When a client approached me to design a 12 footer to voyage across open waters, well, how could I not be intrigued?

Patrick Childress was an experienced mariner, and although some may think his former circumnavigation on a Catalina 27 might qualify him as a bit crazy, I found him very sensible and impeccably prepared for the trials and tribulations of taking a small craft, even a very tiny craft, to sea. At the time, no one had sailed a twelve footer around the world, and that was Childress’ ultimate goal, although we all knew such a quest was a long shot. My charge was not only to design him a vessel that would at least keep him safe but that would also become the first micro-voyager that would perform more or less like a normal boat, that could make reasonably fast passages for as long as he could stand it.
My goal was to create what was essentially a high-performance life boat. I employed enough buoyant materials to pretty much float the boat, even if flooded. I then gave the vessel a watertight bulkhead forward, to contain leaks should the boat hit something while underway. I also gave the boat a watertight sole-berth platform more than 7 feet long that was set at the load-waterline level. If the boat got damaged below, the platform would contain the leak. If struck and holed through the topsides, the volume contained below the platform was enough to keep the boat not only afloat but floating on her lines! The skipper still had access to stores under the platform through watertight hatches. Generous beam carried well aft enhanced form stability at low heeling angles, and sail-carrying power. High freeboard, cabin volume, deep ballast, and all the heavy gear stowed under the platform gave the boat a very good range of stability and desire to re-right quickly if she ever capsized. In bad weather, the skipper would remain safely ensconced inside, steering with the inside tiller that ran through the transom, and looking through a coachroof configured to give visibility all around. He’d comfortably sit on a simple beanbag chair. If he ever got tossed around, he’d be protected from injuries by the soft gear bags that hung from the hull’s sides.

Unlike other micro-cruisers in which skippers had barely enough room to sleep curled up, this boat’s platform had room for up to three to stretch out.

To keep the interior clear, we chose a catboat-like rig. I chose a boomless rig to avoid all-too-common head injuries and allow us to lower the

*The 12 footer featured watertight compartments to contain leaks and large enough to float the boat even if badly holed. Her unusual hull shape helped her to average hull speed on passage, unusual for any cruiser and especially one so small or of such heavy displacement. Her tiny hull could still “sleep two.”*
As the skipper headed off the wind, he could keep the mainsail stretched out by easily attaching its clew to one of two poles that were permanently mounted on swivels on port and starboard rails. The jib could be set on the other pole if sailing wing and wing, or also led through the same pole as the mainsail when reaching. The boomless mainsail, combined with a bowsprit and boomkin, allowed us to lower the mainsail right down to the deck and spread out the sail plan, significantly lowering the height of the center of effort and heeling forces of the sails. Especially off the wind, the forces on a big mainsail when eased off on a typical cat boat can create a lot of turning force on the boat, making it head up in heavy airs. The jib would help to keep the boat balanced and its bow headed downwind. The loose-footed sails set on poles also allowed the skipper to give them more curvature when sailing off the wind, reducing heeling and turning forces while increasing poser. The sprit also could carry a drifter and other big sails to really boost performance in light airs. We chose not to use an unstayed stick to allow us to use a lighter, stayed mast section, again improving stability and ability to carry sail, and to keep the forestay straighter for better upwind work.

One of the most obvious features of the hull is its odd hull shape under the waterline. I’d had some discussions with John Letcher, a CAD (Computer-Aided Design) pioneer and mathematical genius about how many modern boats were spinning out of control, especially downwind in big seas. His theory was that a good deal of this cranky performance could be attributed to the sail plan. The large control surfaces combined with an unusual dorado’s-head whale’s-tail hull shape helped the boat perform like a real sailboat, unlike prior micro-voyagers. A lead-ballast/keel shoe will be bolted to the fin.

Photo: Patrick Childress
trend in design that increasingly moved the center of gravity and buoyancy aft, which for most modern boats might be about 60 percent of the boat’s length aft of the bow. He thought a boat would track straighter if the center of gravity was forward, as it was in the old days of apple-cheeked ships and cod’s head-mackerel-tailed yachts common until the second half of the 1900s, which featured bluff bows and wider decks forward matched to narrower sections aft of amidships. In contrast to them, as a modern boat with narrow bow, wider stern sections, and center of gravity aft accelerated, especially if pushed by a wave, the forces acting through the accelerating center of gravity would have a tendency to twist the boat sideways if not kept exactly in line with the direction of acceleration. Fin keelers especially would want to spin on their keels. Letcher created a boat with shifting center of gravity that seemed to confirm his theory.

I combined Letcher’s theory with one of my own. I had observed dorado at close range for a long time, and found them not only extremely fast but agile, despite their deep, narrow heads. They often swam near the surface. It appeared to me that displacement of a boat also could be carried forward without too much drag if near the surface in a narrower deeper shape. The gravity wave formed by the hull moving through the water could build to the sides, pushing up into the much less dense fluid of air, out and away from the hull, rather than downward and forward over which the boat would have to climb, as in the older hull forms like the mackerel’s head. In addition, a deep forefoot would be very desirable to allow the boat to heave to without falling off in heavier airs and seas. The problem was, in theory, a very deep forefoot would be a disaster sailing off the wind, biting into the sea and making the boat want to head off in one direction, then another. Also, we wondered how the deep forefoot would reduce stability when the boat heeled and the forefoot moved volume to weather rather than leeward. Colleague Steve Weiss and I wrestled with the lines for some time to adjust volumes and balance of the hull, resulting in the Slippery Turtle’s oddball dorado’s-head, whale’s-tail hull.

