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AMORY ROSS, PAGE 052

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STORY AND PHOTOS BY AMORY ROSS

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BY CAROL CRONIN, PHOTOS BY MARC ROUILLER AND GILLES MORELLE

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The International Moth remains the pinnacle of small-boat foiling, with devotees committed to “the progression.”

BY CHRIS MUSELER, PHOTOS BY MARTINA ORSINI

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On board 11th Hour Racing’s IMOCA 60 during a late 2019 trans-Atlantic delivery.
Photo by Amory Ross

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“The spinnaker is designed to have a flying shape, and you always want to keep it powered up enough to maintain that shape.”

STEVE HUNT, PAGE 082



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A person wearing a wetsuit and a helmet is standing on the deck of a boat, holding a steering wheel. The boat is moving through the water, and the background shows a cloudy sky and distant land.

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Tunnel Vision

Poor results must not cloud the easy opportunity to learn, grow, get better and have more fun

■ There are mere inches between us as we round the leeward mark, aligned bow to stern. I'm first around and arc gracefully through the turn, onto port tack. My turn is a good one; I pull the mainsheet, the sail loads, and I can feel the acceleration. It's a beautiful feeling. The play is to get right where there'd been more breeze earlier in the day, as well as the occasional right shift. My bow is pointed toward the open course, and Adam is right behind me. All I have to do is stay between him and the next mark, and I'll have my first race win of the season. I tell myself to exhale, relax and stay in tune with the boat. Don't get slow, pay close attention to the sensory cues: Notice the feel of the light breeze across my face, listen to the sound of the water gurgling off the Turnabout's transom, and look up the course for the next dark wind line.

Adam lifts off me a bit, but I'm bow forward, footing slightly to the layline where I anticipate the next shift will come. The slightest bubble in the front of my sail is all the clue I'll need, and when it happens, it's helm's-a-lee. Adam tacks as well, and now he's to leeward and a few lengths forward. We're locked in our own little match race. The weather mark is

not far off, and I think I've got him in control. A little header comes, but I subconsciously ignore it. As long as I have Adam in my sight, that's all that matters. He's fast, and he's the guy I need to beat.

But because of my tunnel vision, I'm ignoring the rest of the fleet to my right. My eyes are forward; never once do I glance over my shoulder. I'm clueless to what's happening behind me. Once we're squared up to the middle of the racecourse, straight downwind from the weather mark, we both tack back to port, and a bolt of shock and disbelief spears me right between the eyeballs. Three boats are cruising in on the starboard layline, easily crossing ahead of us. They've banged the right side, and we've failed to cover them. The next leg is a short reach to the finish, so the damage is done, and all my visions of race-winning glory and praise are sunk right there and then.

Fourth is the best I can do, and after crossing the finish line, I curse myself under my breath. I feign a smile when

Winning races consistently isn't easy in Newport YC's Frostbite Fleet, nor is losing, but there's something to be said for turning a bad day into a good lesson.

PHOTO: DAVE REED



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Sailors with a growth mindset don't take results personally. They don't care about shame or embarrassment: They care only about using their mistakes as an opportunity to learn and improve.

I step onto the dock for the boat rotation. Adam and I commiserate our misfortune and put it to one that got away. He's laughing it off and taking it better than I am. The right thing to do is to let it go. Next race. But I can't. I'm embarrassed. I so desperately want to win a race, to be congratulated and feel proud. The right thing to do is to accept the fact that I was so focused on beating one boat, I made the mistake of losing sight of the big picture. Get over it, right? Nope. Instead, my frustration festers, and like a toxin, it poisons the rest of my day.

Over the next three races, there's a deeper and darker inner drive to prove to myself and everyone else in the fleet that I don't suck. It clouds my decision-making, makes me slow, and makes me tack more than I should in the light and shifty breeze. In each of the following three races, my starts are magical; I cross the line at full speed and with clear air, and I'm leading both races when I tack onto a thin starboard layline. But each time, inexplicably, the wind dies and shifts, and in a span of two boatlengths, I'm no longer fetching the mark. Twice I have to jibe around and duck five or six boats that are easily laying the mark. The third time, I have to tack to do the same. Hero to zero, indeed. Three races in a row, in the blink of an eye, I go from the front of the fleet to the back. I've proved to myself that I'm not nearly as good as think I am,

or wish I am, and for one fleeting moment, as I return to the dock, sullen and depressed after my eighth-place finish (of 12 boats), I think maybe I should take up a new sport.

I help derig a few boats, peel out of my drysuit, and sulk out the back door of the club without saying goodbye to anyone. During the 20-minute drive home, my mind is racing, processing, replaying the highlight reel in my head, trying to pinpoint what went wrong and where. What the hell was my problem? It continues when I get home: I vent over dinner with my wife. I stand in the hot shower cursing myself again. Even reading in bed fails me; I can't stop thinking about how terribly I sailed.

The next morning, I open my laptop at the office, and coincidentally the file on screen I'd been working on is Jonathan McKee's column, "Success Through Failure," in this issue (page 48). I wish I'd read it before I sulked out of the club. "In sailboat racing, we fail all the time," he writes. "Even top racers are consistently making mistakes large and small—take it from me. A growing body of research into learning and brain plasticity suggests that the manner in which a person processes mistakes and failure will impact their growth and future performance."

In his column, he applies his understanding of the emerging study of the "growth mindset," where we take failure personally, and feel shame and embarrassment when we make a mistake. He could say I'm a textbook example of a "fixed mindset." All I can think about is the outcome. Sailors with a growth mindset, on the other hand, don't take results personally. They don't care about shame or embarrassment: They care only about using their mistakes as an opportunity to learn and improve.

McKee's words are like honey in my bitter morning tea. They don't erase the scores that have caused me to tumble down the standings, but they do help me correct my course, change my attitude and dive deeper into understanding what *should* motivate me every Sunday morning when I show up for frostbite sailing. This is true in life as well: I need to embrace this growth mindset, shift my tunnel vision away from my results and my reputation, and focus instead on the more fruitful process of improving, of accepting my failures simply as headers: Recognize them, tack on them, and enjoy the lifts. ■



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STARTING LINE

The M32 Catamaran Class sets up shop in Miami with a series of winter events that gives skippers and crews—both new and experienced—plenty of opportunities to hone their boathandling and high-speed skills.

