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*The magazine for those working in design, construction, and repair*

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**DESIGNER ADRIAN THOMPSON**
**FIRE PROTECTION IN MARINE COMPOSITES**
**MERRITT'S BOAT AND ENGINE WORKS**
**WESTPORT SHIPYARD**

# MASTER OF SURPRISE

**Adrian Thompson's designs for sail and power have been radical *and* successful. But his biggest and most daring boat to date—the racing catamaran *Goss Challenger*—has yet to be tested.**

**by Steven Callahan**

RICK TOMLINSON

A drum Thompson's designs always appear both aesthetically and technically remarkable. Even knowledgeable observers wonder before each hits the water, "Will it really work?" That's just what many are now asking about his latest effort, the 120' catamaran *Goss Challenger,* which veteran singlehander Pete Goss will enter in The Race—a nonstop global circumnavigation under sail scheduled to begin at the end of next year. Incorporating 50 million miles of carbon fiber filaments in her structure (and still under construction as of this writing), *Goss Challenger* may be *the* most radical offshore racing sailboat ever created. And with some luck, she may just round the world in record time.

Unlike those who cling to proven formulas for popular consumption. Thompson seems instead addicted to rare design missions that seek extreme goals and novel solutions. He prefers to approach each problem with a blank slate, letting logic, not tradition, determine his angle of attack. Fellow designer and friend Nigel Irens remarked, "If the logical solution doesn't lead to something radical, Adrian wouldn't be interested." Thompson doesn't argue the point.

Still, for all the apparent uniqueness of a Thompson powertoat or sailboat—monohull, multihull, or hydrofoil—you can still find links to the notable work of other designers. One could even argue that few, if any, of Thompson's design concepts are absolutely original. Nevertheless, he has an uncanny ability to meld the future with the past and the experimental with the practical.

Until the early 1980s, Thompson was a successful Scottish farmer and only recreational sailor. "But," he says, "with a few grand burning a hole in my pocket, I thought, 'Might as well build a boat.'"

That boat was a cold-molded 30-footer called *Alice's Mirror,* Thompson's initial step down the path of minimiz-

CHRISTIAN FEVRIER

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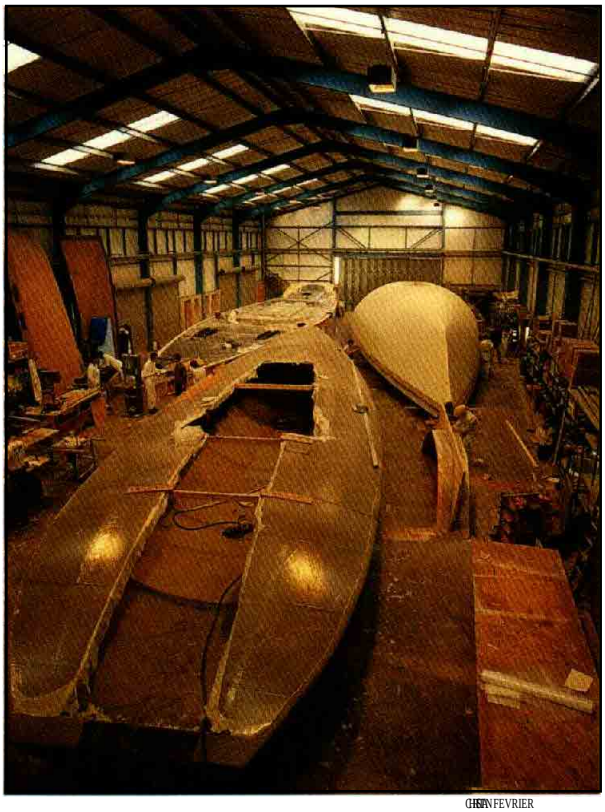
*A farmer/furniture maker turned boat builder/designer Adrian Thompson's first major commission was the 60' trimaran* Paragon ***(above),*** *built about 15 years ago. A distinctive and successful raceboat, she displays a number of bold departures for multihulls of the period: a minimal main bull, large amas (outer hulls). recurred akas (crossbeams), a broad beam (45'). and advanced-composite construction.* ***Facing page****—Photographed in his studio not long ago, Thompson continues to show remarkable intuitive skills: the rendering on the desk is of his* Goss Challenger, *currently under constmction in England. (For more views of the* Challenger, *see pages 55 through 57.)*

ing drag first, then optimizing power. With a displacement-to-length (D/L) ratio of roughly 80, she more than qualified as an ultralight displacement boat (ULDB), hut her generous beam and water ballast made her much stiffer than the slimmer California-style ULDBs from designers such as Bill Lee. Although Eric Tabarly's Singlehanded Transpacific Race winner, *Pen Duick V,* first employed water ballast in 1969, it wasn't until the late '70s and early '80s that designers of singlehanded racing machines began to embrace it. To Thompson it seemed the obvious choice for a beamy hull, because it increased the boat's stiffness at low angles of heel, whereas adding massive amounts of weight to the keel—though lowering the center of gravity—only stiffened the boat as it heeled. Wider boats sailed better when kept upright, sails remained more efficient, and in light airs when you didn't need the water ballast you could lighten ship by simply dumping the ballast. Right out of the box, *Alice's Mirror* planed at 14 to 15 knots in flat water, logged day's runs of up to 250 miles, and handily won her class in the prestigious and tough Round Britain Race in 1982, beating an impressive array of much larger boats in the process.

Staying with construction for a while, Thompson helped build advanced boats like the Kevlar-Nomex maxi Whitbread racer *Drum* (which, despite major problems, eventually finished the 1985-86 Whitbread Race third on elapsed time), and the One-Tonner *Jade,* "which was brilliant but crazy," acknowledges Thompson. "That was before there were any rules about construction. Four of us could pick up the hull quite comfortably. It was a completely lunatic boat, but we did win the One-Ton Cup."