I’d been experimenting with resin-impregnated paper honeycombs, which had been finding their way into cockpit soles and other deck components. I’d built a junk-paper boat and had seen it in the Adirondack Guide Museum on a lovely little canoe that none other than Rushton had molded for himself out of old newspapers in resin. You could still read the articles in its hull. I’d also tested a lot of paper honeycomb in water for months on end. I thought it time to put it into a hull as a core material.

Gold Coast Yachts in St. Croix did a superb job of building the Paper Tiger design, which Childress launched as Slippery Turtle. Using epoxy throughout, they cored all major components using resin-impregnated paper-honeycomb. The hull’s inside skin was tortured plywood, with darts cut in it to take curves, resulting in a hull without chines. The outside skin was bi-directional and unidirectional e-glass, also set in epoxy.
The boat was so small that they needed no TravelLift or even trailer. The builders simply carried the boat to the edge of a marina walkway, balanced her on a plank, and slipped her over the side.

Frankly, I was not at all sure this boat would work. Because of the required weight of stores for up to 50 days plus crew, even with our sophisticated construction, the boat’s sailing displacement would be extremely heavy by modern standards, much like very conservative yachts or ships of previous eras. To my knowledge, no one had ever created a boat of under about 20 feet that had averaged more than about 60 miles a day making an offshore passage, and many of the smallest passagemakers performed no better than drifting rafts. We could only hope we had created a real sailboat capable of 75-mile days.

As it turned out, we need not have worried. Maybe it had nothing to do with the hull shape, but for whatever reason, the boat performed wonderfully, according to Childress. She sailed like a regular boat, he said. More to the point, on her first passage to Panama, she took only 11 days to sail the 1,200 miles. For comfort, Childress slowed her down for the second leg to the Galapagos, but she still averaged nearly hull speed, a rarity for any cruising boat of the era.

Unfortunately, her journey ended there. According to Childress, strong currents combined with oversleeping, and she hit the steep-to lee shore of a volcanic island. With no way to kedge off, Childress could only watch the boat get pounded against rocks by the open sea. Even then, however, his craft kept him safe. It took more than two days for her to begin to come apart, allowing him time to not only abandon ship but re-board a number of times and strip her of gear.

We did a lot of unusual things to create this little boat, and overall, foot for foot, this design probably has had more influence on my design thinking than any other. Although I regret she did not last long enough to get around the globe, I believe she proved herself and most of her features quite well. Even her limited success indicated that it is possible to design effective lifeboats in which survivors could quite easily
save themselves, and would eventually lead to development of FRIB, a Folding Rigid-bottomed Inflatable Boat I would patent to serve as dinghy and supplementary survival craft.

Equally important, many of her features could improve most, if not all, cruising boats, and I would not hesitate to use them again. I had already been a long-time proponent of watertight and water-resistant bulkheads and compartments for damage control and ultimate safety. This boat furthered those concepts.

I also had already favored fin keels and spade or skeg-hung rudders over full-length keels, but for cruiser, larger fin keels and rudders than has become the trend for racers and racer-cruisers. Our preliminary drawings and calculations highlighted how enclosing too much volume in a keel, such as a full-length one, actually shifts volume to weather as the boat heels, reducing stability. On the other hand, new high-performance skinny-section fin keels with profiles more like daggerboards provide little tracking ability and can stall more easily than the more forgiving foils sections and tapered profiles I have developed. In big waves and winds, especially, the small cost in wetted surface appears to me to be well worth the benefits of control. Since designing Solo, the sections I’ve developed for cruisers typically employ 12 percent thickness (as a percent of chord length), and profiles with relatively long chords at the hull-keel juncture and significant taper ratio. The sectional shape and profiles appear to achieve a good balance between good upwind performance, sturdiness, and practicality. The long chord at the hull helps avoid stress concentrations if the boat ever hits the bricks or the crew wants to dry out on the hard, and helps tracking ability. The sloped leading edge sheds lobster pot warps and weed. I can concentrate ballast on the bottom of a hollow fin, providing an effective sump (unlike the virtually useless “bean-can” sumps so prevalent today), and a place to situate heavy tankage or equipment to further aid stability.

Slippery Turtle also confirmed great benefits provided by bowsprits and boomkins, especially on cruising boats, allowing better balance to sail plans, lower heeling moments from the sails, and reduced loads on masts, as well as providing more options for powerful light-air sails. In light airs, a lower-aspect ratio to the sail plan is more appropriate. In heavier airs, the sail plan is reduced and of higher aspect ratio, just as it should be.

I might not go to the same extremes as Slippery Turtle’s dorado’s head-whale’s tail shape, but I would not shy away from shaping hulls with centers of gravity farther forward than has been the trend for many years now. When combined with a somewhat less radical forefoot, I am convinced the resultant boats would be better behaved, and quite possibly faster.

In many ways, designing such a small craft is much more challenging than a larger one, because such things as the weights of crew and stores have a much greater affect on trim and other dynamics. Also, there is so much less space to fit in features to meet minimal mariner needs. If, however, one can create a capable voyager as small as this, think of what the possibilities are for larger craft.

Additional photos of Paper Tiger’s (aka Slippery Turtle’s) hull construction: