on some of my designs, notably on the Gypsy, Saturn and Romany. I accept the compromises as I wanted standing headroom in a small boat. But I designed these nacelles as footwells so they are as small as possible, (they are only 600mm/2ft wide). I sailed my own Gypsy and Romany thousands of miles and didn't find slamming to be a problem. Mind you, I also had a Veed bottom to the nacelle. Had it been flat then I am sure the slamming would have been noticeable.

So my newer designs (like Transit, Vardo and the powercats) don't have a flat bridgedeck bottom, it's slightly Veed.

Of course the smaller the boat the bigger the problem. That's why I don't have any bridgedeck cabin designs with full headroom under 30ft. If you have 6ft headroom on a 30ft boat then scaling it up to 40ft would give you 8ft headroom - more than enough! So a 40ft boat can easily have over 2ft bridgedeck clearance yet still look in proportion

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Forward Cockpits

One of the current fashions is the forward cockpit, but for life of me I cannot see why anyone would want one.

The first obvious problem is of course the total lack of protection for the crew; not just from waves but also from the wind. "That's OK" you say, "I'm planning to sail in the tropics or you may say, "I use the autopilot when cruising".

We spent the winter of 2008 sailing down the east coast of the USA from Annapolis to Miami prior to a crossing to the Bahamas. It was very cold and windy for much of the time and we really needed to be able to hide behind a cabin. And you have to hand steer as the ICW is too narrow and crowded to leave the helm to an autopilot.

I remember being anchored one day in the Bahamas, next to a boat with a forward cockpit. Although the sun was shining, a bitterly cold north wind was blowing. We enjoyed the afternoon sun in our sheltered aft cockpit. Our friends had to sit below, it was too uncomfortable to be in their unprotected cockpit.

In other words, you first have to get to the tropics before you can sail there, and once there you'll find the open ocean waves are larger than you find when coastal sailing. However warm the water, being drenched in salt spray is not most people's idea of fun - you might just as well be sailing a monohull!

Imagine beating to windward in the dark and into 25 knots of wind. Autopilot on and crew safe and warm inside, yet on watch. The wind gets up and you need to reef. On a boat like Eclipse or Romany with single line reefing and halyards led aft it literally takes a couple of minutes to put in a reef and all the while being protected by the cabin/cuddy.

If you have a forward cockpit you have to open the forward door, trying to judge the moment when a wave isn't washing into the cockpit and thus filling the saloon... You get the idea.

I always think, when considering something that affects the performance and sailing of a boat, that it is sensible to look at what top race boats do. If they don't have a forward steering position it has to be because it's slower.

Very definitely everyone agrees that one of the reasons the last Vendee Globe was won by Michel Desjoyeaux was because he had a more protected steering position than the others - "never mind the extra weight and windage, I want to stay warm and dry". Many powerboats motor slower than catamarans can sail, but you don't see forward cockpits on those boats.

I don't know about you, but I look up at the sails a lot when I'm sailing, and pretty much all the time when racing or trying hard. Like everyone else, whether a monohull, dinghy or multihull sailor, I find it best to do that from to windward and from well aft. Otherwise why don't race boats have their helmsman further forward?

A forward cockpit effectively means you must use a self-tacking jib with all the disadvantages that entails. While for safety the cockpit has to be kept small, so everyone gets in each others way when tacking and hoisting sails - again you might just as well be sailing a monohull!

Obviously to get to the cockpit you need a forward door from the saloon. Most forward cockpit boats also have a saloon door aft, so there is less room in the saloon as an access passageway must be kept both fore and aft. This access area is roughly the place you'd expect to see the mast (and its associated high compression loads). I know you can design a structure to take any load, but it does seem un-necessary to deliberately make life hard for yourself by cutting a hole there. (I sailed a Leopard 38 with forward cockpit and opening door. The front windows had both broken and the cockpit showed signs of cracking. The cockpit filled with water even in what I considered moderate conditions)

Boats usually steer better when going forward than going astern so, given the choice, I prefer to be near the back with a good view of the sterns when maneuvering in close quarters.

Most people anchor when cruising; the aft cockpit is protected from the wind and, in many areas those prevailing winds are easterly (like the S Pacific, Caribbean, Bahamas, Greek Islands for example). People like watching the sun set into the sea. You cannot do that from a forward cockpit.

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How long does it take to assemble a trailerable boat?