Then Thompson captured a design commission—for a 60' trimaran. That boat, *Paragon,* would become an important vessel in the evolution of racing-multihull design. "She started out as a cruising boat, actually," says

*Though most closely associated with multihulls. Thompson is also adept at monohull design and construction. The inverted hull in his shop is* Drum ***(aerial view, below),*** *which competed in the 1985-86 Whithread Race. The boat going together in the shop foreground was designed by the late Lars Bergstrom; it is* Hunter's Child, *one of a series of solo raceboats made famous by Hunter Marine's Warren Liihrs. His* Child *series was the cover story in* Professional BoatBuilder *No. 53.*



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Thompson. "The owner wanted sometiling fast. But when he came down to look at the hull, he wondered where all the berths were going to he. 1 told him, 'Well, there's not going to be a *lot* of room.' And he replied, 'Well, might as well make it into a racing boat.' So we cut the sheer down a bit and went off from there." Indeed. Thompson pared the slim main hull to a minimum, enlarged the amas, or outer hulls, with notably more volume than anyone else's (200% of total boat displacement), spread out the platform with a massive (for the period) 45' beam, and tied it all together with eye-popping recurved akas. or crossbeams.

In addition, *Paragon's* Kevlar-carbon structure was highly sophisticated for its time. The boat was laid up wet, using a fabric impregnator developed by Thompson and his crew; it closely controlled the amount of resin that went into the reinforcement. *Paragon* dominated the first three legs of the 85 Round Britain Race before structural problems in her complexly loaded beams stopped her. "We had enough material in the beams," Thompson said recently, "but it wasn't all oriented properly at the ends." The following year *Paragon* upset the ruling French multihulls with an easy win of the Trophee des Multicoques.

Not until Phil Steggall asked Thompson to design *Sebago* for the 1988 singlehanded transatlantic race did Thompson begin to truly distance himself from the pack. Whereas his colleagues continued to optimize power by increasing beam, ama volume, and sail area, Thompson decided to concentrate on minimizing drag by reducing weight and controlling pitching—a particular problem for light multihulls, with significant weights spread out in their akas and rigs. As multis bounced all over the sea, the akas bashed through waves, and sails lurched forward and aft, thus destroying the laminar flow of the quickly changing apparent wind over them.

In the early 1980s, Boston Whaler's 17' and 20' Supercats and later, offshore boats such as Paul Lindenberg's *Fury* (which briefly led the 1984 singlehanded transatlantic race), had demonstrated the value of hulls having rounded decks and sharp noses with no flare. These forms more effectively sliced through smaller chop, dampening the boat's pitching. If the hull stuffed into a wave, then its narrow, strongly cambered deck shed water easily and tended to re-emerge, rather than trip the boat into a cartwheel or pitchpole. Thompson took the logical measure of lengthening and sharpening his bows—in the extreme—making them truly *wave piercing.*

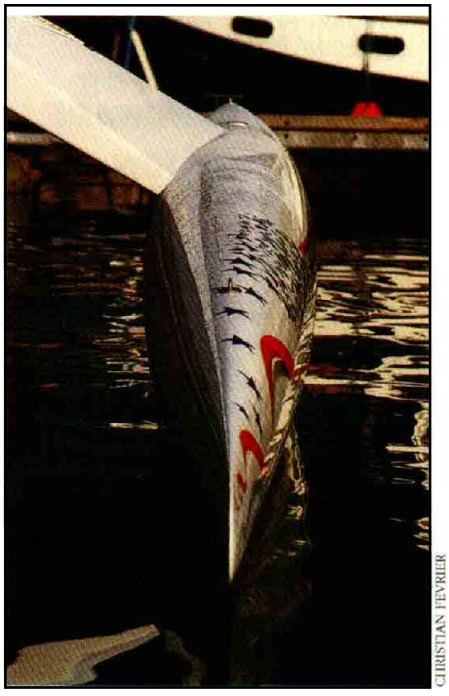
At the same time, Thompson seized upon hydrofoil and composites developments. Designer Marc Lombard and others had reduced the parasitic drag from complex foils by reverting to elegantly simple invertecl-T or -Y foils. When pressed, the foils supported amas, minimizing drag and preventing the amas from adding *to* pitch energy. The shorter, lighter amas and single beam to cany them also helped concentrate weight amidships to ease pitching and lighten ship. Thompson built *Sebago* in carbon fiber, greatly

improving her light-air performance over other foil-equipped boats, many of which were aluminum. A lightweight, easily driven boat, *Sebago* required less sail, thereby reducing rig size and weight, which also reduced both heeling and pitching forces. With less drag, the boat required a smaller, easier-to-handle sail plan that could be hung from a highly efficient carbon wing mast.

*Sebago* was 60' long *and* wide yet weighed just 7,000 Ibs—virtually half the weight of her major rivals. Her needlelike main hull (with a beam of only 4.5') and streamlined amas could spear right through a serious chop without causing the boat to leap all over the ocean. "It was a really nice boat to sail," says Thompson. *"Paragon* had been a big, full-blown multihull with 200% buoyancy floats and deck gear for Africa on it—chunky winches and so on. Going upwind, you really did feel the loads. She was absolutely done up like a bowstring. *Sebago* was quite the opposite: playing the mainsheet, you'd kind of waft along at 18 or 20 knots." Despite shearing off a foil on flotsam early in the race, severely handicapping her, *Sebago* managed a very close fourth place and set an American singlehanded record for an east-to-west crossing that still stands. But she did not win; as Steggall himself pointed out. *Sebago* was not only quick to accelerate, she was also quick to decelerate. demanding constant attention from the lone skipper if he was to sail her close to her potential.

