ISSUE 129
DECEMBER 2011/
JANUARY 2012

The Superyacht REPORT

TRUTH • OPINION KNOWLEDGE • IDEAS AND EXPERT INDUSTRY ANALYSIS

CATAMARANS
TSR considers the unique features and special appeal of these multi-hulled marvels.
Page 67

SARISSA
A day onboard the 42.6m carbon sloop and a look at the arguments for and against carbon.
Page 84

INNOVATIONS
A selection of exciting products, systems and solutions available on the market today.
Page 119

FORMERLY
THE YACHT report
The leading magazine for the design, construction, management, ownership & operation of luxury yachts

THE CATAMARAN QUESTION

In the global fleet of yachts over 30m, catamarans – sail and power – comprise less than one per cent. And yet they continue to draw fascinated crowds in marinas, at anchor off atolls and at the boat shows. With a handful of big projects currently in build around the world, **Don Hoyt Gorman** considers the unique features of these multi-hulled marvels.

The arrival in the past two years of builds like *Hemisphere* from Pendennis, *CHE* and *Ipharra* from Sunreef and *Cartouche* from H2X in la Ciotat, France, has highlighted catamaran possibilities for owners and suggests new opportunities for brokers to consider when approaching potential clients.

The Superyacht Report decided to take a closer look at the features, benefits, drawbacks and costs of catamarans, and present a status report on their place in the world of superyachts.

SPEED & PERFORMANCE

Cruising catamarans are often seen as the derivatives of ultra-fast racing vessels, and there's good reason for that. They can be incredibly swift, but for the luxury end of the market, where comfort is as much – if not more – an issue as speed, the dual-hull design affords significant benefits.

"Catamarans generally have 30 per cent less resistance than an equivalent monohull vessel," said Andrew Tuite, naval architect at catamaran specialists Incat Crowther. "This translates to higher speeds with the same power, or less fuel burn operating at the same speed." (See performance graph of the Curvelle *Quaranta*, opposite.)

Michael Schutte of Brilliant Boats sees it the same way. "Cats are typically much more efficient than an equivalent volume monohull", he said. "It's simple: long, skinny things take exponentially less power to drive through water than short, fat ones. That's great in terms of total vessel resistance, which translates directly into engine power. Less power means burning less fuel, which means the fuel you carry onboard takes you further".

"One of the main benefits of multi-hulled craft is the efficiency and reduced installed motive power requirement for a given speed and weight."

"One of the main benefits of multi-hulled craft is the efficiency and reduced installed motive power requirement for a given speed and weight," Craig Loomes, naval architect and director of LOMOcean Design, said. "In many cases, a multi-hull will require less than 50 per cent of the power of conventional monohulled craft especially at moderate speeds. It's one of the reasons that there are so many multi-hulled craft used as moderate to high speed passenger ferries: The reduction in power results in better fuel economy and more range for a given volume of fuel."

Being able to move quickly has its advantages. "The higher speeds coupled with today's actively available weather routing data provides the captains with the ability to operate around weather systems and enhances the crew's ability to route through favourable conditions," Tuite added.

Draught is a key consideration in design and, importantly, varies when comparing motor catamarans and sailing catamarans. Generally speaking, a motor catamaran and monohull will have equivalent draughts. Sailing catamarans will have a significantly