The first thing to appreciate is that there are two types of boat that can be taken by road, ie "transportable" and "trailable". Transportable means anything that can be legally taken by road. So a Mira and even a Meander are transportable, although each hull has to be taken to the water individually. All the production Flicas and Banshees had to be taken 7 miles along narrow Cornish country lanes to been launched so even large boats are "transportable"

"Trailable" means that the whole boat can be taken in one trip without a police escort and that it can be assembled and rigged without outside assistance. At an Annapolis Boat Show I saw a large trimaran that is advertised as being "trailable" having its mast stepped by crane. I also saw that several builders claim "trailer to sailing in 30 minutes or less, even singlehanded". Now that really is misleading and totally impossible.

When I think of "trailer to sailing" I include: arriving at the slip, untying the boat, assembling it, tightening trampolines, raising the mast, bending on barberhaulers, spisheets etc as well as sails, launching the boat, tying it up, taking the trailer away, parking the car, walking back to the boat, untying it, motoring off and hoisting sail. That's "trailer to sailing". 30 minutes, I don't think so!! It takes me 15 minutes to rig my dinghy from the trailer, and I still have to get changed and launched so I always allow half an hour.

So, after that preamble, how long does it take to assemble a Strider? Many years ago a grp Strider was tested by a magazine. We had the boat in the yard, on the trailer behind a car, but untied. 40 minutes later it was at the top of the slip, ready for launching. 10 minutes later we had the sails hoisted and were sailing. That's with two people who had done it before. Later the same reporter watched us assemble and rig a Wizard in 20 minutes.

What takes the time is not the initial assembly, but raising the mast. The standard Strider and Wizard score well here as their masts are small and light enough for one person to be able to "walk" them up which save a lot of time compared to larger masts that need a pole/lever arrangement and a line taken to a winch. I recently saw a video of a Savannah 26 being launched. It literally took seconds to fold out and assemble itself. But I would still think an hour would be a sensible time to allow for "trailer to sailing".

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How well do catamarans sail to windward and tack?

Obviously two widely spaced hulls will take more time to move through the water than a monohull will, but even so tacking a catamaran should be quick. There is certainly no excuse to have a boat that is hard to tack or one that doesn't sail well to windward. A Youtube clip on the Strider page shows a Strider Turbo tacking very fast, while another Youtube clip, taken from the Multihull Sailors Have More Fun! video, showing a 35ft Banshee tacking, and gives an idea of

how it is done, even if one of the crew does nothing!

Having said that, people often confuse windward ability with a narrow pointing angle, but really what everyone wants is the highest "speed made good" to windward (or max VMG). Monohulls can't sail faster than their hull speed so the only way for them to go quicker is to improve their tacking angle, hence the pointing fetish. That's not the case with catamarans which can just go faster and faster.

Thus comparing an Eclipse with a Mumm 30 in 20 knots of wind and flat water, the former may do 8.5 knots and 85 degrees between tacks and the Mumm 7.8 at 75 degrees. But Eclipse still ends up first at the windward mark. It may surprise readers, but if I want to beat a 38ft monohull to windward (which I can do with Eclipse), I wouldn't want flat water and light winds. Rather I'd want big seas and a F4 or more.

Yet another Youtube clip, again from the Multihull Sailors Have More Fun video, shows a Banshee beating to windward in 20-25 knots apparent wind. The shots were taken from my Sagitta, the Banshee was faster in these conditions. And we were both comfortably (in all senses of the word) faster than the Sigma 38 monohull, just visible behind the Banshee.

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Low Aspect Ratio (LAR) Keel Design

Low aspect ratio keels are very popular on cruising catamarans as they offer a good compromise between easy sailing and cost while also protecting the hull from possible grounding damage and usually add to the load carrying potential.

Unfortunately low aspect ratio keels are also both very inefficient in preventing leeway and in increasing pitching. So it is tempting to improve them by making them deeper and shorter. However deeper keels tends to negate one of the great advantages of catamarans - shallow draft. Short keels result in even more problems. Imagine drying out and have the crew go forward only for the bow to drop as the boat overbalances! Think of the ensuring damage to the boat, never mind to the crew if this happened on hard ground!!

No wonder that many catamarans need props under the bows and often also under the sterns (a bit hard to fit them while drying out on a beach I would have thought!)

That is why I draw relatively long keels and accept the compromise between performance and practicality. See my article on LAR keels versus daggerboards on my Articles pages for more on this subject

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Performance Comparisons with Other Multihulls

People often tell me "I don't want a fast boat". If I reply "So, you want a slow one?" they say "Oh no!" In fact what they really mean is that they want an easy to handle, predictable boat.