This problem would be irrelevant in a powerboat, and in 1990 Nick Keig, a well-known multihull builder/racer, asked Thompson to create a wave-piercing 30-footer to blast across the bumpy Irish Sea to the Isle of Man, where both Keig and Thompson

*Phil Steggall's racing tri* Sebago *represented further experimentation for Thompson, who designed and built her. Lightweight (7.000 Ibs) and very beamy (60'. same as her length),* Sebago sports *a needlelike main hull. Note the wave-piercing amas with foils beneath.*



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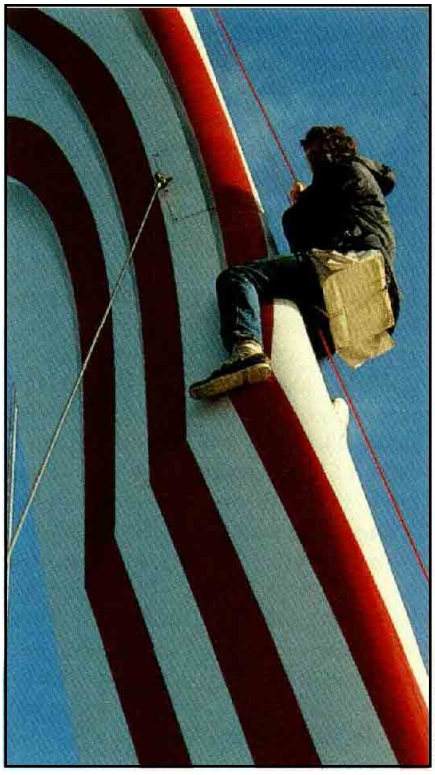

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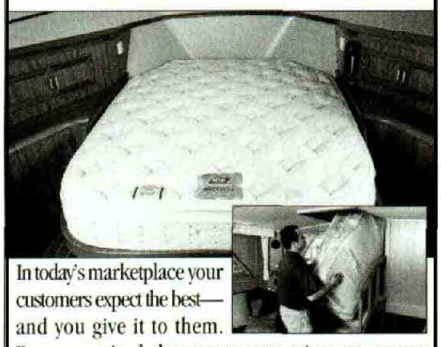

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lived. The 50- to 60-knot Very Slender Vessel, patented and trademarked as the "VSV," is likely to keep Thompson and his now-partner Keig in chips and grog for the foreseeable future.

True, there's nothing new about a skinny powerboat; the revolutionary, 34-knot, steam-turbine-driven *Turbinia* designed by Sir Charles Parsons and debuted in 1897, had a length-to-beam (L/B) ratio of 11.4, whereas the L/Bs of VSVs may be as low as 6. Still, most powerboats are intended to ride over waves, so their hulls usually flare from their narrow waterlines out to wide decks. By contrast, Thompson's VSVs feature *Sebago-like* streamlined noses that are expected to disappear up to 16'below the waves and yet re-emerge easily. Thompson has retained a planable wide and flattish shape aft but has also incorporated highly flared, semi-tunnel chines that run from deck level at the bow to the lower edges of the stern. These provide dynamic lift at speed, control the heeling angle into tight turns, and help dampen rolling at rest.

The military was quick to exploit the VSV concept for fast patrol boats and long-distance transports for special operations. To intervene in a crisis—a terrorist attack on an offshore oil rig, for example—"the military have been using deep-V hulls," says Thompson. "But when it's blowing 15 to 20 knots

RICK TOMLINSON

*Seen from above,* Sebago *resembles a huge water spider.* ***Left****—Thompson aloft on* Sebago Is *wing mast, designed by Barry Noble. The boat set the American single-handed recordfor an east-to-west transatlantic crossing that still stands.*

and the sea state is 3 or 4 and you're doing 50 knots in a deep-V, the G-forces are going to be around 15 to 20. You can't stand up. You spend all your time hanging on. Four hundred miles of that reduces your ability to function. On a VSV, we get only about three or four Gs." All this while using approximately 20% less fuel than a conventional V-bottomed hull. Also, the VSV's low-slung form, rounded shapes, and composite structure make it less visible to both eye and radar than other craft.

Although Thompson admires the multihull wave-piercing powerboats drawn by designers Nigel Irens, Roger Hatfield, and Morelli & Melvin—noting that their even slimmer hulls may provide the ultimate in pitch dampening and fuel efficiency—Thompson points out that multihull wave-piercers have too much wetted surface for the speeds he needs to achieve. Moreover, he says, "they can't fit into an airplane for rapid, long-distance deployment. And, I don't think you could turn them in three times their lengths at 50 knots at which we pull five Gs; our boats have to be able to bank into that kind of maneuver."

Licensed builders have so far built about 20 VSVs. It's hard to tell whether the conservative yachting establishment will ever embrace the VSV, but to date at least one client has commissioned Thompson to design a James Bond-like 36m (118') motor-yacht with accommodations for 10.

Despite Thompson's VSV success, sailing still called. Five years ago Peter Goss, a skilled and daring sailor, asked Thompson to design a mono-hull for the Vendee Globe, a single-handed nonstop race around the-world. The resulting boat, *Aqua Quorum,* can be considered a big sister to *Alice's Mirror:* "You know what we designers are like," Thompson says. "We get a drawing we're partial to and we just put it through the copier." But he notes that *Aqua Quorum* was hardly a carbon copy. The race rules stipulated that all movable ballast could not heel the boat at rest by more than 10 degrees. Neither Thompson nor other open-class designers were brain dead: "If you have a rule that limits the ballast ratio of the boat, then obviously people are going to draw wider and wider boats." Although *Aqua Quorum* displayed greater beam than *Alice's Mirror,* Thompson kept her midriff more moderate than the extreme French "aircraft carriers" of this period, to gain a bit more upwind capability.