CARTOUCHE

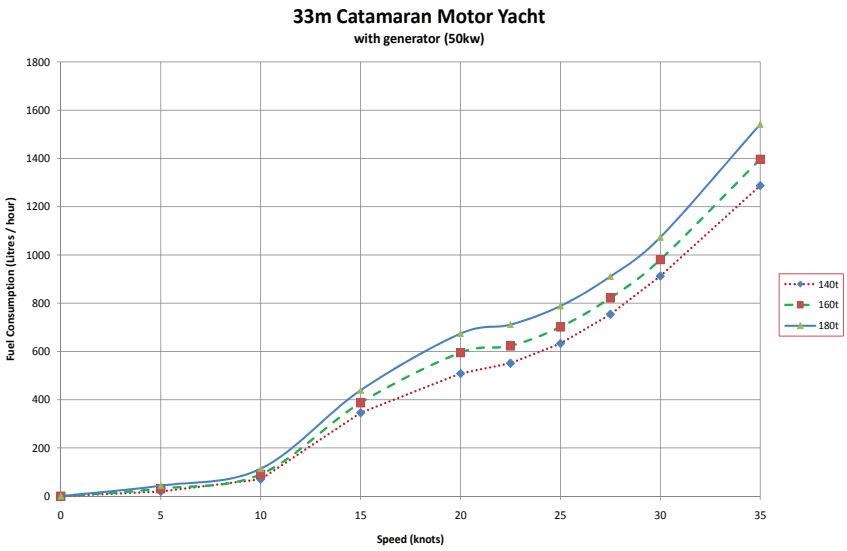
LEFT: *HEMISPHERE* IN BUILD AT PENDENNIS IN FALMOUTH, ENGLAND
BELOW: PERFORMANCE GRAPH OF THE CURVELLE *QUARANTA*
OPENING PAGE: *CHE*, BUILT BY SUNREEF YACHTS IN GDANSK, POLAND

lower draught than sailing monohulls due to their inherent stability and therefore lack of a requirement for a deep keel to offset the leverage of the mast and sails. Some sailing catamarans – usually those on the performance end of the design spectrum – will use daggerboards.

"Draught is key for sailing catamarans, and the ideal is about 2.5m," said Frédéric Jaouen, director of JFA shipyard in Concarneau, France. "The VPLP 110 we are building will have a draught of 2.1m with daggerboard up, and 4.6m with daggerboard down. Even 30m monohulls with lifting keels don't have such shallow draughts. It enables some mooring opportunities that boats this size usually can't get to."

"Some people find the swift motion of a catamaran hard to get used to. Others prefer it to the long, slow motion typically associated with monohulled craft and seasickness."

Along with the advantages of speed, shallower draught for sailing catamarans and fuel efficiency, the catamarans' main deck between the pontoon hulls is a luxurious area to build on. "In superyacht catamarans, the guest staterooms can be situated on the main deck, resulting in easier access and allowance for much larger windows,"



MLC IMPACT ON CATAMARANS

Once in force, the Maritime Labour Convention (MLC) – even with the new draught equivalences proposed by the UK Maritime and Coastguard Agency (MCA) – will impact on catamaran design in as yet unforeseen ways.

With smaller crew numbers than equivalent weight monohull vessels, and restricted pontoon accommodation space, catamaran designs may face interesting challenges as a result of the MLC.

"The MCA has reduced the impact of the full MLC requirements in their draught equivalence," said Alex M Hardy of naval architects BMT Nigel Gee. "We're not dealing with quite the scale of the problem as we were now that en suite floor space is included in the cabin area calculations, but one impact it will probably have on catamarans is that crew numbers might get smaller."

LY2 has minimum crewing requirements based on gross tonnage, range and area of operation. If future owners consider reducing crew by one or two personnel (the largest catamarans have crews between six and eight people), a balance will need to be struck between minimum requirements and maximum guest area.

"We haven't looked at it closely yet, but what I've seen hasn't concerned me," said Van Peteghem. "Very often in the designs, we manage to dedicate space in two-thirds of one hull for crew quarters and galley, and while the spaces are smaller than the guest suites, they have the same quality of living: they're at the same level, with the same deck height and light. I don't think MLC will affect our ability to deliver luxury catamarans."

For previous comparisons between catamarans and monohulls, see Alex M Hardy and James Roy's article in issue 114 of *The Yacht Report*, p102.

QUARANTA BY CURVELLE, IN BUILD AT LOGOS MARINE IN TUZLA, TURKEY

Luuk V van Zanten of YachtMarketing – the company behind the Curvelle concept – pointed out. "General shapes and openness of the main deck and square spaces allow the optimisation of interior installation during build.

"Guest stateroom footprints are more like hotel rooms, resulting in better overall shipbuilding value: better quality ships for equivalent costs."

STABILITY

Perhaps the most obvious, and yet underappreciated feature of catamarans is stability. Serious sailors always deride the catamaran its lack of elegant heel (five-degree heeling angle on a cruising cat is a maximum), but that lack of heel is probably a highly desirable feature for the less salty family members and guests aboard.