Speed has nothing to do with handling characteristics, for it's easy to think of slow boats that are hard to steer and manoeuver (after all one of the most common criticisms of catamarans by monohull sailors is that catamarans are unresponsive). Many of the early English designs, like Prouts and Catalacs, the S African Dean Cat etc don't sail at all well.

One problem with efficiently designed boats is that they make little spray or wake. For example, the Strider "Striderman" shown sailing on the Strider page doesn't look as though it's going fast, yet was photographed as we sailed through the lee of a Dragonfly whose owner later reported that he was sailing at a steady 18 knots.

The video clip on my Youtube channel shows a Skua sailing fast, yet there is little wake or spray. It is hard to tell how fast it is going, that is until it overtakes a monohull (which must itself have been doing 6 knots?)

In comparison, trimarans, like monohulls, always look much more dramatic, with spray flying everywhere. Furthermore they heel and the water rushes by much closer than on a catamaran, both factors make one think you are sailing faster than you really are. I vividly recall racing my Eclipse down the Solent with spinnaker flying. Close behind was a Dragonfly 8m, also under spinnaker. We were comfortable and dry, they were clearly pushing hard, yet try as they might they could not overtake.

It is "easy" to design fast boats. I can design fast racing boats, but such boats always have a low resale value and personally that puts me off owning one. I want my customers to get good value for money from their boats so please think carefully before buying too extreme a boat. Generally racing boats have low resale values and often a short life. Certainly they need skilled crews if they are to benefit from the speed potential.

Having said that, how do my cruising designs compare to the competition?

In 1988 the CTC (the Dutch Multihull Association) held a major symposium/regatta. All the major designers were there and after the lectures about 40 multihulls had a race. In a F3 we were first to the windward mark in our 35' Banshee (despite living on board - we sailed the 400 miles each way from Plymouth). Close behind was John Shuttleworth in his open deck 35' performance cruiser, while Malcolm Tennant on HIS 35' performance cruiser was with the rest of the fleet, ie out of sight behind. At a later meeting another Banshee was voted "best looking multihull" out of 100 boats.

In a French regatta, again on a Banshee, we raced against Erik Lerouge who was sailing one of his 38ft performance cruisers. Again we beat him to the windward mark, by the end of the race he was out of sight astern.

Watch the Multihull Sailors Have More Fun! video, to see us easily overtaking a 32ft Erik Lerouge catamaran on our 30ft Sagitta.

As has been well reported, before going cruising in my Eclipse I raced it in the Round the Island race (around the Isle of Wight, with 1700 starters, 50 multihulls). In the latter stages we overtook Mumm30 monohulls to windward. We were first production catamaran to finish, over an hour (ie 15%) ahead of the next one, which was a 43ft Belize.

Later, when fully loaded for cruising, we spent some time sailing in company with an Outremer 43. First in Spain, then in the Caribbean. Surprisingly we found that Eclipse was faster to windward and about the same speed offwind. The owner told me he bought his boat because of its windward performance, and he was amazed we could beat him, especially as we were 11ft (3.5m) shorter.

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Rig and Sail area considerations

My boats have been designed for English Channel sailing. One thing that I have learnt from sailing all over the world (I have now sailed in over 40 countries) is that the average wind speed in other countries tends to be lower than in the UK.

For example, we have been sailing our Merlin in the Pacific NW nearly every weekend for the last 5 years. In all that time we have reefed it only once. Yet I remember a summer sailing a Strider in the UK where we had to reef EVERY time we went sailing. Not only that but the seas elsewhere tend to be less choppy, so boats pitch less. Conversely, boats designed outside northern Europe tend to pitch more. Thus my boats tend to be under-rigged, but sail smoother when compared to others. In 2010/11 we sailed a Transit 38 from Maryland (leaving Nov 8th) to the Bahamas where we cruised for several months and never had to reef.

So if you think your sailing conditions warrant a bigger rig then please let me know and I can draw a new sailplan for you. And furthermore, I design all my cabin boats - even the smallest ones - apart from the Saylon, Chat and Strike that is - to be seaworthy enough to make long coastal passages, what in the UK we call "cross-Channel sailing".