PHOTO: [FELIPE JUNCADILLA/UP TOP MEDIA](#)

Cat's Play

A group of young sailors are given the keys to a M32 catamaran and dispatched to Miami for a season of hard knocks and fast sailing

■ We're now 10 days into our immersion in the M32 catamaran scene. We're walking down the dock at Shake-A-Leg on the second day of the M32 Miami Winter Series. The boys—Gordon, Chris, Riley and Key—all sporting their Young American team shirts, stroll past the other perfectly polished and vinyl-wrapped race boats. I can sense their anticipation and excitement growing as we make our way past. As I walk behind them, I notice a little more pep in their step, the soreness from the previous day's racing barely noticeable.

Berthed at the far end of the dock is our boat—two stark-white hulls with light-blue decking and black trim. The boat is owned by Sail Newport, the

community sailing organization in Newport, Rhode Island, so it's not technically "ours," but we're campaigning it for the winter, thanks to the support from Sail Newport and the M32 Class Association. It's been a long time coming with putting it all together and getting the boat down south.

We're the "youngsters" of the class—a team of college students and recently graduated kids, looking to experience, train and compete in one of the top high-performance classes in the world. We're sailing under the banner of the Young American Sailing Academy, which started in 2013 as a way to kick-start a new generation of offshore sailors. Highlights of

the Academy's achievements include racing in the 2016 and 2018 Newport Bermuda Races, where the team received line honors in 2016 on the Tripp 41 *High Noon* and competitively sailed the Reichel/Pugh 63-footer *Gambler* in 2018.

Some of us are recent additions to the Young American program, so we've had only a few days of practice as a squad, but we've quickly bonded into a tightknit team. Key Becker, who is the forwardmost guy on the M32's rack, is our main trimmer. He's tall and lanky and has bleach-blond hair that sticks out from his pink helmet. He shares a similar big-boat background to myself and sails for the College of Charleston's Offshore Team.

He's my older brother, and yes, he has been suspiciously nicer since this boat came our way.

Behind Key is Riley Freeman, our floater. Riley is a big-boat sailor and surfer from California who is studying at the University of San Diego. He is the muscle on our boat and brings the laid-back West Coast vibe to the team. He matches Key with the long blond hair, making them the

The Young American sailing squad for the second event of the Miami M32 Winter Series event included (l to r) Carina Becker, Chris Manson-Hing, Gordon Gurnell, Blake Cabassa, and Key Becker.

**PHOTO: FELIPE JUNCADILLA/
UP TOP MEDIA**



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perfect rack buddies. Next aft on the rack is Gordon Gurnell, who skippers at Connecticut College and grew up sailing dinghies in Newport, Rhode Island. In his hand is the traveler line, the “big-guy” job on the boat.

Chris Manson-Hing is on gennaker trim. Chris graduated from Hobart and William Smith Colleges, and is the one with experience in multihull and skiff sailing on the boat. He’s small, but he’s fierce.

As for me, I’ve come up through a wide variety of monohull big boats. I define myself as a driver, but I can run around and fill any position on most boats. I also grew up sailing dinghies and now sail for Boston University, and until our first event with the M32 class—this past summer’s Midtown Cup in Newport—I’d never been exposed to multihull sailing, or much of skiff sailing, for that matter. As you can imagine, the M32 came with a vertical learning curve for all of us. After only a few days of sailing on the boat, I’ve learned it requires a strong helm and a playful hand. The balance of the boat and the rate of acceleration when it’s loaded is far different than anything I’ve ever experienced.

As we arrive at our boat at the end of the dock, we prepare for the day ahead. The wind is drowned out by the latest recording of a Phish concert playing from a little blue speaker clipped to the rack. It’s our team anthem now, thanks to Key and his obsession with the band. We tackle the morning work list: Tighten the trampoline, put in the boards, situate the lunch, check the spares kit, and so on. Because we’ve had two days of practice canceled this week on account of too much wind, we’ve had plenty of dock time, making us a well-oiled machine when it comes to boatwork.

Soon after, as we pull off the dock and head out of the harbor, waves crash over our bows as we slam through the chop. It’s blowing a solid 18 knots, with gusts in the low- to mid-20s—conditions we have sailed in only once before. As we hoist the main, anticipation is building.

Gordon, Riley and Key line up on the main halyard, as if they’re about to start a game of tug of war. They’re waiting for the “ready to go up” from Chris. As they hear the call, they lean in to every pull as the bolt rope zips up the mast track.

Once the main is up and the boys are ready to play, we take off for our pre-race practice. We head upwind but look for the first opportunity to turn downwind and get the gennaker unfurled. When it’s go time, I reach behind me, clip the tiller extension onto the tiller bar, pop up onto the back beam, and lock



my front foot under the traveler.

Chris counts, “Three, two, one,” and I steer the boat down into a bear-away set. The gennaker rolls out, Riley leaps to the winch, puts his head down and spins the handle like a madman.

Our next move is a furl-and-jibe. Riley jumps off the rack as Chris prepares the gennaker sheet to be eased. Key and Gordon are waiting, ready to bounce into action. The call is made, and Key darts across the boat, bouncing his way toward the leeward hull. I watch the gennaker begin to furl, and then, unnaturally, I feel the hull beneath me begin to force itself out of the water. Both bows are fighting gravity and lift skyward.

The windward board must have been put down in preparation for jibe, but with both boards down, there’s too much

lift. The boat pops a wheelie before the bows come crashing down with a thud and big splash. The boat then settles, as do we. The mistake with the board drop is identified—one of the many lessons we’ll learn.

For each race, we set up one step behind the fleet, hanging back and being conservative by not engaging with the more-experienced teams. But when the flag skies, signaling the last race of the day, our hearts are beating a little faster. I think we’re all feeling that it’s time to be closer to the fleet. We’re excited and more comfortable

Close-quarters racing is what draws more-experienced crews to the M32 class.

**PHOTO: FELIPE JUNCADILLA/
UP TOP MEDIA**

with this weirdly bouncy, wet and jerky boat.

Each race begins with a reaching start, followed by a power reach to a bear-away mark, transitioning the race into a downwind leg. That first leg is the most intense part of the race, and the outcome typically determines one’s positioning for the rest of the race.

“This is the race, guys,” Chris, our trimmer and tactician, yells. “Let’s get closer.”

