ASK THE EXPERTS

POWER MULTIHULLS

FEATURING

ASPEN POWER CATAMARANS

"Without tradition, art is a flock of sheep without a shepherd. Without innovation, it is a corpse."

—Winston Churchill

LARRY GRAF

A lifelong Washington resident, Larry Graf, founder and chief designer of Aspen Power Catamarans, is also an engineer, inventor, and entrepreneur with 27 patents pending. In college, he was the student director of the Viking Car Program at Western Washington University where the students built cars in 1980 that could go 85 to 100 miles per gallon. He founded the Glacier Bay power catamaran company in 1987 and ran it until 2007. His designs had production runs of over 3,000 and he managed 250 employees at the company's peak. After leaving Glacier Bay in 2007, he founded Aspen Power Catamarans in 2008, the culmination of his years of experience and passion.

Modern power catamaran and trimaran designs are creeping into many maritime applications from eco-tourism to the Zumwalt-class destroyers of the U.S. Navy. These new power multihulls are considered cutting edge by many in these fields, but why? If they are so great, where are the fleets of recreational power catamarans poking around the San Juans during the summer?

To sate our curiosity, we turned to Larry Graf, the founder, chief designer, and "lead adventurer" of Aspen Power Catamarans, a Burlington, Washington based boat building company. Aspen Power Catamarans has begun to make a name for itself with patented, ultra-modern power catamaran designs. The company, in cooperation with a proud Aspen owner, is even taking a 40-foot Aspen on an adventure /pilgrimage from Alaska to the Annapolis Boat Show (via the West Coast, short Mexican trailer hop, and up the East Coast) this year to strut their flagship design. We toured Graf's bustling factory before settling into the conference room to shoptalk multihulls.

Q: Is there anything you'd like to say to the monohull crowd?

My theory is that an awful lot of new boat buyers, maybe as much as 80% of them, have always dreamed about buying a pointy bow boat (monohull). But I'll tell you, we tend to sell interested buyers a boat after we get a chance to get them on the water. Our roll stability is 78% more than a monohull, our fuel efficiency is on the order of 50-70% more efficient, and the motor is out behind the bulkhead so it's super quiet, and Aspens are great in heavy seas.

Q: What are the different types of catamaran hulls?

All catamarans are definitely not created equal, and there are big differences in terms of performance. Essentially, there are three shapes; planing hulls, planing hulls with rounded bottoms, and high speed displacement hulls.

The first catamaran hulls in the Pacific Northwest were Livingston-type planing catamarans. The design features a fairly flat hull bottom at the stern, and as one moves forward, the hull shape gets a little more v-shape to it. This planing hull isn't much different than what they're doing in Australia these days. A lot of the cats in Australia are planing hulls, and as one moves forward, the hull shape gets sharper and sharper (i.e. greater deadrise angle) until the bow. They run and track ok and come up on a plane no problem, but you have flat surfaces on a planing hull which by definition means you're at the mercy of the shape of the ocean surface. So when I hit a wave, what has to happen? I either bang over it or turn it into spray.

The round-shape planing design, used by companies like World Cat, is another family. Instead of a flat-hull bottom, it's a round shape, even at the transom. They are basically trying to plane on a round surface. In some ways it's ok, because it does give a little more cushion as you run through waves, but it doesn't have any tracking to it. In large seas, sometimes those round shapes slip out. I don't care for that feeling when the boat suddenly goes sideways on me.

Then you have the high-speed displacement hulls. The Glacier Bay shape was modified so, as one moved forward along the hull from the stern, the shape got finer and deeper much quicker before coming up again, almost like a lobster boat shape. There was 55-degree deadrise forward, very "v." That hull slices through the water and has big chines on it; 20% of the lateral stability at speed came from the lateral chines. The trick for displacement boats is to not have the boat plane for the sake of rough seas. Once you're planing, you have to pound, and I don't like pounding. The Aspen power proa shape is basically a full displacement design.

Q: All this complexity may come as a surprise to the uninitiated.

There are a ton of features to catamarans, and especially my Aspen designs. An important physics concept to remember is buoyancy. With our 40-footer, for every inch the boat is pushed deeper into the water beyond the resting waterline, it gains about 2,700 pounds of buoyancy per inch. The tunnel section has about 22 inches of clearance toward the stern, so if the boat is pushed 10 inches downward into the water, the resulting force translates to 27,000 pounds of buoyancy. Here's the key, the boat only weighs 24,000 pounds. See what I'm getting at? Thanks to buoyant forces, the boat naturally bobs through the waves as a full displacement boat. The driver never gets that slap feeling like with a planning design. Aspen hull designs always get travel beyond buoyancy that allows the boat to bob through seas. There's a lot of thinking that goes into how that tunnel section is laid out.

