BULBOUS BOWS USED TO BE FOR COMMERCIAL VESSELS ONLY. DO THEY REALLY WORK ON RECREATIONAL BOATS? EVEN POWERCATS? BY CAPT. BILL PIKE

Shape Shifter

See more photos of our Aquila 44 test @ *www.pmymag.com/june15*

Engineers experimented with numerous bulbs during the MarineMax project to improve the performance of the original, bulbless Aquila 44 (above). Some designs (below) were more bulbous than others.

Talk about a cool little project! We had a great testing venue lined up at Clearwater Harbor Marina in Clearwater, Florida, complete with two Aquila 44 powercats from MarineMax Vacations, the stateside rep for Aquila and a purveyor of vacation charters featuring Aquilas as well. The weather was okay, meaning it was calm both inshore and offshore, which was good for gathering most of the test data we were after but unfortunately not all.

And then, there was something else—two rather controversial questions concerning bulbous bows on small boats. First, do bulbs genuinely address all aspects of performance, improving speed, efficiency, *and* seakeeping? And second, do they have a downside? Are there potential drawbacks?

Our two 44s were virtually identical. Each had the same propulsion system, a set of 225-horsepower Volvo Penta D4 diesels synched into 20 x 23 4-blade BT props through ZF V-drive transmissions. And each had about the same displacement and the same topped-off fuel, water, gear, and personnel loads.

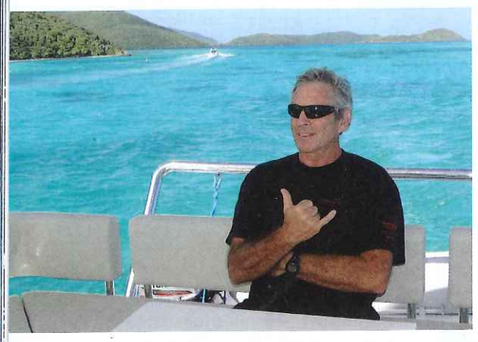
There was only one difference. One boat's hulls had been significantly modified, with bulbs added forward and hull extensions added aft, an arrangement that stretched her waterline length by an extra 42 inches.

A Short, Sweet History

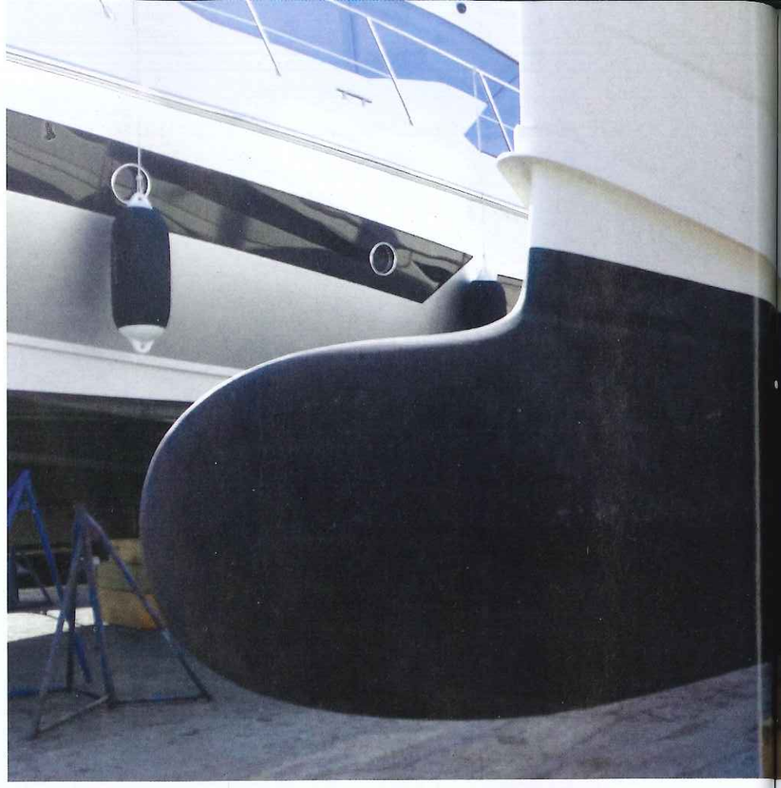
Of course, MarineMax was hardly thinking about bulbous bows when it first contracted with J&J Design in Slovenia and Sino Eagle Group in China to develop a new 44-footer. But the ensuing prototype, as well as the first few production versions, evinced improvable performance. Times to plane were not up to snuff, and neither were efficiencies.

"So eventually," says Lex Raas, president of marketing, charter, and special initiatives for MarineMax, "we decided to add bulbs and do some other things."

Raas is a modest man. What MarineMax and its partners actually did was create a significantly new sort of bulb for small-boat application. And what's more, they vetted the technology with dogged intensity, experimenting with a variety of configurations and then sea-trialing each one assiduously.



MarineMax's Lex Raas (above) was an early supporter of bulb technology for the Aquila 44. The performance of the original model was okay, he says, but bulbs (right) and hull extensions have seriously improved speed, efficiency, and rough-water seakeeping.



Changing Shape

Of course, commercial and military ships were the first to employ bulbous bows, primarily because they boosted speed and efficiency by extending waterline length and easing the hydrodynamic drag that bow waves engender. Bulb proponent Patrick Bray, a British Columbia-based naval architect, says these same virtues brought commercial fishing vessels into the fold in the late 1980s. And today, bulbs are penetrating the recreational market as well, although, according to Bray again, they are considered inappropriate for most midrange (45 feet and below) vessels.

Mike Telleria of Pacific Asian Enterprises, the builder of full-displacement Nordhavn passagemakers, the larger ones with bulbous bows, explains: "A bulb can cause what some might consider an unwelcome amount of noisy pounding or slapping while going to weather in rougher seas—especially on our smaller yachts, so we've decided that the benefits are not worth building a boat that some customers may find noisier than they'd like."

Mainstream thinking did not deter MarineMax, however. The company figured it could beat the drawbacks of bulbs and still cash in on the benefits. "The key," emphasizes Raas, "seemed to be changing the shape."

Damn the Torpedoes!

One of only two guys we know of who've circumnavigated the globe in an open boat, Anthony Steward, MarineMax's international sales manager for Aquila, is a salty soul and also an erudite one. So as the bulb project progressed, Steward's knowledge of World War II torpedo technology proved helpful.

"Torpedoes are tubular for a reason," he explains. "If you energize a tubular shape from behind it will maintain its course and hit a target better than any other shape, primarily because it resists lateral movement, whether up, down, left, or right."

It's an important idea. Bulbous bows on ships were originally tubular, with domed forward ends, and some recreational vessels today still retain the form.

But what if the bulbs on such relatively small, light craft were slamming due to the semi-flat convexities that tubular shapes manifest? And what if said convexities were given a V-shape instead, top and bottom, and spray rails and soft chines were added?

"Then maybe," Steward concludes. "You've fixed your problem."

So?

The results of our sea trials beyond Clearwater Pass were dramatic. In displacement mode (9 knots or less), the modified 44 averaged only slightly more speed. At 2,500 rpm, for example, she did 8.3 knots, just .3 knots more than her sistership.

As the boats sniffed planing speeds, though, the performance spread widened, with the modified boat posting 12.4 knots at 3,200 rpm and the unmodified one holding almost steady at 8.9 knots. The discrepancy at WOT was radical—average top end for the modified 44 was 16.1 knots, but for her sistership? Just 9.4 knots.

Fuel burn followed suit. The 44 with bulbs was a bit more efficient in displacement mode and considerably more once she'd planed off. In terms of sound levels, the bulbed boat did better too, although her lesser readings were due to in-line mufflers (absent on her sistership) and nothing more.

All but the last unrelated finding dovetailed nicely with the running attitudes we measured. Despite a full fuel load astern, the modified 44 achieved plane at 3,000 rpm (with a running attitude of 3 degrees that shortly dropped to 2 degrees) while the other 44 simply kept her nose aloft, never making it out of the hole.

Certainly, the added buoyancy of the hull extensions abetted the modified 44's planing performance, producing lift astern. And the spray rails and chines on her bulbs probably generated lift forward, too. Moreover, these forces working in concert most likely levitated the whole boat a bit, thereby cutting waterplane area slightly and drag-producing skin friction as well.

The Slamming Issue

Calm conditions precluded the direct observation of rough-water seakeeping. But both Raas and Steward say the modified 44 exhibits absolutely no pounding or slamming in headseas during normal usage, an endorsement backed by a delivery skipper we happened to meet between trials who'd shepherded both versions in big seas.

"The pitching moment is a helluva lot less with the bulbs," Captain Richard Mosely said, "and there's no slamming, no noise."