As the countdown continues, we place ourselves in the same “safe zone” we’ve been playing in the whole weekend—to windward of the rest of the fleet, just below our layline to

the race-committee boat. This time, we tuck ourselves that much closer to the pack. We want to play.

I pull on the tiller, the bows turn down, and I aim toward the orange triangle in the distance. Water rushes past the leeward hull, and the windward hull pops out and starts to fly. Expressions turn more serious, and the boys start howling, “Coms.” We are in the mix. We have a boat to leeward, and we are on the tail of the fleet.

Before we know it, the orange turning mark is upon us. “Hold on deploy,” Chris yells as he watches the leeward boat scream past the mark. Once we’re clear of their stern: “Deploy in three, two, one.”

I turn the boat down hard, the apparent wind builds, and I jolt the boat back up to get the hull flying, and we quickly watch the speedometer on the display climb into the mid-20s.

Someone on the rack screams: “Yeah, buddy! Let’s get her ripping.”

Shortly after boats ahead flop onto the other jibe, we pick our line and prepare to jibe ourselves. Chris, when happy with our positioning, yells out, “Jibing in three, two, one.”

Similar to earlier, Riley jumps off the rack and reaches for the furling line. Key and Gordon wait until the boat starts to turn. The gennaker wraps around itself, and the boys are already on their feet. I finish the turn, and the boys wrap up their jobs before getting back on the rack. Once the gennaker starts to make its way in, I turn the boat up and pop a hull.

The fleet leaves us in a frothy sea of wakes, but we keep working hard to stay as close as possible. Being the new team on the course, we have a lot to learn, but the learning has been the most fun and insane sailing we’ve ever been exposed to. The M32 catamaran is challenging and physically demanding, but we are determined to master this beast. As we cross the finish line of our last race, Key speaks for all of us when he says, “I’m officially in love with this boat.” ■



THIRTY YEARS, FIVE-HUNDRED BOATS. Still the Prettiest Girl at the Dance.

Onne van der Wal Photo

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■ Paul Sevigny is on a mission. He wants to slay giants and, along the way, revolutionize the handicap racing scene in America. How's he going to do that? Win a world championship in a sporty 26-footer, taking down the most expensive and best-prepared racing machines around. The arena for this sailing battle of the ages will be Rhode Island Sound, venue for New York YC's 2020 ORC/IRC World Championships in early October.

He will be stepping onto the battlefield not only for himself and his teammates from Noroton, Connecticut, but also for the good of the common beer-can racing sailor. Should he emerge victorious, he hopes to inspire local handicap racing teams to step up and travel to race weeks, as many big-boat teams did 20 to 30 years ago before the proliferation of smaller, turnkey one-design classes that live on trailers.

I once thought he was nuts. But then I sailed with him.

"You can race with the big boys for a fraction of the cost with a small sporty boat," Sevigny says. He bought his GP26 *Smokeshow* in spring 2019. "A [used] \$14,000 Melges 24 might not be competitive in one-design. But in PHRF or ORC, you might have yourself quite a rocket ship."

He reasons that adding crew and new sails, and optimizing the design for handicap racing, are simple upgrades. "When your boat costs less than most top guy's mainsails, you have a little change left to try things. And now you can race against big teams. Isn't that wonderful?"

I fall under Sevigny's spell in fall 2019, during the daylong Denmark Race on Long Island Sound. When I first meet him, the boat is under the hoist at Noroton YC, surrounded by a monolithic fleet

of Sonars. It looks like a miniature TP52, all tricked out with control lines and high-tech sails. We cram six sailors into a cockpit that is no bigger than a solo sailor's Mini, and over the course of a breezy afternoon—pulling plenty of power from the boat's asymmetric spinnakers and code sails—we hoot and plane to second overall, ahead of several 45-footers.

Though the experience is fun, I don't see a GP26 future in my career, until Sevigny bends my ear about his goal to win the ORC/IRC World Championship. Now I'm listening.

Over dinner on a frigid November night in Newport, Sevigny is determined to get me on board with his plan. He has printed a schedule of handicap events up and down the East Coast.

"So, which ones should we do? Who should we get?" he asks, serious as an undertaker.

I love it when someone takes fun sailing this seriously. After dinner, I drop him off at a house down the street, and we agree to follow up soon.

The next morning, I notice a perfectly positioned, simple little black-and-white bumper sticker on my truck's tailgate: "SMOKESHOW USA 2609." I'd been tagged. This guy is into it. I'm in.

"We weren't sure they would let us in," Sevigny says about the entry application submitted to the regatta's organizers, but they "made a change" to allow his boat type. "It's extremely important to me because there's probably never going to be another chance to sail in an ORC world championship for less money."

The last time the New York YC held a handicap rule world championship was in 2000, the Rolex IMS Offshore World Championships. But the IMS rule—and that event—was short-lived. The first

Big Dogs, Little Dog

The sailing world might soon know if good things really do come in small packages



The *Smokeshow* crew—(l-r) Will Graves, Luke Raymond, Chris Larson, the author and owner Paul Sevigny—celebrate a win.

PHOTO: COURTESY
PAUL SEVIGNY

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The smaller the boat, the smaller the budget, says *Smokeshow's* Paul Sevigny. He likes his chances as the smallest boat registered for 2020 ORC/IRC World Championships in late September.

PHOTO: PHOTOBOAT.COM

combined ORC/IRC Worlds was in 2018 in Istanbul, Turkey, with 85 boats. It's going to be a long time before this championship returns to North America, so Sevigny's view is it's a once-in-a-lifetime opportunity. At the combined ORC/IRC Worlds, there is not *one* world title at stake, but rather three: in classes A, B and C. *Smokeshow* sits comfortably in Class C as the smallest entry—by many feet.

Smokeshow's Denmark Race performance may very well have been an anomaly, so before I fully commit, I have to see what this show can do, one more time.

A few months later, I fly to Miami for the Wirth Munroe Palm Beach Race, which is part of the new SORC Islands in the Stream series. I'm interested to see how *Smokeshow* fares against a few high-power, big-boat teams.

The boats around us at the marina in Florida are twice the size and overflowing with professionals, dollar bills practically spilling from their sail bags. For this race, Sevigny has splurged too, hiring a boat captain to deliver the boat to Florida and rig it. To help tune the boat and demonstrate to the crew the effort required to win a world championship, he's also hired Chris Larson, the highly experienced professional sailor from Annapolis, Maryland.