I have personally sailed my own Wizard, for example, 120 miles non stop from the UK to France more than once. That is twice the distance of Florida to the Bahamas, which is also a much easier crossing than across the English Channel - I sailed back from the Bahamas only recently so conditions in the Gulf Stream are fresh in my mind. And of course I have sailed a Strider Club singlehanded (in convoy with two others) from the UK 1400 miles to the USSR and back. And, over the years, dozens of trips from Plymouth to the Solent (about 120 miles of open sea) usually non stop and often singlehanded in Striders, Gwahir and Wizard.

I know there are many areas in the world where conditions are very benign (like much of the

USA and Pacific NW for example) and there are other designs that would suit those conditions, but I don't design boats like that. I want to be confident that my designs are safe in bad weather. In Europe boats are divided into 4 categories, Category D boats are suitable for lakes, rivers and sheltered waters, Category C are "Coastal". All my cabin designs (except Saylon/Chat) are considered at least Category C. Category B is "Offshore" and Category A is "Ocean".

I have updated my article on rigs, essentially to say that I (or any good sailmaker) would be happy to draw a new mainsail for your boat with a more modern "squaretop" shape if you want better performance. Also please note that, except on the smallest boats, flat battens (as typically used on monohull fully battened sails) are NOT recommended on my catamarans. You should use rod or tapered fibreglass battens.

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Vertical Bows

People seem to think they result in a faster boat that is less prone to pitchpoling.

People seem to think they result in a slower boat more prone to pitchpoling.

They cannot both be right, or can they?

In fact it all depends on whether you think a vertical bowed boat is a longer WL boat cut off or a short boat with the WL extended forward.

Vertical bows are often seen on race boats (both monohulls and multihulls) these days because most top end race rules have a maximum overall length (eg TP52 or Vendee 60). But for people who don't need to conform (like most cruisers) what are the pros and cons of vertical bows??

Well first of all, just because a race boat has a certain feature that doesn't mean it is a "good" thing to use on a cruising boat.

There is only one non-aesthetic reason to draw a vertical bow. Simply to get the maximum boat for a given length, for by and large the longer the WL the faster the boat will be.

However a hull is not a two dimensional object. You want the WL to come to a nice sharp point, so clearly, unless you distort the hull shape, a vertical bow also means very fine bow sections all the way up the freeboard, resulting in a very narrow foredeck. And of course that also means smaller sail lockers and less room inside.

These vertical topsides also mean that a vertical bowed boat will be wetter to sail and also more prone to bow impact damage. Furthermore the water running up the hull side causes drag (it is after all "wetted surface area" even if it is above the WL). So anything that reduces spray is a good thing. After all, that is why powerboats have spray rails.

I have designed several vertical bowed boats (Wizard, Sango, Elf, Wizzer). To try to overcome

the increased wetness and lack of space all these designs have a distorted hull shape in cross section to make forward sections appear wider. Elf has a knuckle, the others a tulip shape. Even so I know from personal experience that a Wizard produces more spray than a Strider when sailing at the same speed (they have the same WL length).

Recently "ram bows", or a reverse rake, have become popular on beach cats and of course now feature on the new America Cup boats. They are even seen on some cruising multihulls.

I'm not sure about that though, it seems impractical to me. I have often had times when I've been anchored in light winds and when the tide changed have had the anchor line catch under the stem. Obviously with a ram bow the warp will not release itself under the hull but rather ride up to deck level. At the very least this will be noisy and disconcerting, especially if you are asleep at the time. And I'm not sure what happens when hitting flotsam or weed, while coming bows-on into a dock or to another boat is tricky if you cannot fend off easily and safely. (And any damage will be on the WL not high up)

The shape of the boat above the water doesn't have a great deal of affect on speed, so there is no real reason why a vertical bowed boat should be any faster than a boat with an angled stem and the same WL length. The only advantage is that potentially a slim bow will cut through the water as it burys, so the boat doesn't slow down, then potentially broach or pitchpole. The vertical bow opponents say, "yes but with a fuller bow the bow won't bury in the first place"

Many people think you need a modern design with vertical bows and rounded decks for high speed. So it is interesting that the Tornado is still the fastest beach cat, yet has none of this attributes (it was designed in 1965)

As you can tell, I'm in two minds about vertical bows, not surprising as I have designed both overhanging and vertical bowed boats. But I won't be designing cruising boats with ram bows however fast they are, for the reasons I mentioned earlier.

Having said that, for cruising I prefer a bow with an overhang, flare and preferably a knuckle. If nothing else that is because it results in a drier boat and the decks are nice and wide making coming alongside and sail handling easier.