Thompson also traded water ballast for a swinging keel. More than a quarter century ago, the late L. Francis Herreshoff had proposed a


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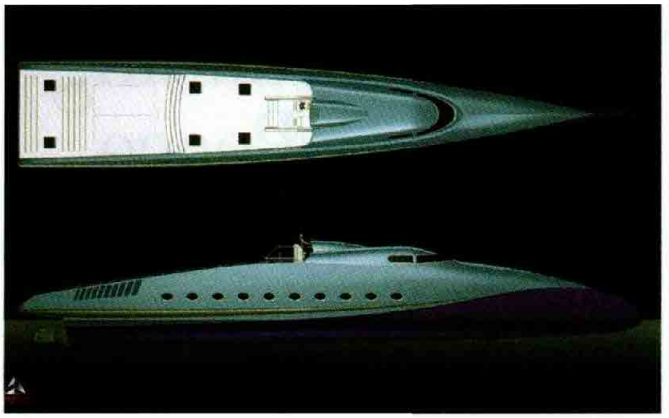

*In the context of his other work, Thompson's patented Very Slender Vessel hullform is less surprising bill no less stunning. The fast, wave-piercing, elliptical-sectioned canoe body with a planing surface aft allows reduced fuel consumption and increased range with modest power requirements. It also corners like a rabbit, provides a soft ride, and presents a low profile—features not lost on the navies of the world. The upper right and lower left photos are of a 50' demonstrator. The lower right photo shows a 30' prototype, used to test different drive systems. The rendering at upper left is a proposed 50m (164') yacht version of the VSV, with accommodations for 10.*

swinging keel in his seminal hook. *The Common Sense of Yacht Design.* And Dave Hubbard had created *Red Herring,* an actual swinger, hack in 1980. Both boats were narrow; in Herreshoffs case, because in those days narrow boats carried the deepest fins that would he most effective when swung. The *actual* performance of *Red Herring,* however, indicated that a narrow boat with little form stability still heels dramatically, and her lifted keel often rode nearly parallel to the sea's surface, making it a poor device for resisting leeway. Thompson and a few others foresaw that the swinging keel would prove much more effective on a stiffer, beamier boat. Even so, he accepted that the keel would serve primarily as a righting-moment mechanism rather than a hydrodynamic-lift device.

To combat leeway. Thompson chose twin, high-lift, low-drag asymmetrical daggerhoards (reminiscent of the "bilgeboarders" designed by Bruce King in the 1970s, which were so effective their type was soon handicapped out of existence). Because each board needed to work only on one tack, when set in a trunk angled outboard from the deck it would remain perpendicular to the sea's surface. Although movable-ballast systems above water might prove more efficient than a swinging keel dragging *through* the water, they were prohibited by the rules. Therefore, says Thompson, "you make the keel as slippery as you can," adding, "1 like the canting keel a lot better than water ballast—especially going upwind. On any boat that's optimized for righting moment with a deep-draft bulb keel, when you're going upwind, that awful pendulum wangs around with three or four tons of lead on the end of it. The pitching moments become frightful in certain seaways. But if you hitch a swing-keel up to windward, then the keel is pretty much horizontal and the pitch axis of the boat is going through the center of the bulb's mass, which is great. On *Aqua Quorum,* we fixed the keel in a 'normal' keel position and placed a bunch of people out on the rail to mimic water ballast. The ride of the boat was just totally different; with the keel canted and no one on the rail, the motion was miles better."

Racing right after her launch, *Aqua Quorum* finished second in class in the 1996 singlehanded transatlantic, logging daily runs of up to 314 miles. She was not only fast but tough: skipper Goss, deep in the Southern Ocean on the Vendee Globe Race later that year, turned *Aqua Quorum* into a 65-knot gale and bashed dead upwind 160 miles to rescue fellow competitor Raphael Dinelli. Goss completed the Vendee in fifth place in the smallest—and only new—boat to finish.

So it was no surprise that Goss returned to Thompson for what is undoubtedly the most daring exploit for both yet. The *Goss Challenger* was

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*Racer Pete Goss commissioned Thompson to design* Aqua Quorum *for the 1996 Vendee Globe, a singlehanded nonstop race around the world. In a gale in the Southern Ocean, Goss made a daring rescue offellow competitor Raphael Dinelli* ***(lower left).*** Aqua Quorum's *interesting collection of appendages includes a swinging ballast keel, twin rudders, and twin high-lift, asymmetrical daggerhoards.*

CHRISTIAN FEVRIER

RICK TOMLINSON

born from a simple directive: create-the fastest boat capable of sailing nonstop around the world. Because the current record stands at 71 clays and change (faster than the power-boat record), breaking it requires an average speed in the mid-teens. Goss plans an initial circumnavigation as a *warmup* for The Race, which begins in Barcelona, Spain, on December 31, 2000. A fleet of the most extreme racers ever built will scurry round the world nonstop seeking a new record.

"It's pretty scary, actually," confesses Thompson of his newest design. "It's almost impossible lor any designer to put himself clown in the Southern Ocean with 6()-knot winds and 40-foot seas and come up with a design that works reasonably well and, more importantly, that will survive and look after the crew. We're phony designers, really: not many of us venture on our boats around the world. If I went down to the Southern Ocean. I think I'd probably not design another boat. When Pete [Goss] was beating back on *Aqua Quorum* to pick up Raphael...well, you don't in all honesty design scantlings, fittings, and reserve factors with that sort of maneuver in mind. Structure is not an absolute science, because a boat is an interface vehicle that bashes around on the surface, and nobody knows at what speed it takes off from a wave or at what angle it will land. So if you design something radical and send your mates down in the Southern Ocean on it, those are the kinds of worries you have to live with."