Before the race start, as we all fiddle with ring dings, electrical tape and tension gauges, a veritable black cat crosses our bow: a massive black RIB crammed with nearly a dozen pro sailors in black attire. These are the rock stars of *Interlodge VI*, the Botin 44 of Gwen and Austin Fragomen. As they putter past, they stare at us, like we're the kids who show up to the basketball court in Keds when everyone else is sporting Air Jordans.

The forecast is showing lighter breeze. That's good for *Smokeshow*. Larson and Sevigny agree that our sweet spot is in 8 to 10 knots, when we can nimbly get up on plane reaching while the big racers like *Interlodge* stay stuck to the water.

Larson has the forecast analyzed for the 50-mile race up the east coast of Florida. A light northerly is supposed to clock to the right slowly, before filling in offshore for a beam reach to the finish and the world-famous buffet of Palm Beach's distinguished Sailfish Club.

In the early hours of the race, the light and long port tack put

Interlodge and the 60-footer *Prospector* on the horizon in no time. But Larson's shift soon comes, and when we tack to starboard, our Code Zero spins out of the furler. All six of us put every wet pound of our bodies outboard and aft as the boat lights up and skims across the sea.

"See ya!," Larson yells to a Melges 32 team as we blaze past. Then, he starts cracking the whip on *Smokeshow*. "Head up, get some power, but don't lose it," he commands Sevigny. He speaks with a clear and casual cadence. "Get up on the step. OK, now we're off."

Soon, the big boats are more defined on the horizon, so we know we've made a leap. We transition through our quiver of reaching and running sails until we settle into the big A1. We streak past President Trump's sprawling Mar-a-Lago resort at 9 knots, leaning in and out, and hiking it down like a dinghy. When we finish at sunset, we're sure we've done well.

We win our class and ORC overall, beating *Interlodge* by 13 minutes on corrected time.

Maybe Sevigny is on to something.

He dons a double-breasted jacket and tie to receive his crystal trophy. He likes to wear the uniform, and he's nostalgic about big-boat racing.

As a kid, he watched in envy as boats like the deep-orange Admiral's Cup yacht *Runaway* sailed in and out of his club. His parents weren't members though. His entree was as a junior sailing member, and even then, he was an outsider.

He's a big fan of the colorful IOR era of the 1980s, and even collects vintage crew polo shirts, especially from the maxis *Obsession* and *Boomerang*.

He has his own collection of *Smokeshow* gear for each event. Maybe someday someone will want to collect his.

"As I grew older, I felt like the sport was passing me by," Sevigny says. "I needed to reboot myself and get up to date." His parameters for a racing boat were simple: modern and spirited, with all the latest control systems and sails, and it must fit under Noroton YC's hoist. The GP26 fit the bill.

"I sailed one-design my whole life," Sevigny says of his move to handicap racing. "There's a lot more to learn when you're not just using a sailmaker's tuning guide."

Sailing regularly in Noroton's summer evening races, he recruits junior sailors and members, anyone looking to go fast. "There are not enough modern boats," he says. "I want them to look at us and have that 'hello tomorrow' moment."

There's something contagious about Sevigny's approach. The notion of elevating a seemingly modest production boat and its team to a level of world-champion contender is exciting. The challenge now is convincing and recruiting others to give the worlds a shot.

"This is just about a once-in-a-lifetime event for most sailors," says Patty Young, event chair for the worlds. "Many people are on the fence, whether they should be racing one-design, but they are thinking about this."

Young says the biggest leap of faith for unfamiliar PHRF teams is obtaining an ORC or IRC certificate, which comes at a cost. The races in 2018 and in 2020 are scored with a combination of both rules. IRC is a single-number rule, while ORC is a more precise, scientific-based rule with velocity prediction inputs and three wind strengths applied. Any boats with ORR certificates will have an easier time completing their certificate, she says.

Sevigny says the precision of ORC makes it possible for any boat to compete on a more level playing field than ever before. He's a believer. With some early victories and a string of regattas lined up on the boat's schedule, Sevigny hopes that *Smokeshow*, diminutive as it might be, is the right boat to win his first world championship.

"It's considerably more rewarding being one of the smallest boats in the fleet," he says. "For us, everything is a win. I like being the underdog." ■

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Now that he's running his own program again, one of America's top sailors is realizing challenges and barriers to participation in offshore racing

■ Ken Read, one of the biggest names in sailing, admits he's seen the light. Looking out from his ivory tower at the top of the sport, the 58-year-old yachtsman's view has been clouded by the ease of his grand-prix lifestyle. Jetting into superyacht regattas in the Med and tearing across open oceans on a 100-footer was easy for this guy. In the distant past are the experiences that made him the natural sailor

he is today. Back when he was making a name for himself in the J/24 class and racking up world championships and scoring a Rolex or two, he and his buddies had to do things themselves. Then came America's Cup gigs, big-boat programs, two Volvo Ocean Race campaigns, and his ascent to the top of the food chain at North Sails. Charmed life and all, Read is now back in the trenches, among the mere mortals of

shorthanded sailing, feet-first into the next big thing. With a new Sun Fast 3300 on loan from Jeanneau, Read teamed up with professional navigator Suzy Leech to give coed doublehanded racing a shot in Florida during January's Fort Lauderdale to Key West Race. They won their two-boat division, but more important, Read says, they had fun. The sailing was the easy part. Getting to the start—not so much.

Ken Read and Suzy Leech start the 2020 Fort Lauderdale to Key West Race on the Sun Fast 3300, their first event as a coed doublehanded team.

PHOTO: SHARON GREEN

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How do you go from maxis and superyachts to this double-handed offshore thing—a 100-footer to a pint-size 30-footer for two?

When it comes to projects that I think are good for the sport, I like to get involved, especially if it can help build a little bit of momentum in a sport that's in desperate need of renewed momentum. Time is a prohibitive factor in sailing today; the amount of time it takes to go racing is just too much. It's not only the time to participate. It's all the preparation. If there's one thing I've learned recently, it's that putting together a two-person team in a semi-stock boat is way easier than recruiting eight or 10 of my buddies and hoping like hell they show up. Not to mention the flights and food and logistics and hotels and the personalities and the WhatsApp group messages—it is bloody hard.

Is it really that much harder today to go racing? Back when you were campaigning big IMS boats, you didn't have the tools that simplify things today.