Owners, guests and crew can sail and live on a nearly horizontal platform. They're not completely motionless, of course. "Catamarans roll less than monohulls, but the motion of a catamaran is much faster and more difficult to predict," Loomes said. "Some people find the swift motion of a catamaran hard to get used to. Others prefer it to the long, slow motion typically associated with monohulled craft and seasickness."

COSTS AND VALUE

One key point to consider is that catamarans are always going to cost more to build for a given length: they need two hulls instead of one, but an easy way to compare catamarans with monohulls is to consider weight. "From our experience, the cost of a boat is very closely related to the weight, regardless of geometry, as long as construction medium, speed, level of fit-out and systems are to the same standard," Loomes added.

The guesstimate calculation of €1 million per metre doesn't work with catamarans because of their dimensions. "A catamaran and a monohull may be 50m in length, but one will be nine metres wide and the other twice that; so which should cost more?" Loomes asked, rhetorically. "When people do this it is like comparing the cost of a building using the length of one side of the building. A single-level house, a three-level house and a high rise office block may all have the same length on one side; does that mean they will cost the same?"

"As catamarans increase in size, it is actually easier to create a vessel that is more aesthetically pleasing as relative freeboard heights and wind deck clearances become less of an issue."

"Generally, the construction costs of superyachts today are primarily based on volume or gross tonnage rather than length," van Zanten said. "The general public still uses a cost per LOA since this appears to be a lot easier, but it is erroneous: an equivalent length catamaran (compared to a monohull of same performance) will be more expensive to build because it will have more than 35 per cent deck area (and internal volume)."

>>

THE KNOWLEDGE

IAN COOK
CEO OF YACHTING DEVELOPMENTS, WHICH HAS THE 30.5M *Q5* SAIL CATAMARAN IN-BUILD, & PRESIDENT OF THE MARINE INDUSTRY ASSOCIATION OF NEW ZEALAND.

FRÉDÉRIC JAOUEN
CO-FOUNDER & MANAGING DIRECTOR OF JFA SHIPYARD IN CONCARNEAU, FRANCE, WHICH CURRENTLY HAS A 33.5M CARBON COMPOSITE SAILING CATAMARAN IN BUILD (VPLP 110).

FRANCIS LAPP
FOUNDER & CEO OF SUNREEF GROUP, WHICH INCLUDES SUNREEF YACHTS, BUILDER OF LUXURY CATAMARANS BOTH POWER & SAIL, INCLUDING *IPHARRA* & *CHE*.

CRAIG LOOMES
DESIGN DIRECTOR AT LOMOCEAN DESIGN LTD, NEW ZEALAND, SPECIALISTS IN POWER CATAMARANS & MULTIHULLS, INCLUDING THE SOLAR-POWERED *TÛRANOR PLANETSOLAR*.

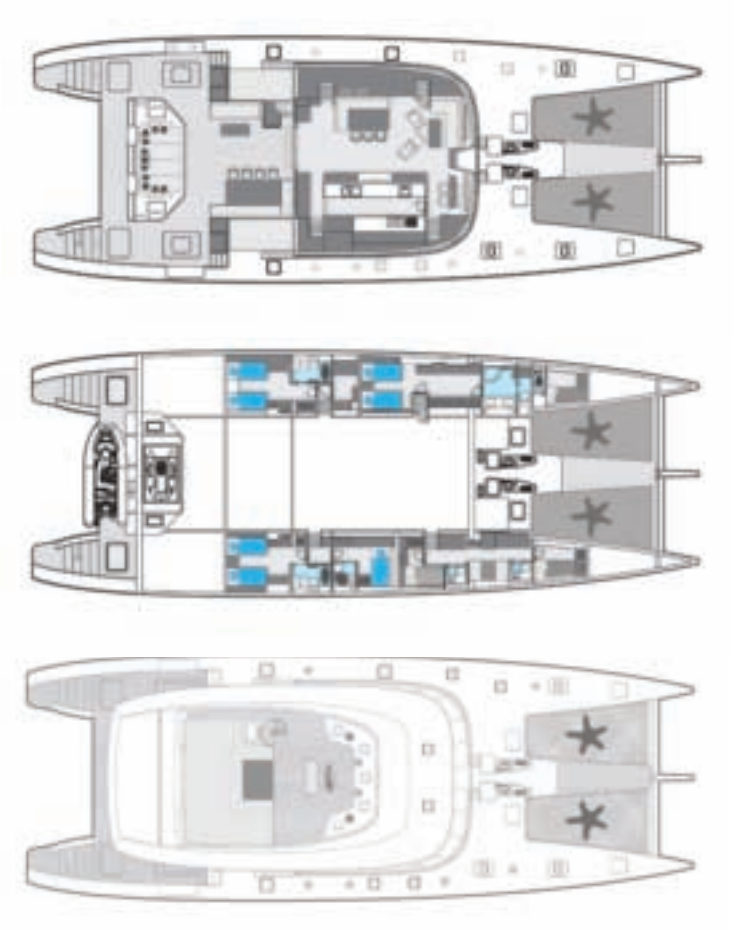
MARC VAN PETEGHEM
NAVAL ARCHITECT & CO-FOUNDER OF VAN PETEGHEM LAURIOT PRÉVOST (VPLP). VPLP'S CATAMARANS INCLUDE THE BIGGEST IN THE WORLD: *DOUCE FRANCE* & *HEMISPHERE*.