Aid living with it he seems to be. Goss' new 120' catamaran is big enough to span center court at Wimbledon. When launched in January, she will be the largest composite structure in Europe, yet her empty weight should fall well shy of 50,000 Ibs. Even big conventional cats with high freeboards have stuffed their bows in heavy seas, dramatically slowing, and in a few cases nearly pitchpoling. Thompson hopes the *Goss Challenger's* very slender hulls—featuring only *4.5'* of beam and 9' of depth—will spear through the seas and keep going, though no one really knows just how deep she'll dive or how her 70'-wide platform will handle extreme conditions as it spans complex wave trains. Unlike the trimaran *Sehago,* which would lift its main hull when pressed, the *Challenger's* leeward bow may routinely dive 16'or more under water.

For all her size, though, the Goss *Challenger* appears delicate compared to Steve Fossett's *PlayStation,* a huge

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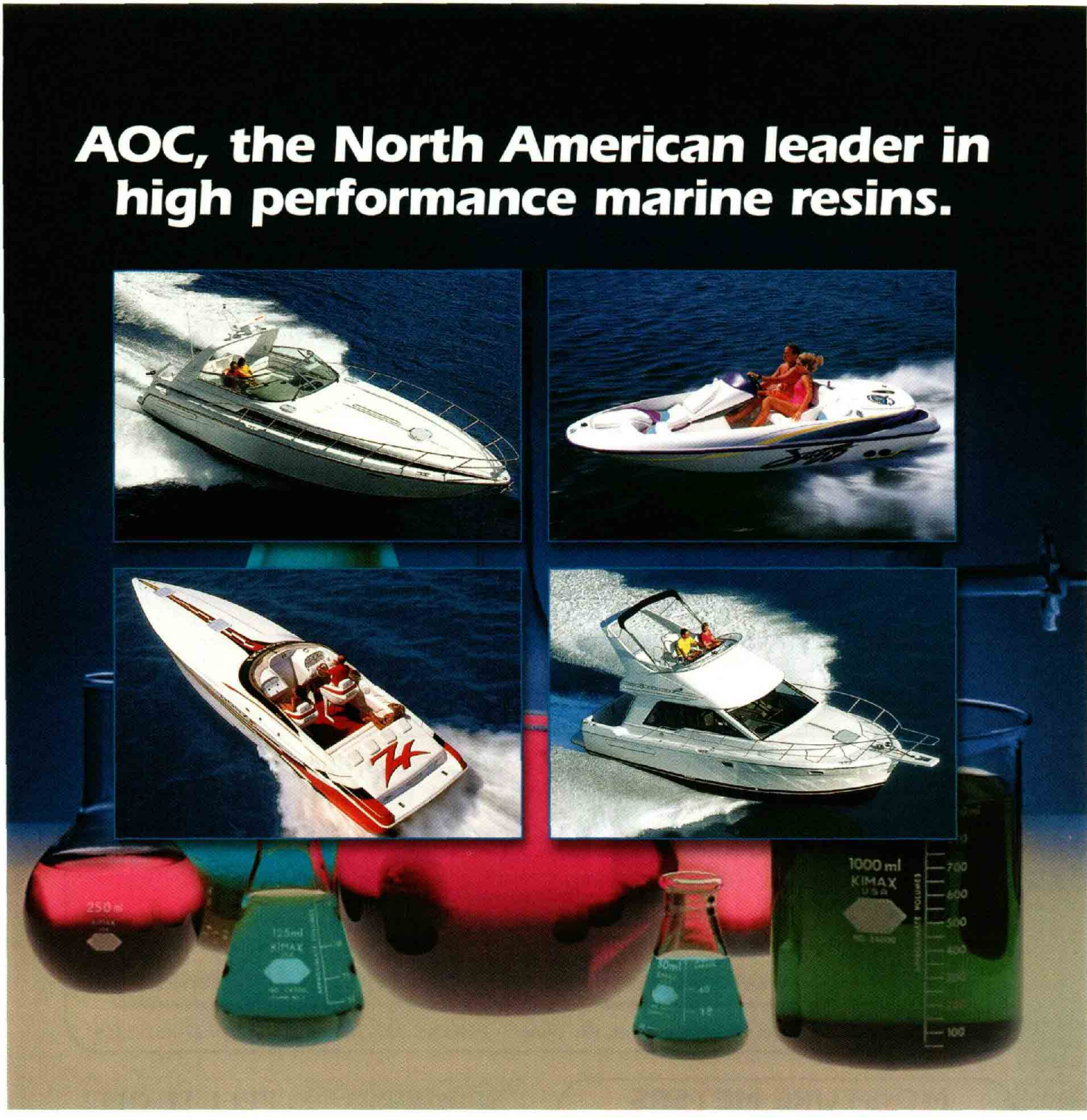


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"conventional" catamaran with full-volume hulls and a skyscraping rig. "I've always looked at the minimal way to accomplish any job," says Thompson. "That's what gives me my kicks. If you're trying to break the round-the-world powerboat record, you could build a really massive vessel, pack it full of engines, and blitz. it. But that's not clever, really; it's just a sledgehammer approach. A far more elegant way to achieve that record is to use technology and design expertise to create the smallest possible boat with the smallest possible engine. That's what we're trying to do with Pete's boat."

The *Goss Challenger* is hardly underpowered, but Thompson knows that radical is cool only if it finishes, and that pragmatics often rule at sea—especially in the unforgiving Southern Ocean. "We're trying to create a boat that is safe to sail and handle," Thompson insists. "Everything has to be done with muscle power—it's all you've got, and how quickly you can deal with a problem is critical to safety." Accordingly, Thompson has stressed simplicity, streamlining, and the reduction of drag and loads.