Another thing about an Aspen hull is the height of the tunnel vs. the width of the tunnel. There are a fair number of catamarans out there that don't understand the importance of the ratio. Some think, "I'll just spread it out and get a whole bunch more interior space." The problem is that if you have the ratio of the tunnel height vs. tunnel width wrong, one hull drops into one wave and the other hull drops into another wave during rough seas. The bridge deck in-between slams.

With Aspen, there are a number of details on the tunnel section of the hull. The inner chine grows quite a bit. If you are going into a head sea and you want to bob, there's quite a bit of lift there because the inner chine is about three times the size of the outer chine, which allows the boat to lift very well. There are also some features in the top of the tunnel as the vertical wall rolls into the tunnel. There is a step there that breaks off the water and creates a bubble water zone that helps with the cushioning at different speeds. There's also a large asymmetrical wave breaker down the center of the tunnel that helps a bit in a tight chop. The wavebreaker also stiffens up the hull and gives us a wonderful place to run wires and cables to the dash.

Also, the propeller shaft is inside a big keel. Additionally, my rudder is 50% bigger than the design books tell you to do. I wanted a boat that that tracks well in heavy seas.

In general, I think almost all catamarans are about 20-30% more fuel efficient than a comparable monohull of similar LOA. The catamaran simply has a finer shape to slide through the water, and you can see that in action if you witness the wake that comes off a multihull. On any boat, if you're making gentle, soft-shaped waves, then the fuel bill will be less. If you look at some of these boats that, when underway, their bows are just covered in spray and the wake has this tight, curling, whitewater wave, that boat is going to use up a lot more fuel than an Aspen. If you look at an Aspen while underway, there's no bow wake at all. All you see is a little rooster tail, and you can't even see any wake at all from 1,000 feet away. All that energy that a boat puts into the wake represents wasted energy that wasn't expended to propel the boat forward; it's wasted energy that is used to push water out of the way instead. With our catamarans, we perform at 50-70% more fuel efficiency than comparable monohulls. It's a very slippery hull shape; the proa side of the hull is almost free to go through the water. Above the water, the windows and everything are designed to be very aerodynamic.

For example, our 28-footer with a single 150-horsepower engine at 16 knots only uses five gallons an hour. On the Aspen 32, picture it, a 32-foot boat with a 10-foot beam and king-sized master stateroom, dinette for four, and standing head with shower. That 32 uses six gallons an hour at 18 knots. A ski boat uses about 12-15 gallons an hour, and we're using six with a 32-footer. Our 40-footer is 23,000 to 24,000 pounds depending on fuel and water on board, complete with a big flybridge, 14-foot beam, three staterooms, two heads, two showers, dinette for six, etc. According to one of our owners who was fully loaded with fuel, water, and adventure gear for a summer of cruising, he averaged 17 knots at 11 gallons an hour. In our magazine testing, if you carry half the fuel and half the water, it's only 10 gallons an hour. That's 1.7 miles per gallon, which is competitive with any other powerboat design in the world.

Larry Graf shows off the electrical wiring systems of an Aspen 40 being built at the Burlington factory at the time of this writing. The king-size berth of the master stateroom is around the corner to his left.

Q: I suppose you need less engine, which means less weight, which means less fuel needed.

Exactly! The single engine on the Aspen 40-footer is a Volvo 435. To run a diesel engine at 100 horsepower requires five gallons an hour. So if we're using 10 gallons an hour at 17 knots, the inference is that it's about 200 horsepower coming out of the motor to push the boat at 17 knots. That's 200 horsepower to go 17 knots with this 40-foot boat. And again, the motor is at less than half throttle, because it's 435-horsepower at full throttle. The motor should last forever at that speed. The same follows with the 32s. There it is only using about 94 horsepower to do 17 knots, and the motor is a 220 horsepower motor. The motors are very lightly driven, which has all kinds of benefits with regards to longevity and maintenance.

Q: Let's move above the waterline. The master suite on the 40-foot Aspen we saw today is huge, and even has a king-size bed.