MICHAEL SCHUTTE
FOUNDER & PRINCIPAL NAVAL ARCHITECT OF BRILLIANT BOATS, A FULL SERVICE NAVAL ARCHITECTURE & MARINE ENGINEERING CONSULTANCY.

ALEX SHIMELL
MARINE CONSULTANCY DIRECTOR AT SP-HIGH MODULUS, WHICH IS SUPPLYING THE CARBON HYBRID (CARBON & E-GLASS ON AIREX COMPOSITE BONDED WITH EPOXY) FOR THE CURVELLE *QUARANTA*.

ANDREW TUITE
INCAT CROWTHER'S TECHNICAL DIRECTOR AND NAVAL ARCHITECT. INCAT CROWTHER HAS DEVELOPED FOUR – OR HALF – OF THE LUXURY CATAMARANS CURRENTLY IN THE GLOBAL ORDER BOOK.

LUUK V VAN ZANTEN
FOUNDER & MARKETING DIRECTOR OF YACHTMARKETING LTD (YM), WHICH DEVELOPS CATAMARAN POWER YACHTS UNDER THE CURVELLE BRAND NAME FROM INITIAL CONCEPT TO FINAL PRODUCT WITH INTERNAL FINANCING.



ABOVE: *CHE'S* WET DECK, HULLS & FLYBRIDGE FROM SUNREEF (FROM TOP)
BELOW: *CHE'S* INTERIOR

"Catamarans cost more to park in the marina, and more to haul out, as you need a wide lift," Schutte said, "but they burn less fuel, go more places and have much more useful space."

"Due to the higher efficiency of a catamaran," Loomes said, "it will have more range when compared to a monohull with the same fuel capacity and weight; and some of the additional cost of catamaran construction is offset by the reduced requirement for installed motive power and associated driveline components."

LOOKS

Perhaps the most frequent derisive comment levelled at catamarans is that they're inelegant or boxy. The pontoons have been childishly described as "training hulls". A look at the largest new catamarans – *CHE, Hemisphere, Cartouche* – should dispel these criticisms. With their greater length, the line of the vessel is elongated and the flybridges take on a less lofty, exposed appearance.

"Beauty is in the eye of the beholder: as catamarans increase in size, it is actually easier to create a vessel that is more aesthetically pleasing as relative freeboard heights and wind deck clearances become less of an issue," said Ian Cook, of Yachting Developments, which is set to deliver the 30m sailing catamaran *Q5* in mid-2012. "By using composite construction, designers can specify just about any desired three-dimensional shape and incorporate these into the exterior styling of the vessel."

> "In order to compete on a level playing field with monohulls, slender lines and sleek modern styling count for a lot."

"A high beam-to-length ratio can result in a boxy-looking ship," admitted van Zanten, whose company name – Curvelle – is derived from the notion of curves and feminine shapes. "Significant design investment is required to achieve world standard yacht aesthetics; there should be balance between the aesthetics and the vessel's function."