For that is another important difference you must remember when saying "yes but a racing boat has..." It probably also has a big experienced crew and certainly only has one aim - to win races. A cruising boat has to do much more than just sail fast.

You may come into a strange anchorage in the dark with only two people on board. Been there, done that - lots of times. In that, all to common situation, a boat that is easy to handle in a marina or anchorage suddenly becomes much more important than a boat that sails a fraction faster to windward.

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Which steering system should I use?

Getting the steering system right is vitally important because after all it is the main point of contact between you and your boat.

Except on the simplest and smallest boats I prefer to use semi balanced rudders with no skegs. These offer light steering - you should be able to balance the tiller extension on the end of your finger, even at speed, yet will still steer straight "hands off". Check my many Youtube videos for proof.

I've sailed enough of my boats to know that it is quite possible for any of them to sail themselves in a straight line, yet still tack quickly in any sea. To say that only boats with a skeg hung rudder will steer straight is simply not true.

Boats with LAR keels have a conventional rudder setup with bearings at each end of a rudder stock tube. On boats with daggerboards the rudders have to lift when drying out. I use kick up rudders which lift clear of the water and are fixed to the boat with one bolt at deck level, and held down at the lower bearing by a rope led to a cleat.

It's a very simple system, and has worked extremely well over the last 20 odd years. When raised the rudder does not stick out behind the boat, where it could be prone to damage from other boats when moored. It does not kick up automatically because such a method would have to ensure that the rudders didn't lift when sailing through a clump of weed at speed, but did kick up at low speeds if running aground in mud when probably the shock loads are a lot less. It doesn't seem likely that an automatic system can be devised that can differentiate between the two.

Clearly a wheel offers far more power than a tiller and thus it is essential for boats over 12m (40'). Conversely, the steering loads on boats under 30' are low and tillers work well. It's on boats between 30' and 40' where it's more a question of personal choice. Of course, there are pros and cons to both wheel and tillers. A wheel is good when motoring as the engine controls are always within easy reach, the steering position is near to the centre of the boat, so it is well protected and the helm can reach most sail controls.

On the other hand, tillers are good when sailing as they allow the helmsman to move around the boat, see both sides of the sails, keep clear of the crew winching etc. Furthermore, tillers are more responsive when sailing in a quartering sea, while when coming alongside they allow the helm to stand near the gunwale for the best view.

I always use a tiller bar despite its disadvantages, as it ensures that the rudders always stay in line. With a tiller steered boat I now prefer two telescopic tiller extensions, one for each tack, rather than a very long central extension. I use standard dinghy extensions that extend out about 5' and initially hose-clamp them to the tiller bar to check for their correct position. Later I through bolt them, I haven't found pop rivets to be very successful as they tend to wear out

quickly. I always draw an Akkermann linkage on the tillers (that's the same as used on the front wheels of a car). As the boat turns the inner rudder makes a smaller radius circle than the outer, so it has to be held over at greater angle.

For wheel steered boats I suggest using a quadrant to one rudder stock. You can buy one, or take a lead direct from lugs on the tiller. It's then simple to use a pair of wires (or spectra rope) from the tiller leading to a chain and sprocket fitted to the wheel. An alternative is to use a push-pull cable (eg Morse, Teleflex) although this usually only works well on smaller boats (say under 10m).

I don't recommend a hydraulic system. It's heavy, complicated and seems more prone to problems than any other system I've seen. But worst of all, it gives no feel to the helm. The result is a bit like driving a car with PAS or a motorboat, not a sailboat.

It is hard to arrange a automatic disconnect wheel system for use with kick up rudders that doesn't result in some play, so if you choose a boat with daggerboards (and thus kick up rudders) the wheel is probably not for you. Having said that, some people have made a good compromise (eg a local Sagitta) and use a wheel purely when motoring and revert to tillers when sailing.

If you do use wheel steering then you must also consider emergency steering. I usually prefer to have an emergency tiller that can be fitted to the rudder without the quadrant as that means it is possible to disconnect a potentially completely jammed rudder and steer with just one.

These days autopilots are simple to set up and use (especially those with a remote control), reliable, draw very little power and so when passage making are almost certain to be used. This means that the crew comfort and protection considerations are no longer as important as they once were.

Having said that, when was the last time you drove a car with wooden seats? So why are so many boats so uncomfortable to helm?? Some don't even have a seat - forcing the helmsman to stand. In comparison I draw wrap round cockpit seats. You can sit low when on autopilot or sailing ofshore as I am doing on Eclipse, above (note, I'm holding the autopilot remote control), or steer from the seat top for racing or close quarters sailing. Much more civilized!!