Yes, that's true, but I think there's more competition for our time now. Also, there's been an interesting byproduct for me from this whole doublehanded experiment. I started in dinghies, then went to college and sailed in little boats, and then I graduated to J/24s. I did everything myself. I bought the boats, I rigged the boats, I faired the keels—half the time at least. We did everything ourselves, and we figured it out. I got the van, made sure it was full of gas, paid the entry, got the hotel rooms, or found people's couches to sleep on. Whatever it took, I was in charge. Then, I got very good at delegating. We graduated to the next level, and all of a sudden, I've got a couple of people helping. By the time we got to the America's Cup, the Volvo, the *Comanche* and the big programs like that—I got a staff. To enter a regatta and get support, I've got staff. And I mean *staff*. Now, with the doublehanded stuff, all of a sudden, I have no staff.

“I want to be seen as the latest person who finally woke up one morning and said: ‘Hey, you know what? These people aren’t crazy. This is a lot of fun.’ I’m excited, and this is something completely different for me.”

It's been a real wake-up call for me to try to enter an event, to get a boat measured, get it to the starting line. To figure out how to get it all together to do a short, little distance race—it's too hard. And we wonder why more people aren't signing up for events. I'm ready to sit down with anybody who wants to talk and figure out how to make signing up and getting to and participating in a sailboat race way easier.

But it's all online and paperless nowadays. What exactly is so hard?

Yes, getting a certificate is probably as easy as you can get, but the fact that there's still IRC, ORR, ORC, ORC Club and PHRF is obscene. Someone with common sense needs to

stop the madness. We should all be sailing under one rule and get over it. Until rating rules are not-for-profit, we're going to continue with too many rules, and it's going to be wild frustration for everyone. I mean, I have to get multiple sail certificates because a code-zero “tweener” doesn't measure in for IRC, but it does for ORR? It goes on and on.

The fact that the Fort Lauderdale to Key West Race—which is only 150 miles and within the sight of land the entire way—has an ocean-race classification is crazy. It adds another layer of onboard safety equipment that isn't even close to being needed. I know there's a great reason for all of this stuff, but it is too hard, and until we can simplify everything, it's not going to improve. It's been a great lesson learned for me to not actually have staff and have to do it myself.

The volunteers who are putting these races together are doing a phenomenal job, by the way. They're not making the rules, but common sense has to prevail at some stage. Shame on me for not doing this sooner and realizing how good I had it. I give a ton of credit to all these volunteers for knowing what they're getting themselves into, which is probably months and months of complaints and questions from people like me trying to figure out how to register for the race.

This discussion of having too many rating rules has been ongoing—for a long time.

Yes, but in the Key West race, for example, there are 35 boats registered, sailing under ORCA, ORCB, PHRFA, PHRFB, ORC doublehanded, ECRA Performance Cruiser. I don't even know what that is. So, there are essentially four rules for 35 boats. That's crazy. If we're going to get people to want to do this more, we've got to make it easier for everybody. Make it easier to sign up and get measured—and don't get me started on the required equipment. For a 150-mile race, it just seems like overkill to me.

Is this what you're hearing from customers as well?

All the time. I know I'm going to get a lot of grief for saying stuff like this by the many people who've been working on these systems over the years, but I don't think anybody would disagree with the fact that it's just bloody hard. We, as a sport, need to figure out how to make it all easier.

What makes you so certain doublehanded sailing will catch on in the United States, with or without Olympic appeal?

There have been plenty of people doing doublehanded racing and preaching about it for a long time, and maybe we're all finally starting to listen. There are a lot of people who may be interested in this, and the more the merrier. If boats like the J Boats, the Jeanneaus and the Beneteaus are fun to sail and safe offshore, then even more regular sailors will get involved.

My reason to do this really has nothing to do with the Olympics. It has to do with trying to grow an aspect of our sport here in the United States that I think has real potential. Maybe I can use my name a little bit in order to gain a little more momentum. It takes people like us to stand up and shout into the rafters and hope somebody is listening. I want to be seen as the latest person who finally woke up one morning and said: “Hey, you know what? These people aren't crazy. This is a lot of fun.” I'm excited, and this is something completely different for me. Remember, you're talking to a person who got so sick of windward and leeward sailing, he sailed around the world twice. I'm not afraid to switch it up. ■

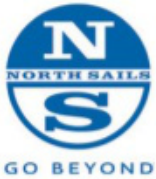


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Pewaukee YC's annual E Scow Blue Chip Regatta, with its celebrity mystery guest, is renowned for competitive racing and antics, both on and off the water.

PHOTO: SHARON GREEN



The Long Walk

The E Scow Blue Chip bar walk comes with a price—but it's worth it

■ As we stand outside the doors of the Pewaukee YC bar, a voice booms over the loudspeakers. “And now...the moment you’ve all been waiting for...the infamous E Scow Blue Chip bar walk.”

As per tradition, the last-place team going into Sunday of the regatta must walk across the club’s bar in their underwear. Unfortunately for my crew and me, no races Friday and a horrific Saturday means we’re the night’s entertainment.

Anyone who’s been in the game long enough knows that sometimes things just go wrong out there on the race-course, but I’ve never had more go wrong than my first day at the Blue Chip. On the first beat of the first race, our outhaul shackle snapped, and one of our crewmembers sliced open his thumb trying to repair it. Blood trails ran thick enough to make our boat look like a Jackson Pollock painting. We retired and sent our crewmember ashore to

get patched up before Race 2. By then the wind was cranking from the southwest, an unfavorable direction for Pewaukee Lake, which at just under 4 square miles of surface area, feels more like a puddle than a lake at times. The race committee posted a five-leg race with the breeze blowing anywhere from 10 to 20 knots with 25-degree shifts. Halfway through the race, we were mid-fleet before we capsized on a downwind leg, going into lunch

without finishing a single race. A 12th in the third race wasn’t enough to get us out of last place, and as we derigged for the day, the text messages were coming in hot.

“Can’t wait to see some action tonight!”

“I hope you brought something sexy!”

“Make sure you practice your dance moves!”

Being in last place wasn’t bad enough. Now we had to humiliate ourselves in front of the



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entire event. But this would be no half-assed effort. If we had to put on a show, we'd give them a show they would never forget.

As the emcee introduces our team, I take a deep breath, compose myself, and push through the doors of the club, where more than a hundred drunken sailors stand waiting.