"What's driven the whole design," he says, "is this: How do we handle the sails in Southern Ocean conditions downwind? In a SO-knot squall, you can't round up because you'll just chase your apparent wind forward and over you go. So you've got to be able to put a reef in on the run. On a conventional boat, a big-roach sail with battens is going to bear on the spreaders and shrouds. The crew has to drag it down. I think that's a big problem. The question is, how do we get rid of the sails when we don't want them? We've chosen unstayed rigs designed to rotate a full 360 degrees. You can weathercock them and luff them no matter where the wind is. We have long mainsheets, and in the cockpit we'll keep a couple of chopping boards and an axe. If things get really hairy we'll just chop the mainsheets and let them go."

Without headsails to tend, the crew can remain relatively safe in the cockpit, and with no headstays to support. Thompson can eliminate the forward beam and even "foredeck" netting. Because rig height is then independent of aka height, the designer can also afford to highly arc the akas and lift the 5()'-long crew-accommodations cocoon and cockpit, reducing the frequency with which the beams and pod will slam into waves. Unstayed wing masts also promise a 30% greater efficiency over stayed rigs, at least theoretically. And even if the wings get stuck in a blow and are unable to feather. Thompson notes that in that worst possible condition, the capsize windspeed is about 85 knots.

Critics have wondered if the *Goss Challenger's,* theoretical design concepts will prove as advantageous in practice. Large mast loads might excessively twist the very narrow hulls, for instance. But Thompson argues otherwise. "I don't think the engineering is as bad as for a conventional cat," he says, "because the loads are a lot easier to analyze." A trimaran's main hull can absorb enormous rigging loads, but a conventional cat must somehow absorb them using a


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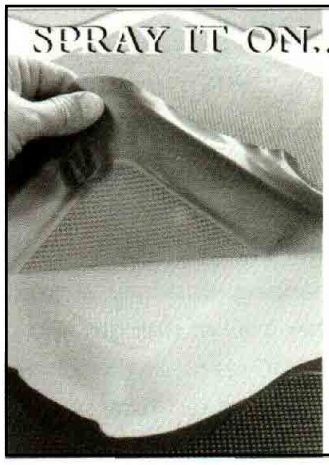

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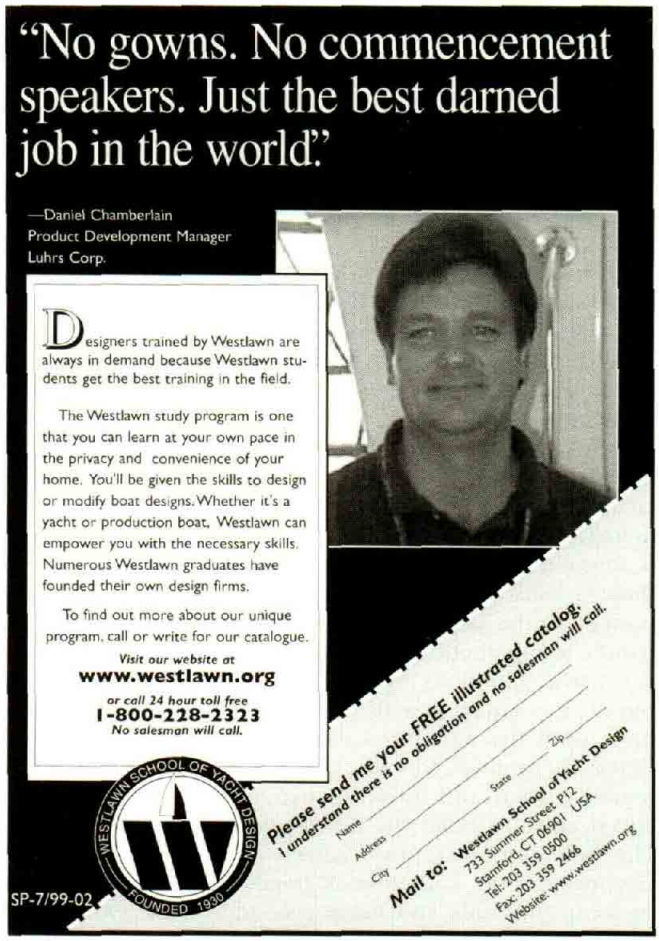
STEVEN CALLAHAN

*Goss' newest racing machine—a 120' catamaran designed by Thompson for The Race 2000, a no-holds-barred nonstop sailboat sprint around the world—is taking shape in Devon, England. The low-slung structure extending into the foreground is an oven for cooking the all-carbon boat. Hull tooling is seen at right.*

complex truss structure suspended between the hulls.

Thompson suggests *Playstation* as a yardstick. A stayed mast on a boat that size might produce 100 tons of compression, so *PlayStation's* main beam is about 30% deeper in section than the *Challenger's*, and a lot heavier. Additionally, a conventional rig's forestay would tie to a hefty forward-beam truss that must also withstand loads to about 30 tons, and much of this load would be transferred aft to the main beam via a sizable compression tube. Moreover, mainsheet loads on the middle of the rear beam might reach 40 tons. Finally, the normal arrangement of staying a mast would lead the cap shrouds well aft on the hulls, so any wracking in the hulls feeds back into the rig. *PlayStation's* designers (Morrelli & Melvin, Newport Beach, California) assume that even their stiff structure will allow the bows to routinely flex enough to vary by a height of 8' or more, which Thompson says, "sounds about right" for his boat as well. So *trracking* can become critical.