"At Sunreef, we have two concept yacht designers who exclusively study the exterior lines of our catamarans and make sure that they look sleek, sporty and modern," said Francis Lapp, founder and CEO of the Sunreef Group. "Of course, it is easier to design a super-sleek big catamaran than a small one (especially with a flybridge). When you look at *Ipharra*

BIG CATS

ALLURES

DOUCE FRANCE IMAGE: DANA JENKINS

CARTOUCHE

HEMISPHERE

CHE

IPHARRA

MOECCA

NECKER BELLE (AVAILABLE FOR CHARTER FROM BURGESS).

MASHUA BLUU

SEAFARIS (AVAILABLE FOR CHARTER FROM BURGESS).

HEMISPHERE

and *CHE*, they both look superb on water – the hull shape is streamlined and the freeboards are quite low, which make them look even longer, sleeker."

"Cats have always suffered from the stigma of being less good looking than their monohull cousins, most likely due to a higher beam-to-length ratio and the fact that, historically, to compensate for this, they have been designed with a more utilitarian nature in mind," explained Alex Isaac and Mauro Giamboi, who styled the Curvelle *Quaranta*. "In order to compete on a level playing field with monohulls, slender lines and sleek modern styling count for a lot."

Isaac and Giamboi insist that advances in design software and hardware have enabled greater subtlety and innovation in catamaran design, and they point to the automotive industry as an example. "The workhorse 4x4s of the '80s have been replaced by the luxury SUVs we see today, often considered a viable alternative to the equivalent-priced saloon. An analogy can be drawn with the styling of catamarans versus monohulls. As our ability to design and manufacture more complex forms grows through the use of more powerful tools and software, so does the capability to design better looking catamarans, ultimately changing people's perception of them."

"Large-volume composite cruising superyacht catamarans with good performance – both power and sail – are perceived as appealing to a wider potential client base, more so than niche high-performance ultra fast catamarans."

SIZE

Although, theoretically, there should be no upper limit to the size a catamaran hull can be designed, built and sailed, for sailing catamarans, at least, there are physical thresholds beyond which matters become technically very complex. "The existing model for cats being relatively lightweight and fast will need to be adjusted as we get bigger, not only because of the structural issues, but also from a practical handling point of view," Schutte said.

"The loads we are looking at managing on sailing superyacht catamarans are enormous. So there is a practical limitation to the size of the gear that you can buy and operate. Just think of the weight of a mainsail on a sloop-rigged cat with a 50, 60 or 100m mast. You are categorically in the world of joystick sailing, but with loads that beggar belief and eclipse anything that has been really produced and tested at sea to date," Schutte added.

"From a manufacturing and structural engineering perspective, there is no known limit," Cook said. "Class compliance isn't an issue: Yachting Developments currently has a large volume 30m sailing superyacht catamaran under construction, being built to meet and exceed Germanischer Lloyd classification requirements."

"I don't think there is an upper limit to sailing cat size," Loomes said. "I believe that the only limitations are

IPHARRA

THE NEXT GENERATION: CATAMARANS IN BUILD

CURVELLE QUARANTA

Builder: Logos Marine
Country: Turkey
Naval architect: Incat Crowther
Delivery (est.): 2013
Type: Motoryacht
Hull: Composite
Superstructure: Composite
LOA: 33.7m
Beam: 9m
Max draught: 1.95m
Gross tonnage: 295gt
Cruise speed: 23kn
Max speed: 25kn

Q5

Builder: Yachting Developments
Country: New Zealand
Naval architect: Yachting Developments
Delivery (est.): 2012
Type: Sailing yacht
Hull: Composite
Superstructure: Composite
LOA: 30.49m
Beam: 14.64m
Max draught: 2.1m
Gross tonnage: 284gt

VPLP 110

Builder: JFA Chantier Naval
Country: France
Naval architect: Van Peteghem Lauriot Prévost (VPLP)
Delivery (est.): September 2012
Type: Sailing yacht
Hull: Carbon composite
Superstructure: Carbon composite
LOA: 33.5m
Beam: 14.05m

Max draught: 4.6m
Gross tonnage: 234gt

33M CATAMARAN MOTORYACHT

Builder: Silkline International
Country: Thailand
Naval architect: Incat Crowther
Delivery (est.): 2011
Type: Motoryacht
Hull: Composite
Superstructure: Composite
LOA: 37.3m
Beam: 8.2m
Max draught: 1.9m