"To be clear," one of the regatta organizers says in my ear. "You don't have to do this. It's all at your discretion."

"Don't worry," I say. "If we can't win the regatta, we'll win the party."

And with that, we are fully committed.

The key to a Blue Chip bar walk is layering. As we hop onto the bar, we strip our slacks to reveal radical neon-pink joggers with the words "Unicorn Dreams" stitched into the waistbands. "It's Raining Men" booms out of the speakers, and everywhere I look, I see smartphones capturing every moment. The crowd throws cocktail straws and shouts obscenities from the top of their lungs.

As I reach the middle of the

bar, I strip down to my second layer—a pair of multicolored swimming trunks. Any nerves I had before are long gone. Chris Farley comes to mind, and I attempt my best Chippendales impersonation.

Our third layer is a pair of standard tighty-whities, and needless to say, the crowd loves it.

My final layer is the toughest to reveal—a pair of boy's jockey shorts with a Batman cartoon print. After all that had gone wrong today, the last thing I need is another blowout. This is where we unleash our grand finale—a series of bananas and

in scow sailing are present. Add that to tight racecourses, massive windshifts, and the tricky nature of sailing on Pewaukee Lake, and you are in for a battle.

Moreover, event organizers invite a "Mystery Guest" each year: pro sailors, Olympians, and America's Cup legends alike. This year's Mystery Guest is Malcolm Page, a two-time Olympic gold medalist in the 470. Unlike our team, he had a stellar day, winning two races to lead the regatta. Believe it or not, this is a rarity for most Mystery Guests, some of whom have gotten beaten up by the lake and the E Scow, a

The Blue Chip has grown into a cult classic over the years, with the fierce competition nearly outdone by the Midwestern hospitality of Pewaukee. Perhaps the best insight of the Blue Chip experience comes from Gary Jobson, who was the Mystery Guest in 1991. "You'll do great," he says. "Just don't let them overserve you."

Locals often regale visitors with their Blue Chip memories: how one year Morgan Reeser became so inebriated that he fell down the stairs of his host family's house with his silver medal still hanging around his neck. Or how Peter Harken took Russell Coutts on a midnight romp through Chicago on Saturday night of the regatta and somehow made it back for the final day's racing. One year the bar walk got so unruly that a Pewaukee YC board member had to hose down the crowd to get them to disperse.

Yet the heart of the Blue Chip has always been E Scow racing. Dennis Connor calls the E Scow "one of the most refined one-design classes in the world." He was the Mystery Guest in 1972; though he didn't win that year, he borrowed a boat in 1977 and qualified the old-fashioned way. That time around, he went home a winner.

Fellow San Diegan Andrew Campbell says: "To judge the quality of E Scow sailors is to index the very best that American sailing has to offer. National, international, world, and Olympic champions and legends are scattered across the historic records."

In 2011, he became only the second Mystery Guest to win the event, behind 1969's Gordon Lindeman. Page eventually goes out and captures the regatta, becoming the third Mystery Guest to win in 54 years of competition.

"It's a tremendous honor to win this event," he tells the crowd. "I'll have to shout a challenge to Andrew Campbell to come back and try to recapture his title. It would be a great time—if he's man enough."

And the saga continues. ■



As per tradition, the last-place team after the first day of racing must strut the bar.

PHOTO: COURTESY FRANKIE POTTS

cucumbers hidden beneath everything. The crowd dodges them as we throw them out to the masses.

By the time we hop down, we are showered with praise.

"Best bar walk I've seen," one of them says. "I did it 15 years ago."

"You guys killed it. Have a drink on me."

"Way to go. That banana hit my girlfriend in the face. It was hilarious."

"Plenty of good sailors have walked that bar. Don't feel bad!"

And that is where it finally hits home. The E Scow Blue Chip is one of the toughest regattas on the planet. Because it's an invitational, the best of the best

few of them having walked the bar themselves.

"These boats are something special," Page says. "They have the tactics of a keelboat upwind; downhill, they drive like an 18-foot skiff. This event has been a blast. It's lived up to everything I had heard beforehand."

He first learned of the E Scow and Pewaukee Lake from Australia's John Bertrand, who lived in the area for three years in the 1970s and served as Mystery Guest in 1974. "The people are the best part of the event," Page says. "We fight as hard as we can on the water; afterward, we're all good mates."

Being in last place wasn't bad enough. Now we had to humiliate ourselves in front of the entire event. But this would be no half-assed effort. If we had to put on a show, we'd give them a show they would never forget.

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All Systems Go

Much of the magic of a big foiling monohull is in the precision controls and elaborate systems required for takeoff and flight. Here's a guide to what's happening under the hood of American Magic's AC75.

■ “Mechatronics engineer.” That’s one job title that never existed back in the America’s Cup’s 12-Metre era. But today, every Cup team has a few on payroll. These are the unknown wizards tasked with ensuring that every adjustment on the AC75 is precise. From micro to macro, from the top of the rig to the tip of the foil flap, when and if someone presses a button or pushes a toggle on these complex flying beasts, something logical better happen, and it better be right. Such is the new high-tech domain of

modern America’s Cup sailing, one in which software, hardware, electronics, hydraulics and human input interplay through intricate systems.

“It is the crux of performance,” says James Lyne, head coach of the New York YC’s American Magic challenge. “The Cup can be won or lost in these control systems.” Lyne, who analyzes every move and every adjustment the American Magic sailing team makes on board its AC75 *Defiant*, can see through 14 onboard cameras and a deluge of data streamed from the

boat just how important this business of mechatronics is to getting up to speed and around the race track.

Let’s start with the big picture: Who does what on the boat?

We’ve split up the tasks of controlling the boat. Dean [Barker], the helmsman, has control of the wheel and various things, but his primary role is to steer the boat around the course. Paul [Goodison], as the mainsail trimmer, controls the shape of the mast and the [twin-skinned] mainsail. He

also has some control of the jib. Andrew Campbell is then, effectively, in control of flight. From his position, he controls the foil cant, foil flap and rudder rake. Other people can also control those functions, but 99 percent of the time, three people effectively have control of the boat.