Yes, every Aspen, even our 28, has a king-size bed. I like it because it's comfortable. There

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SZ	TYPE	YR	PR	PRICE	BROKER	PG
42	Garden Porpoi	71	D	69,500	WaterLine	29
42	Hallberg Rass	86	D	225,000	Swiftsure	51
42	HallbergRassy	83	D	174,000	Swiftsure	51
42	Hunter Pass	93	D	107,000	NWYachtnet	39
42	J Boats	0	D	125,000	Stan Miller Seattle	11
42	Jeanneau 42DS	7	D	199,500	MarineServctr	43
42	Nauticat PH	4	D	399,000	MarineServctr	43
42	Person	80	D	85,000	NHarborYS	95
42	Roberts PH	94	D	119,000	Swiftsure	51
42	Wauquiez	85	D	139,999	NWYachtnet	39
43	Beneteau	12	D	315,000	NWYachtnet	39
43	Beneteau OC	9	D	194,900	Signature	27
43	HallbergRassy	5	D	375,000	Swiftsure	51
43	Jeanneau 43DS	3	D	198,500	MarineServctr	43
43	Perry	77	D	199,950	Swiftsure	51
43	Schucker 430	79	D	62,500	WaterLine	29
43	Slocum	84	D	169,000	NWYachtnet	39
44	Beneteau 44.7	6	D	187,500	Swiftsure	51
44	Bruce Roberts	93	D	49,500	MarineServctr	43
44	Bruce Roberts	81	D	69,000	WaterLine	29
44	catalina	7	OB	259,000	Ocean Trawler Yts	49
44	Jeanneau 44DS	17	D	339,483	MarineServctr	43
44	LaFitte	87	D	129,000	Bristol	92
44	McGuire	88	D	165,000	Denison	106
44	Morris	94	OB	459,000	Swiftsure	51
44	Peterson	77	D	49,000	WestYachts	25
45	Beneteau O	17	D	In Stock	Signature	27
45	Hunter 45CC	6	D	214,000	Signature	27
45	Jeanneau 45.2	0	D	189,000	Denison	106
45	Jeanneau 45DS	10	D	294,500	MarineServctr	43
45	Jeanneau SO45	6	D	240,000	MarineServctr	43
45	Malo Classic	5	D	489,900	Swiftsure	51
45	Passport	4	D	375,000	Swiftsure	51
46	Cal	72	D	129,000	Port Gardner	96
46	Cal 2-46	74	D	97,500	WaterLine	29
46	Garcia Passoa	93	D	298,000	Swiftsure	51
46	Grand Soleil	98	D	169,000	Swiftsure	51
46	Hallberg Rass	0	D	348,000	Swiftsure	51
46	Hylas	0	D	310,000	Swiftsure	51
46	J Boat	0	D	327,500	ElliottBay	41
46	Jeanneau 45.2	0	D	189,000	MarineServctr	43
46	Jeanneau 469	15	D	389,500	MarineServctr	43
46	Swan	84	D	239,000	Swiftsure	51
46	Tayana PH	13	D	419,000	SeattleYachts	26
47	Beneteau	5	D	210,000	ElliottBay	41
47	Beneteau 473	5	D	219,900	Signature	27
47	Jeanneau 479	17	D	409,838	MarineServctr	43
47	Southerly 145	78	D	199,000	MarineServctr	43
47	Stevens	84	D	175,000	Swiftsure	51
47	Valiant	84	D	235,000	Swiftsure	51
48	Amel Maramu	84	D	138,900	WaterLine	29
48	C&C	73	D	230,000	Swiftsure	51
48	J145	3	D	339,000	Swiftsure	51
48	Oceanis	16	D	In Stock	Signature	27
48	Schooner	86	D	99,500	ElliottBay	41
48	Tayana	6	D	425,000	ChuckHovey	13
49	Jeanneau 49P	7	D	349,500	MarineServctr	43
49	Outremer	10	D	595,000	Swiftsure	51
50	Beneteau	97	D	228,000	AnacYtsShip	18
50	Dubbel	89	D	269,000	Swiftsure	51
50	Flying Dutchm	78	D	79,500	MarineServctr	43
50	Lavranos	90	D	184,775	Swiftsure	51
51	Alden Skye	80	D	178,500	MarineServctr	43
51	Ben SeabornRS	56	D	79,900	Signature	27
51	Beneteau	93	D	179,900	AnacYtsShip	18
53	Hallberg Rass	3	D	485,000	Swiftsure	51
53	Spencer Ketch	73	D	Call	WestYachts	25
54	Jeanneau 54	16	D	598,789	MarineServctr	43
54	Sparkman Step	75	D	195,000	ElliottBay	41
55	Columbia	74	D	59,950	Bristol	92
56	Herreshoff	56	D	215,000	WaterLine	29
57	Skookum	82	TD	299,000	WaterLine	29
60	Deerfoot	80	D	259,000	Stan Miller Seattle	11
60	Farr PH	97	D	775,000	Swiftsure	51
60	Shannon	14	D	1.195M	Swiftsure	51
64	Roberts PH 64	88	D	298,000	MarineServctr	43
68	Nelson Marek	84	D	245,000	ElliottBay	41
70	CNB	7	D	1.595M	Bristol	92
70	Jensen Exp	4	D	2.850M	Swiftsure	51
73	Manuel Campos	41	D	475,000	Swiftsure	51

ASK THE EXPERTS

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are no triangular v-berth shapes monohull guys are forced to deal with.

Q: What are some design features that one should stay away from when looking at a multihull form?

Always think about the tunnel height vs. tunnel width ratio. The most common power catamaran design flaw is when the height of the tunnel is, for example, one foot and the width of the tunnel is five feet. A one-to-five ratio will guarantee a boat that will get the tunnel section banged in about 12 inches of chop. You need travel; think about the hull shape as a suspension system kind of like a dirt bike. A dirt bike has a real long travel suspension, right? In my view, the monohull and a lot of the other catamarans have a suspension kind of like a skateboard, basically none. My boats are two and a half to one, height of the tunnel vs. the width of the tunnel.

Q: What are some trends you see as you look forward into the future?

Aspen right now is a lot like Glacier Bay in year 2005 or 2006. It takes a period of time with a new idea to get enough snow together to create that snowball and get it going. We had around 70% growth last year and Aspen is at that stage where the snowball is starting to roll down the hill and gathering energy. As far as the industry in general, there's a lot of creativity, and more options than there were even three years ago for a customer.

NWY

ASPEN POWER CATAMARANS

Aspen Power Catamarans is an American boat building company that, at the time of this writing, has over 30 employees. The company started in 2008 just in time for the market crash and partnered with Nordic Tugs to get production space for their first builds. Success begot success, and Aspen opened its own factory and creation space in Burlington, Washington in 2016. The 28- to 40-foot ultra-modern designs use the company's patented power proa hull form, designed by Larry Graf, who started with daydreams and a yellow notepad for sketching.

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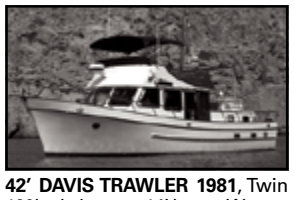

42' DAVIS TRAWLER 1981, Twin 120hp Lehmans, 14' beam, Westerbeke gen, AP, 36-mi radar, 2nd owners, FRP decks, asking **$64,900**

40' OCEAN ALEXANDER 1979, S/120 Lehman, 1.5 gph, 13'8" beam, Radar, AP, 2000W inverter, great condition, asking **$62,500**

35' MAINSHIP TRAWLER 1997. Twin Volvo TMD41P, 7.5kt cruise, 14 tops, radar, GPS, AP, inverter, gen, Avon w/OB, cool layout, asking **$105,000**

34' TOLLYCRAFT SEDAN 1989, T/454 IB's, low hrs, wide beam, color GPS, inverter, 10' dinghy, 15hp OB, super clean, asking **$74,900**

32' GRAND BANKS 1976. 80hp Ford Lehman, exceptional upgrades, GPS, AP, Radar, dsl furnace, replaced fuel and water tanks asking **$107,500**

32' CARVER 3227 '90. T/5.7L Merc V-drives, GPS, Radar, 3 inverters, 2014 batteries, 12VDC windlass, super clean in and out, asking **$37,900**

30' BAYLINER ENCOUNTER 1977, 1996 350 Chevy long blocks, 280 VP sterndrives, wide beam, super clean, same ownership 25 yrs, asking **$15,000**

30' SEA RAY WEEKENDER 1992, Twin 5.7L V-drives, 10'6" beam, GPS plotter, full canvas, super clean, asking **$22,900**

30' TOLLYCRAFT 1987, T/Crusader V-drives, 11'6" beam, 12V anchor windlass, dsl furnace, inverter, radar, GPS, engine syncs **$35,000**

28' BAYLINER 2855 2003, 5.7L w/ DP, 9'10" beam, dinghy, OB, color Radar/GPS, mint condition, great maintenance records, asking **$36,950**

28' CARVER MARINER 1984, T/ Crusader V-drives, rebuilds, 11'1" beam, DS, VHF, outstanding accommodations, asking **$17,500**

28' BAYLINER 2859 1993, 7.4L w/ Bravo II, cruise curtain, GPS plotter, downriggers, dinghy, custom radar arch, asking **$17,500**

28' NORTHSOUND 1992, aluminum boat, Volvo 155hp diesel engine, 2016 electronics package, telescoping tower, trailer, asking **$58,000**

27' SEA SPORT NAVIGATOR 1993, Volvo Penta 7.4L w/DP, GPS, radar, OB, dinghy, trailer, asking **$58,500**

27' SEA RAY SUNDANCER 1995, 7.4L w/BR 11, 8'6" beam, GPS plotter, full canvas, terrific condition, high quality, asking **$16,900**

24' GRADY WHITE HT 1990. 225 Yamaha OB, 9.9hp kicker, Radar, GPS, 12V pot puller, 12V downriggers, 2 – axle trailer, asking **$29,900**

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