ZENITH

Builder: Sabre Catamarans Pty Ltd
Country: Australia
Naval architect: Incat Crowther
Delivery (est.): 2011
Type: Motoryacht
Hull: Aluminium
Superstructure: Aluminium
LOA: 37.45m
Beam: 10.3m
Max draught: 1.5m
Cruise speed: 25kn

RFF135

Builder: Royal Falcon Fleet
Country: Singapore
Naval architect: Kockums/Incat Crowther
Delivery (est.): 2011
Type: Motoryacht
Hull: Aluminium
Superstructure: Aluminium
LOA: 41.14m
Beam: 12.5m
Max draught: 1.7m

QUARANTA: EXTERIOR, TOP DECK & SALON

physics, advancements in construction materials and how much someone will pay to have the largest sailing cat in the world."

"The price is trending down, and this should continue now that more carbon fibre is being used for aircraft and other industrial uses."

Because of their beam, finding available refit facilities can sometimes be a particular challenge for superyacht catamaran captains. "For maintenance and service works, there are limited places to haul out," said Lieven Maertens, captain of the Sunreef-built *Ipharra*. "But if builders encounter sufficient demand for larger catamarans, nothing would stop them from investing in suitable sheds".

CARBON

With at least one all-carbon catamaran in build at the moment (the VPLP 110' project at JFA in Concarneau, France), the twin-hull form is poised to lead the way in full-carbon superyacht construction. "Carbon composite is a very good material for catamarans," Loomes said. "It has a very high strength-to-weight ratio, very good fatigue properties and has none of the maintenance/life issues associated with metals (for example fatigue cracking, corrosion and electrolysis). They're the same reasons that carbon composite is now coming to the fore in aircraft construction."

The team at Curvelle cites carbon composite's strength to weight characteristics and its acoustic and thermal characteristics when combined with a foam core for sound and thermal insulation.

SP-High Modulus, which has provided the engineering on the *Quaranta* project, also regards carbon as a material for catamaran construction in some areas of the structure. "The advantage of using carbon in the deck specifically is three-fold due to the increased importance of stiffness versus strength," said Alex Shimell, marine consultancy director at SP-High Modulus. "Firstly, the carbon content in the deck sole makes the feel under foot much stiffer than the equivalent weight in e-glass, giving a higher quality end product, with no increase in weight. Secondly, carbon deck beams can be shallower than their e-glass counterparts, giving more headroom. And thirdly, the weight savings in the upper decks reduces the amount of structure required, allowing a much more open-plan, airy interior."

Thin carbon structures transmit noise easily, which means it needs insulation to achieve a quiet, comfortable yacht interior. "Carbon is lighter, but it's also really noisy," agreed Marc Van Peteghem of Van Peteghem Lauriot Prévost Yacht Design (VPLP), which developed the 44m *Hemisphere* and the 42m *Douce France*, both of which are all aluminium. "If you accept the noise because sailing is important to you, then it's great. But if you go carbon to save weight, then expect 45db noise

Catamarans, as a form of yacht, are arguably more versatile a design than monohulls. They can be faster and lighter, or roomier and more open.

levels in the owner's stateroom; you'll need quite a lot of insulation. So you'll pay twice: once for the carbon, once for the insulation, and at the end of the day, the weight isn't so much of an advantage."

"When carbon is used in combination with foam cores and e-glass reinforcements, and only used selectively in certain areas that are stiffness-critical – such as decks or beams – there is very little cost difference compared to an all e-glass structure and also very little effect on the noise transmission within the structure as a whole," Shimell said.

>>

With the right materials and equipment, carbon is easily and quickly reparable, but it remains a material requiring specialist, high-tech skills to work with. "The only trouble with carbon, other than the loudness, is that if you ding it somewhere remote where there's no local carbon surgeons, you could be in for a wait," Schutte said. "It's not like every port has the technology and expertise to do these repairs yet. So, to me, carbon needs to be considered by adding up the raw material cost, the skill required of the builder, the reparability, the availability of materials, and possibility to modify the boat after it's launched."

"I'd say that, thanks to the America's Cup, the popularity and demand for catamarans around the world is expected to accelerate."