That leaves eight grinders, and one of those is a tactician. The tactician is talking about the course and the options, so in that sense, we’re set up a bit like a traditional boat. All the grinders are doing is, as



Control of American Magic's AC75 *Defiant*, at its cruising altitude in Pensacola, Florida, requires precision adjustments, achieved through a complex array of hydraulics, software and mechanical systems. Trimmer Paul Goodison has complete control of the complex rig at his fingertips using the controller. The goal is dry laps, since touchdowns at 45 knots are undesirable.

PHOTOS: AMORY ROSS/NYYC AMERICAN MAGIC

they say, "We grind forward and then we grind backward." It's an oversimplification, of course, because these guys are electronically changing gears and choosing functions depending on the task at hand.

The grinders are essentially running who's in what and how much power to put in at any moment. If they choose the wrong function at the wrong time and let oil pressure get too low, the boat will get unbalanced quite quickly, and the flight controller and the helmsman can't

do anything about it. Nothing happens on these boats without hydraulic pressure.

How many control buttons do the grinders have to manage while also hammering away at the handles?

It's traditional in that they're using foot buttons, but they're electronic rather than mechanical. When you look down into the cockpit, into all the grinding stations, you'll see there's an array of buttons. The jib trimmer has at least six [foot] buttons just to

himself, from the engaging of the winch, to the jib cars and the up-down systems that affect his sail shape. It's like a dance/game for them because they can't be off the handles for any lengthy period of time. We need a certain amount of watts, on average, to power the boat.

The grinders are producing almost what a professional cyclist would produce, over a relatively short period of time. We're asking these guys for more than 200 watts on average, with spikes of nearly 1,000

watts on special occasions where they need to dig deep.

So, what's happening, systems-wise, when a foot button is engaged?

When they press a button, an electronic signal is passing to a programmable logic controller, which is programmed to control the opening and closing of hydraulic valves or mechanical mechanisms to achieve a given function. For example, are they straight into a winch, or switching to fill an accumulator tank or drive a hydraulically

controlled sail function? Are they behind in how much oil they're producing? When they're coming to the boundary and they have to jibe, if they're low on oil, it's not going to be pretty. Paul, Dean and the trimmer are the primary consumers of the energy, and the grinders are choosing how that energy is allocated around the boat.

I can imagine there is quite a complex web of hoses, pumps and rams below deck.

When you look inside the boat, it looks way more like the inside of a plane than it does the inside of a boat. It's impressive. You've got a lot of electronics, a series of pumps and hoses to produce and supply pressure, and tanks to store high- and low-pressure oil. Without the high-pressure tank/accumulator, there are moments around the race-course where it's impossible to generate enough grinding power to meet the demands of the boat, so we're always asking the hydraulic system to be more and more efficient.

When people look at the boat, it looks sort of traditional in that there's an outhaul, a mainsheet and jib sheets, but the big difference is the forces this boat generates are so big that the whole boat would have to be one big purchase system just to do something as basic as trimming on the mainsheet. We have to handle tons of mainsheet load, so that's why the systems are dominated by hydraulics. These boats produce so much righting moment that the loads on all the sail-control systems—never mind the foil-control systems—are more similar to a 120-foot multihull, in terms of righting moment.

How much of all of this can be automated with software?

The class rule is pretty stringent on how we can use feedback loops in our software systems, but everything has to have logic. For example, when Paul pushes a button or a lever on his control box, there is logic running in the background to translate his input

“What's clearly obvious with these boats is the concentration it takes to sail them well. We have to give the guys enough breaks in the day to keep them mentally fresh. Certainly, more uncontrolled moments come toward the end of a long day of sailing, and that's just a result of the mental fatigue and concentration it takes to sail an AC75 well.”

into a valve command, or series of commands that perform multiple functions at a time.

Let's put the boat in motion. What's the sequence of mechatronic events to get the boat flying?

The AC75 is unique because the boat has no effective initial stability. It gains stability only when it gets flow across the foils. In light air, we can hip-tow the AC75 [with the tender] up to a speed of around 7 knots, where they have steerage and some semblance of righting-moment flow out of the foil. Then we spike the side tow off and they fall off onto whichever tack, ease the sails, and then slowly accelerate the boat.

As they accelerate to about 10 knots, the boat starts generating quite a lot of righting moment from the leeward foil. At this point, they can start sheeting on the sails. They're always trying to balance the righting moment generated by the foil versus the aero load of the sails to allow us to get to takeoff speed. Where takeoffs can go bad is when they're either producing too much righting moment versus aero lift or vice versa.

Takeoff, in other words, is a delicate balance between the forces, so one moment they're sort of sailing in displacement mode at 12 knots or so, and there's not a lot of load on anything. Once they've taken off and they're doing more than 20 knots, all of a sudden, the loads on the boat increase by a factor of 10.

Explain what's happening when we see the massive foil arms set in motion.

Andrew, as the foil trimmer, has control of the cant system, so as soon as they're off the tow and at a decent wind angle, he brings the windward board up, which increases righting moment and gives them the ability to take aero load very early on, while they don't have a lot of foil load. Then, he effectively puts the leeward board to a target cant angle, which at that time will be set up to

provide the right amount of lift and side force for the acceleration. The foil-cant system is one-design; it is run by a battery, so the grinders don't need to power it. All we have control over is when it moves and how much it moves. The rams are big gears, and as you would imagine, the amount of load the foil arm and the cant system sees is incredible.

How much control then do you have of the active leeward foil when it's loaded?

We use it dynamically, though the adjustments are relatively small. Think of the foil cant as a gross adjustment and foil flap as the ride-height control.

The accumulator tank volume is one-design as well?

Yes. It's about a liter and a half, which is hardly any, so that's why you see the grinding team working the whole time, from the moment they come off the tow to the moment they're back on tow.

One challenge of the catamarans of San Francisco and Bermuda is the transfer of crew during maneuvers, which is less of a factor with the AC75, right?

There are all sorts of things that must go right with every maneuver. The rates of the maneuvers are very similar to the boats in Bermuda, so for most people, it'll appear to be a pretty fast rate of turn. There's a big onus on producing aero lift into and out of the tacks and jibes. They can turn too fast and skid out, which means all of sudden there's no flow over the foils. So, there is a limit as to how fast they can maneuver.

