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BALANCE OF POWER

Asymmetrical Aspen Cat Puts Efficiency First

STORY BY JERRY STANSFIELD
PHOTOGRAPHY COURTESY OF ASPEN POWER CATAMARANS

This can't possibly work.

A look around Larry Graf's prototype Aspen 26 catamaran hull, a test bed for a planned 39-foot production cruiser, reveals more than a few anomalies, and to the untrained eye raises doubts about the boat's ability to perform at all—much less to the level he has promised.

First, the boat seems out of balance. Her port hull is 35 percent narrower than her starboard hull. Worse, there's only one engine, mounted low in the starboard hull, turning a straight inboard shaft well off the centerline to suggest either a constant fight with the helm or a day of cruising in circles. Kind of like yoking together an ox and a rocking horse.

True, there is precedent for this arcane geometry, beginning with the earliest Polynesian proas, narrow sailing canoes that derived their stability from a small outrigger hull secured off to one side of, and parallel to, the main hull by crossbeams. Even in its most primitive forms, the seaworthy proa design is credited with innumerable ocean crossings and was central to the peopling of the far-flung Pacific islands.

More recently—and on a considerably larger scale—the 2003 launch of the 289-foot steel motoryacht *Asean Lady* at the Yantai Raffles shipyard in China demonstrated the feasibility, course-keeping, volume capacity, and integrity of the asymmetrical proa configuration. Widely hailed or reviled as a thing of beauty or a hideous aberration, depending on the observer's sense of aesthetics, *Asean Lady* in any case has proved her seagoing mettle, even to the extent of surviving the devastating tsunami that in 2004 killed scores of thousands as it leveled communities rimming the Indian Ocean.

With about 14 inches of vertical clearance between the Aspen prototype's hulls, water passes astern with little disturbance or resistance. Aggressive forward deadrise and keels aid directional stability, and asymmetrical hull sides provide balanced, neutral steering.

Graf's own experience with multihull designs has shaped his preference for the proa concept and its variants. Having founded Monroe, Washington-based Glacier Bay Catamarans in 1986, he has long been a proponent of twin-hull designs. Graf ultimately developed a range of dual-outboard and dual-sterndrive-powered semi-displacement models, up to 30 feet in length, that earned favor for their stability, soft ride, and admirable fuel economy compared with monohulls.

As much a marketer as a gearhead, Graf promoted these attributes aggressively, completing ocean crossings between Virginia and Bermuda (in 1995; 728 miles) and from Hawaii to Midway Island (in 1998; 1,328 miles). Aboard a variety of Glacier Bay models, he has traversed long stretches of the North American coastline, and in 1999 he crossed the ice-choked Bering Strait to land on Siberian soil at Big Diomede Island. All of these exploits helped him establish the brand as a major player in the power multihull category and the catamaran hull form as an attractive choice for prospective owners with ambitions of extensive open-water operation.

During his not infrequent product testing, Graf noted his boats' unexpectedly straight tracking and less-than-anticipated loss of speed when simulating emergency operation with one engine shut down and the other supplying thrust way off the centerline. Never a slave to conventional thinking, he began toying with the idea of asymmetrical propulsion and, following his tenure at Glacier Bay, attacked the dual-hull, single-engine concept with a will. Following months of calculations and drafting, patent applications, and a spanking new brand name—Aspen Power Catamarans—Graf built a two-thirds-scale test prototype, the first manifestation of his Self-Balancing Power Proa design.

To the observer who's more accustomed to preproduction test boats as cobbled-together plywood-and-strip-plank affairs with exposed wiring and hoses, ballast tanks of roped-down 55-gallon drums, and an overturned plastic bucket for a helm seat, the 26-foot Aspen prototype is palatial. Exterior contours are admirably fair, the plywood deck cleanly finished and fitted with proper access hatches, and two—*two*—pedestal seats face a real dashboard atop a real fiberglass console behind a real Lexan windshield.

While the sponsons' overall length and general shape are the same, the port (or proa) hull, when viewed from astern, is visibly narrower, a difference that Graf says is alone sufficient to lessen running resistance by about 50 percent compared with the drive hull. The absence of a propeller, shaft, strut, and rudder in the port hull

the design's miserly fuel consumption, Graf adds. With its broader cross section, the drive hull accommodates a 104hp, four-cylinder Yanmar diesel. "Our best choice for this test boat was a sailboat engine," Graf notes. "It meets our design horsepower requirements, and it fits nicely in a space that's only moderately wider than the port hull."

Mindful that every degree of propeller shaft angle below horizontal translates to an approximate 1 percent loss of effective thrust, Graf created a blister in the starboard hull bottom, enabling him to mount the engine low enough to produce a shaft angle of only 6 degrees. The shaft emerges through the trailing end of a skeg keel that aids tracking and partially shields underwater gear from debris and shoals; a steel shoe offers further protection and provides a lower bearing for the bronze rudder.

Each hull on the Aspen prototype features a deep, slender forefoot that gradually flattens to a moderate and asymmetrical V-bottom. Neither component shows more than a hint of flare, but each has a double chine on both sides, and each is fitted with a small spray knocker extending from the stem approximately 1 foot sternward along both sides. To counter the turning force of the off-center propeller thrust, the port side of each hull is ever-so slightly more rounded than the starboard side, an unusual geometry shaped by Graf's earliest calculations.

"The lateral force exerted by the hulls increases as the boat accelerates, proportionate to increased thrust at higher throttle settings," Graf says, "with the result that steering remains balanced and true from idle to full throttle." That attribute became apparent during straight-line running in open water at a variety of speeds from idle to full bore. Each throttle setting produced neither the slightest deviation from course nor any hint of tug from the steering wheel. Turns at cruise and top speeds were consistent and predictable in both directions, with perhaps only a vague feel of a quicker response to the left.

Hull sides are rather tall, their positive sheerline curving aft from either prow to about 36 inches of freeboard near the transom. This dimension, according to Graf, provides sufficient tunnel clearance to allow unhindered passage of water between the hulls. "There's about 14 inches of daylight through the center, and the inside wake is minimal, so the boat moves silently and with very little resistance," he says.

For proof, Graf ferries his guest from a public launch ramp in Everett, Washington, to a nearby vacant dock, a good vantage point for observing wake patterns. In calm conditions—the better to note the behavior of water passing along the hull—Graf accelerates smartly to about 20mph for a series of flybys in both directions. At that of a propeller, shaft, strut, and rudder in the port hull compounds the reduction of drag and helps account for

20mph for a series of flybys in both directions. At that speed, apart from a lacy veil rising maybe 8 inches above

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