Carbon's biggest disadvantage is its shipbuilding cost. "The price is trending down, and this should continue now that more carbon fibre is being used for aircraft and other industrial uses," Loomes said. "On the environmental front, carbon fibre is probably as bad as aluminium, as both materials require a significant amount of electrical energy to manufacture. But carbon fibre doesn't come with the impact of mining, as does bauxite, the source of aluminium."

"If I were building myself a cat under 30m, I would probably suck it up and go all carbon," Schutte said, "but I would not be sound insulating and I'd just live with the noise in exchange for the performance. If I were building a 30m for a client, who had any expectation of luxury or sanity into the future, then I would probably advise him to plump for the alloy. Safer, cheaper and more practical – so, smarter in the real world." [*Carbon is discussed from another angle in the* Sarissa *report on page 64 – Ed*].

YACHTING DEVELOPMENTS' *Q5*. FROM TOP: SALON, AFT SUNDECK & EXTERIOR

BERTHING IN PORTO MONTENEGRO

WHERE ARE ALL THE CATAMARANS?

Cook, of Yachting Developments, sees demand as the most significant limiting factor in the lack of catamarans over 30m in the water today: "If there is demand, the industry will accommodate it by building them."

"The problem is that catamarans take up a lot of space in a yard," said Van Peteghem. "It's been difficult to find really good yards. But we were lucky with Pendennis (on the *Hemisphere* project). I was really very happy working with them, and I'd really like to do another boat with them. They're great."

Catamarans, as a form of yacht, are arguably more versatile a design than monohulls. They can be faster and lighter, or roomier and more open. This actually makes them a difficult kind of yacht to start building on speculation. "You can have a very fast catamaran, or a very liveable one," Van Peteghem pointed out. "So they're very difficult to build on spec, because you never know what the ultimate client will like and want. There is a broader spectrum of design – compared to monohulls – from which to start."

Francis Lapp of Sunreef sees the evolution of the superyacht catamaran as nearing its point of exposure. "Catamarans were perceived as small production family boats until 10 years ago – and 10 years is not enough time to persuade current and future owners that this is a fantastic concept for a superyacht," Lapp said. "To do that, we need to show examples and enable owners to charter this kind of yacht to understand their full potential in regards to exceptional living comfort, closeness with nature and cruising quality."

> The twin-hull form is one that elicits curiosity and offers real advantages in terms of space, design and stability.

In the past two years, several high-profile catamarans have been delivered, heightening the awareness of the form. "The construction of the 30m sailing superyacht catamaran *Q5* at Yachting Developments has generated interest from around the world," Cook said. "I'd say that, thanks to the America's Cup, the popularity and demand for catamarans around the world is expected to accelerate."

"Large catamarans are one-off superyachts, so the specification is made with the client, for the client," Lapp said. "At Sunreef, we obviously have basic specs for our large concepts but it's just a base for the personalised superyacht. I think superyacht owners want and appreciate that."

"Catamarans are perceived as being spacious, stable and sea-kind platforms," Cook said. "This, along with possessing at least twice the useable interior volume than many monohulls of the same length, suggests that first-time yacht owners or charters may be attracted to the catamaran concept."

"Experienced owners will have fun on catamarans as well," Lapp added. "If the owner's plan is to have a fast-sailing cruiser, the specification will be made for that purpose and he or she will experience very good speeds on sails. Of course, you won't get much heeling or rolling on cats, so you'd have to charter a monohull from time to time!"

SHAPE OF THINGS TO COME

Although catamarans comprise a fraction of the superyacht market, without question, the twin-hull form is one that elicits curiosity and offers real advantages in terms of space, design and stability.

As we went to press, we saw a new design at FLIBS, a 24m Greg Marshall motorcat design by Odyssey Yachts, which had all the amenities, useable guest space and clever design features of a 30m+ vessel, and required less than 200kW of power to cruise at 12 knots. That's within range of the new HybriDrive system on offer from Northern Lights and BAE.

The combination of hull form and design approach makes the project certainly exciting, and only further confirmed that these kinds of vessels are enabling concepts, designs and approaches that inject innovation, excitement and opportunity into the superyacht marketplace. If this is the future, bring it on. ■

Images: courtesy of respective yards

To comment on this article, email *issue129@superyachtreport.com* with subject: The catamaran question