One final comment, if you want a boat that is easy to build and maintain, go for tillers.

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Why Predicting Performance is an Imprecise Art

I was fortunate that when I was a design student I was able to use the college test tank to run some model tests on a 5' (1.5m) model catamaran. I wanted to see how much extra drag was generated by having two hulls relatively close together rather than at infinite spacing. I quickly discovered that test-tanking models is not a very exact science (even using 5 ft models in the

biggest educational test tank facility in the UK) A bit better than a guess, but not a lot.

Purely theoretical /computed tests are even more of a guess. There are far too many assumptions that have to be made. The monohull race boat rule, the IMS is a good example of such a "theoretical" rule.

I'm sure I'm not the only one who has a background of dinghy sailing. Thousands of dinghies race thousands of handicap races every year. So we "know" a Laser 1 rates 1077 and a Laser 2 1035 (using the UK's RYA data from 2000). That's what, 4% faster? Even my mother could look at the two boats sailing and say the Laser 2 is the faster boat. After all it is longer, and has a trapeze and spinnaker.

I believe the IMS is supposed to be accurate to +/-2% and people are happy with the results because the formulae look complex and results can only be calculated by computer so therefore must be right! Yet if a Laser 1 speed was calculable under IMS it could be 1050, say, ie within 2% of the real value. Similarly a Laser 2 could work out at 1050, also within 2%. So the super accurate, everyone is happy with the results, IMS would make the Laser 1 and Laser 2 the same speed!! As I said a second ago, my mother is a better handicapper than that.

Compare the complex measurements needed, the small speed range that monohulls use and the type forming of the IMS rule and I think you can see that no completely theoretical calculation can be much better than a guess dressed up by computers to convince the uninitiated.

Having said all that, about 35 years ago I developed a spread-sheet to try and predict the performance of my new designs. It seems to give reasonable results. As an example, the 35' Banshee has been tested full size under power with engines ranging from 4hp all the way up to twin 90hps. The predicted speeds were always close to the real thing.

One reason for the accurate results is that my hull shapes are all fairly similar so I was able to "type form" the results. I also used the data I obtained from those early tank test results and also from work done by the US Navy in the Taylor tank. Unlike many I also make an allowance for windage (those who have tried to motor a large multihull under outboard in a strong wind will know how great windage drag can be!)

At its simplest, it seems that the best indicator of speed is the Texel Rating, developed by Nico Boon of Holland . More details can be found on the website www.texelrating.knwv.nl for beach catamarans and on the website www.ctcnederland.nl for all cruising multihulls.

Incidentally, I think the nut on the end of the tiller has a bit to do with it as well. I once raced my Stealth dinghy one New Years Day. A number of Laser 1's also raced, including one from the UK Olympic squad. He was 30% faster than the second Laser and that's in identical boats!! I regret to say he also beat me and I was supposed to be in the faster boat.

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Some quick notes on selecting deck gear

I always recommend ball bearing blocks as the extra cost is small but the friction reduction is huge.

The loads on the genoa will be similar to those on a monohull. The mainsheet loads will be higher due to the bigger roach. The more purchases you have the more friction and the more rope you need to pull in or release.

So taking one of my trailable designs (Strider/Wizard etc) as an example

A beach cat with the same mainsail area may have an 8:1 purchase but that is generally too much on a Wizard. 4:1-6:1 is optimum. Barton (see below) Size 3 blocks are good for the mainsheet, size 2 for spi and genoa. 25mm genoa track. Size 1 for mainsheet track.

As far as actual loads are concerned I always work it this way. I can just lift my own weight, 75kgs, so a 4:1 purchase would be 75x4 or 300kgs. If the load was more than that I wouldn't be able to pull it in, or release it. So it's the boats way of saying it's overpowered. I try to use thinner ropes than most as again it's less friction and obviously less weight. So 8mm for the mainsheet and maybe 8 or 10 for the genoa sheets.

I have used 6mm on spinnaker sheets but they are hard on the hands (even though I always wear gloves) and stretches more. So again 8mm is more comfortable, but thinner is better in light winds

I find cleats on the traveller car itself better than cleats on the track ends.

I tend to use Barton deck gear www.bartonmarine.com as Barton offer good value for money, have a big range and are helpful with answering specific questions. They cover all boat sizes up to about 40ft/12m. Readily available in Europe they also have stockists in Canada and the USA (see their website for a full list)