"And you know," added Raas, "we're so impressed by all this that we're incorporating bulbs and extenders on all new models and retrofitting all older models. We simply won't sell a 44 without them." ❐

Aquila, 888-230-7174; www.marinemax.com

Fancy a Virgin Islands interlude? Charter an Aquila 44 from MarineMax Vacations. Weekly bareboat rates (7 days/6 nights) run **$8,295** to **$10,325**, depending on time of year. Discounts and crewed options are available. *www.marinemaxvacations.com*

AQUILA 44 (WITH MODIFICATIONS)				
RPM	KNOTS	GPH	RANGE	dB(A)
700	2.4	0.5	1,253	52
1000	3.6	1.3	723	55
1500	5.6	2.5	585	63
2000	7.1	5.2	356	68
2500	8.3	10.0	217	71
3000	9.9	17.0	152	73
3200	12.4	18.0	180	75
3560	16.1	24.0	175	73

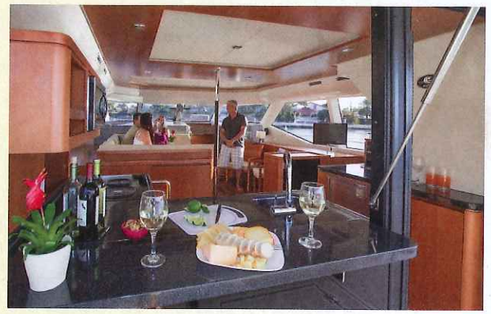
AQUILA 44 (WITHOUT MODIFICATIONS)				
RPM	KNOTS	GPH	RANGE	dB(A)
700	2.5	0.4	1,631	55
1000	3.5	1.2	761	60
1500	5.3	2.4	576	65
2000	6.6	5.2	331	76
2500	8.0	10.0	209	76
3000	8.5	17.0	131	77
3200	8.9	21.0	111	78
3240	9.4	22.0	112	82

TEST CONDITIONS: (same for both versions of the 44) Air temperature: 69°F; humidity: 67%; seas: calm; wind: variable, light; load: 280 gal. fuel, 50 gal. water, 3 persons (2 persons on modified vessel), 50 lb. gear. Speeds are two-way averages measured with Garmin GPS. GPH taken from Volvo Penta display. Range based on 90% of advertised fuel capacity. 65 dB(A) is the level of normal conversation.

NOTEWORTHY OPTIONS: lower steering station; engine upgrade; upholstery upgrade; additional fuel tanks; and enclosure (prices upon request)

LOA: 44'11"
BEAM: 17'4"
DRAFT: 2'8"
DISPL.: 40,212 lb.
FUEL: 290 gal.
WATER: 180 gal.
TEST POWER: 2/225-hp Volvo Penta D4-225 diesels
TRANSMISSIONS: ZF HS63IVE-D w/ 2.48:1 ratio
PROPELLERS: 20 x 23 BT Marine 4-blade bronze
OPTIONAL POWER: 2/-300-hp Volvo Penta D4 diesels
GENERATORS: 9-kW Northern Lights
WARRANTY: 5-year limited structural hull and deck
PRICE AS TESTED: $721,000
PRICE (FULLY OPTIONED): $835,000

Superb Little Cat



Our test boats shared identical layouts. Both had an ample cockpit on the main deck as well as a large, window-and-door-encompassed saloon with an after galley, U-shaped dinette to port, and an opposing U-shaped credenza enfolding two, movable straight-backed chairs.

Below, there were three staterooms, each with its own shower-stall-equipped head. The master forward was more expansive but the others had lots of headroom and elbow room too.

On the bridgedeck, a lounge area aft (with barbecue grill and wet bar) emphasized the boat's general outdoorsiness. Further forward, an L-shaped settee put itself at the comfortable disposal of a centerline helm pod, and a walkway (with stainless-steel rail) led down to the anchor-handling area.

Engineering was basic but solid, as befits a charter boat. Access to primary and secondary engine filters was adequate. Each ER revealed the crisp precision with which Sino Eagle builds the 44—everything is infused using vinylester resin and bilge spaces are painted out. Ancillaries, from Spectra watermakers to Racor fuel-water separators, were bulkhead-mounted on StarBoard panels.

And there were shock mounts under pumps and other components to cut vibration, and lots of sound-insulating, flame-retardant polyurethane foam, most of it 2 inches thick.

Oddly enough, despite differences in performance, driving experiences were similar. Turns were broad, hydraulic steering smooth, sightlines virtually unlimited, and close quarters maneuverability excellent, thanks largely to a whopping prop offset. Indeed, I had little trouble spinning one of the boats within her own length and docking her alongside another vessel, despite some confining circumstances and a sporty bit of tidal current.