"These considerable problems have been solved at small scale, but are increasingly problematic with increasing size," says Thompson. "All right, we have some crazy masts stuck in the hulls, but no parts of the structure rely on stays. Although the loads are



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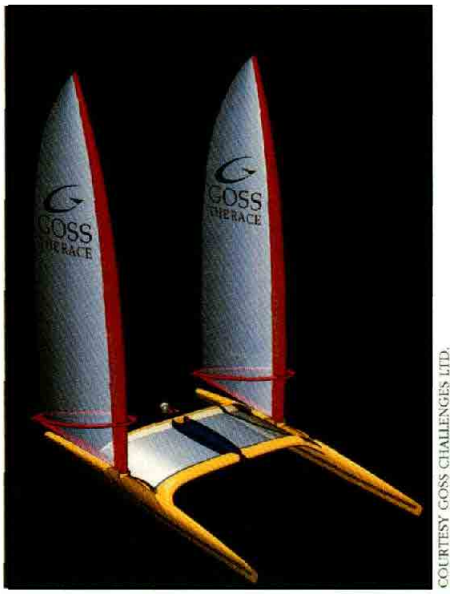


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*The simulated action-figures in this rendering of the Goss* Challenger *underscore the spaceship-like quality of the big boat. Her helm is protected by a pod for the crew. Note the rig change: Thompson and his team recently switched from an AeroRig* ***(left)*** *to a wishbone setup (right). Each mast rises 137' above deck.*

pretty high—a hundred tons of side load on the mast bearings—the masts are buried into the biggest element in the boat and picked up between two beams, so it's actually quite a nice clean thing to engineer. To counteract the side loads, we use a carbon fiber strap that's only 1 square inch in cross sectional area. It's not that much." The t2-plus-inch-diameter bearings will likely be composed of high-density composites and run in aluminum races.

Overall, Thompson is comfortable with *Goss Challenger's* structure. His engineers are among the world's most experienced. Although Thompson does all of what he refers to as the "conceptual stuff—how we're going to stick it all together," for finite element analysis (FEA) and number-crunching he relies upon SP Technologies (Isle of Wight, England). SP is satisfied the Goss boat will handle three-G loads with all the weight supported by the corners, and will also handle sympathetic frequencies that can allow vibrations in structures to build in resonance with the conditions until the structures eventually shake themselves to bits. Goss has rented a shed and hired an experienced crew to build the *Challenger.* The boat is constructed entirely of pre-preg carbon, with Nomex honeycomb in the hulls and foam core in the pod. The masts contain a bulkhead-stringer framework to handle high shear stresses.

Each mast carries 400 sq ft of wing area plus about 3,300 sq ft of sail, creating a tad more upwind sail area than *PlayStation.* Each mast rises 137' from the deck, about the same as *PlayStation's* rig. Critics have speculated that the heavy unstayed rigs may aggravate pitching and detract from stability. Thompson admits the unstayed masts will be heavier, "but we're not sure exactly how much. Besides, you have to look at it a little more globally," he insists. "A stayed mast is roughly the same size from top to bottom because it's a compression strut, so the CG [center of gravity] is generally at 50% of its height." The *Goss Challenger's,* masts taper from 2m (6.5') of chord at their base to .5m at their tips, so the CG's only 30% from the base. "If you do your sums—the weight of the rig times the CG height—you'll find our pitch inertia a little bit lower, which is quite nice," he concludes. Finally, notes Thompson, "You also have to put into the equation associated gear with a stayed mast, like the heavy forward beam."

Still, the *Challenger's* design team has had to confront troublesome details required for their concepts to work. Obviously, the cantilevered spars will bend—possibly up to 9'at the tip. though Thompson confesses it might reach 16'—but the bend dynamics are not obvious. When the design team analyzed the bend three-dimensionally, they realized that 15 tons of leech tension will curve the sticks one way, while heeling loads bend them another. A tested scale model has helped refine the design and allowed the sailmakers (Halsey Liclgard of Southampton, England) to rewrite their programs to account for the complex dynamics. Even the sail track got tricky, because the aft side of each mast shortens by 8" due to compressive bending, requiring expansion joints in the track. Details regarding the latter item are undisclosed.

The *Goss Challenger's* boom arrangement, too, has markedly evolved. The first AeroRig sail plan showed the hallmark "ballestron" boom that projects forward of the mast to carry a small jib, but Thompson eventually decided against it. "Probably I'm wrong, but to get enough tension on the headsail to make it pay its way, I thought the mainsail shape would suffer, because you get this backbend in the mast. Also, it was quite a lot heavier." Again the design team deep-sixed complexity in favor of a fresher, simpler direction. The *Challenger* crew can set light-air drifters from the unstayed *unarigs* that still provide enough power to begin flying a hull in 12 to 14 knots of true wind.

Thompson's team more recently examined their first wishbone-boom design within which the large-chord wings need to rotate. With enough

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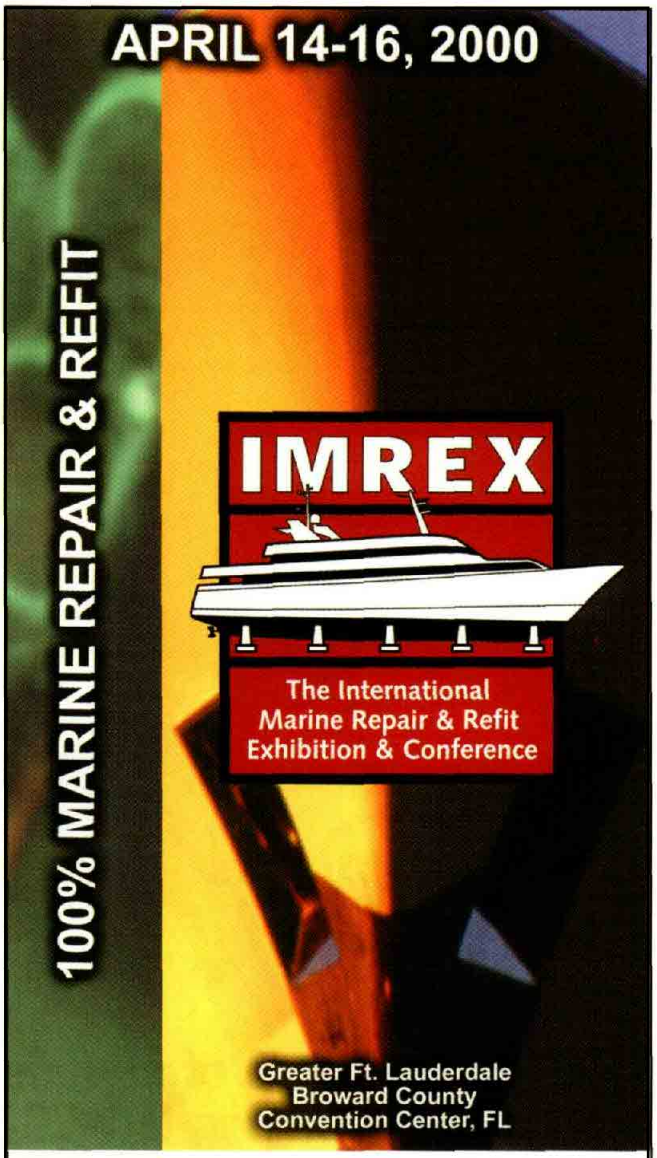


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curvature to hoop the rotated stick, and enough strength to handle 35-ton compression loads, each wishbone became a half-ton monster. The designers then realized they could slot the wishbone between the sail track and the structure of the mast, reducing the camber to contend only with the curve of the sails, increasing their compressive capabilities and thereby reducing their weight by half. Even so, Thompson notes that the wishbone size can "pretty well encompass *Aqua Quorum."*

The most fundamental compromise of the *Cross Challenger's* design, however, is that the leeward rig must sit in the turbulent lee of the windward one when the apparent wind is about on the beam. Because of the large shift in apparent wind, this will be when the true wind is fairly well aft. Only sea trials will tell how much of a handicap that may be. Otherwise, Thompson and his team seem to always remain a step ahead of the doubters. They're even providing protective pods around the leading edge of each mast for crew working there. And, should something go wrong way out on the end of an eased leeward wishbone, then anyone unlucky enough to have to crawl out that far will at least be contained by a netting sock beneath the wishbone.

The *Goss Challenger* team has no illusions of warp-speecl potential. "I don't think she's going to be faster than any 60' multihull on flat water," says Thompson, who recognizes you can't fight the law of similitude. "If you take a 60' multihull that weighs five tons, make it twice as big, and keep the same proportions of rig, then the sail area increases four times—a squared factor—but the displacement of the boat will increase eight times—a cubed factor. You're dealing with that rule the whole time, and it's cast in stone. Our boat can't carry the same sail-area-to-displacement ratio as a hot Open 60 trimaran like *Primagaz.* Nor. for that matter, can *PlayStation.* The only reason a bigger multihull is faster overall is because it's less affected by waves and the weight of all the gear and stores required to sail around the world nonstop."

None of the above means these boats will be slow. On the contrary. Thompson figures the *Goss Challenger* will sail in the 20- to 30-knot range most of the time. "More to the point," he says, "I hope the boat will slip along at 28 to 30 knots without it feeling too dramatic. Some boats at 28 knots feel a little alarming. We hope that the low-drag hulls on *Challenger* will move along at that speed, and any seas will easily clear the beams."

Similitude can also prove to be an ally. *Challenger's* twin mainsails weigh 160 kilos (352 Ibs) each, compared to *PlayStation's* 800-kilo (1,760-lb) main, making the *Challenger's* sails easier to handle.

Presuming *Challenger* will be less labor-intensive than her competitors, and because her crew can operate mostly from the cockpit using only four winches, skipper Goss figures he might even be able to sail his *Challenger* around the world with as few as five crew. But Thompson is

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less certain. "I'll probably get shot for saying this, but I think that all these boats will be very physical to sail and every task will take more people than you think it will." He believes the Goss *Challenger* will eventually sail with about 10 crew. Regardless, she'll inevitably be able to sail with at least two to four fewer crew than her rivals, and considering food and gear, will save a half ton for each person that can be left on the dock. Remember, two tons equals 10% of boat weight.

If Thompson's design proves successful, then it might just lead to a new style of cruising multihull honed for comfort of motion and ease of sailing. Thompson already has one client thinking of it. *Goss Challenger's* rig, too, promises a simpler life for cruising sailors and may finally allow unstayed spars to closely compete with stayed ones. "I think there's quite a future for unstayed masts," says Thompson. "Multihulls are not brilliant performers when they have to drag all that rigging upwind, especially in light airs, because you come up against a brick wall when your lift equals your drag. Just cleaning up the designs and making things more organic—I think there's a future in that."

As for Thompson's own future, "I tend to hop in big steps, which has high risk attached," he says. "It's quite stressful designing boats, especially at the sharp end, if you can call it that. You lose your appetite for sticking your neck out after a while. I'll hate it when they launch this boat *[Goss Challenger]*. Trials are nerve-racking. Everyone's aspirations are running so high. In their minds, the boat's already sailing 40 knots and is brilliant in every way, and you know it's not going to be like that, really. No, designing these kinds of boats is a young person's business."

So at the ripe old age of 52, Adrian Thompson dreams of throttling back, returning to making furniture, maybe even building a nice, slow, conventional cruising monohull. A what!? "Well, yeah, absolutely, as a reaction to what we do normally." he says. "It would probably be wood, like *Alice's Mirror*, which I enjoyed building. I've done so many composite boats—it's really like a chemical process. Wood is just nicer to work with."

It's hard to picture Adrian Thompson lolling about on a traditional British cruiser. Or carving a Chippendale chair. But who knows? The man loves to surprise. PBB

***About the Author**—A multihull sailor with many offshore passages to his credit. Stere Callahan has designed and built a number of these boats. He wrote a short text on multihull design while working at the Yacht Design Institute 20 years ago.*

As this article was going to press, we learned that Pete Goss has a new title sponsor and therefore, his boat has a new name. It will now be called *Team Phillips,* thanks to Royal Philips Electronics. *—Ed.*

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