As far as crew moving from side to side, some teams send people across, while other teams don't. We're still working on who goes where, but compared with the AC50, there are fewer people moving through the tack. The people who are moving, however, are the most important, so that makes it relatively tricky, and that's where the efficiency of every system has to be right. ■

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From Online to On the Rail

An online portal seeks to put an end to the hassle of team management

■ *Meat*, meet rail. Rail, meet *Meat*. It's a tongue twister for sure, but that's the essence of John Madey and Marco Heuer's crew-management website, RailMeets, which aims to take the hassle out of team building and management, and essentially put—and keep—butts on the rail. Think of it as Match.com for sailboat racers and as at least one reason why boat owners can no longer say, "I can't find crew."

Madey, a past Chicago Corinthian Yacht Club commodore, heard the same complaint plenty of times over the years, as did Heuer. Existing crew-finder boards are one way for sailors to connect, but Madey and Heuer felt most are limited, with "old technology and not pretty or functional."

Madey, who races his J/92 *Cyclone* in the Chicago area, says Heuer came to him and said he could do better. So they went for it. The original site launched as a way to organize their crew. Word of the site spread quickly in the Lake Michigan racing scene, and the founders realized others wanted in on it too. Once they added more functionality—a crew organizer, crew pool and boat pool—users flocked to the site. "One neat thing is, if I'm crewing on multiple boats, I can see all of them in one spot, rather than having different organizers with different boats," Madey says.

As RailMeet's pool of registered boats (and teams) grew, so too did interest from area yacht clubs, most of which were happy to get out of the business of managing their own crew-finder portals. Some of these pages, Madey says, openly list phone numbers and emails, leaving members' contact information vulnerable to nefarious sources. With RailMeets, he says, users must have an approved profile in the system, and connections between owners and seekers are kept private until the owner initiates the connection.

In the two years since launching the site, they've taken over Chicago YC's crew-finder portal for its Race to Mackinac, as well as the crew finder for the 2020 Newport Bermuda Race and Newport to Ensenada Race. One thing Madey and Heuer have discovered: Skippers tend to be more passive than crews in using the site, which hints a demand for crews looking for more opportunities to race, even on other boats, but that too comes with challenges. "There's a saying here in Chicago," Madey says. "It's: 'Don't bring me nobody that nobody knows.'" To that end, when a crew reaches out to an owner, it's up to the owner to accept the connection and then add that person to the boat's email list. Once the owner populates the boat's schedule, crews

can sign up for events they're available for. "We have a couple of boats that have 70 to 80 people on their crew," Madey says, "and they can go and build out a crew for certain events, confirming the right six people that they may want, even though 10 expressed their availability."

Brian Kennalley, one of the owners of the Chicago-based Tartan 10 *Meat*, was one of RailMeet's early adopters, and he says it's been useful for managing the dozen or so crewmembers on their list to fill all seven spots on the boat. "We race every single week-end and several times during the week, so it's the only way to manage knowing who's in, who's out of town, and who's available," Kennalley says. "We can quickly see at a glance who we have for each race. Because we sail one-design, we can also use it to see different crew configurations and know what the weight combination is. It's just quick and easy."

Early in 2020, Madey says there were more than 300 boats using the system, with more than 350 crews seeking a match. They're up to 2,000 users, and Madey says they're set up to take thousands more. They have users across the country and, now, internationally in Bermuda, Italy and Canada, which has brought about one surprise benefit. For anyone traveling for work or vacation, Madey says, if you find yourself in a strange place looking for a spot on the rail, just go ahead and log in. There's likely a boat in need, and a boat in need is a ride indeed. ■

Brian Kennalley
—an owner of
Chicago-based
Tartan 10 Meat—
uses the RailMeets
crew-finder
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Jimmy Goes Sailing

In his role with Luna Rossa Prada Pirelli, America's Cup's top hired gun is finally free of distractions



to take everything to maximum loads," Spithill says. "The rig, the foils and the hardware—all that takes time. Some things go well; some things need development."

For Spithill and the Italian Challenger of Record, break-in of their first of two AC75s has ratcheted ever higher since the beginning of the year. In a few months, they'll host the first of three America's Cup World Series events, providing themselves, two other challengers and the defender, Emirates Team New Zealand, a taste of what's to come in Auckland.

All four teams—Luna Rossa, Ineos Team UK, American Magic and Team New Zealand—have each put significant hours into their boats, their bodies and their simulators, and Spithill says he's happy with the team's progress. But these are early days yet, and they're only just coming to grips with their flying beast.

Still, no sailing doesn't mean a day off. The simulator is calling. The simulator, one of which every team has, is a game-changer for this Cup cycle, Spithill says. Emirates Team New Zealand was the only syndicate to employ one in the previous Cup, and several Team New Zealand engineers involved with its development are now in the Italian camp. "We can go through a lot of the sailing data and that sort of thing with it," Spithill says. "Whether we're down because we're doing a modification to the boat or because of the weather, we can keep going, to test the software out or try different appendages and setups. The most powerful thing with the simulator is the ability to get results much quicker than in the past and

■ The wind is howling through Luna Rossa Prada Pirelli Team's base in Cagliari, Italy, in mid-January. There will be no sailing today, but they've already had plenty of whitecap sessions, validating their sleek, black 75-footer all the way to the top of what is yet to be determined as the raceable wind range for America's Cup in Auckland, New Zealand, in 2021. "We've been pushing pretty hard," Luna Rossa helmsman Jimmy Spithill says. "Most days, we're off the dock at 7:30." A few weeks later, a rigging failure resulted in the team's entire rig timbering over the front of the boat. It's a new boat—it happens. Better now than later. "We have

In his role as helmsman with Luna Rossa Prada Pirelli, Jimmy Spithill says he's enjoying simply being part of the afterguard.

PHOTO: CARLO BORLENGHI

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make sure the behavior of the boat in the simulator is as close to replicating what's actually happening on the water when we're sailing."

There's a tremendous efficiency to the simulator as well. He says: "In the past, you look at just how much time, money and effort goes into getting on the water and sailing in the America's Cup. It's no different this time; we need a crane, a heap of people, chase boats. It's a huge operation, and by the time you get out there, you may get only a few hours of quality sailing. In the simulator, we go until we're brain-dead. If you make a mistake on the water, you lose so much, but on the simulator, we can just stop and do it again, setting up different scenarios."

He recalls the first time he walked into the team's simulator and left feeling sick. Not because of the motions of the platform and the realness of it, but because he "realized how far behind the rest of us were by not having this tool last campaign, and instantly regretted not pushing harder to develop one then."

Spithill—once the most visible personality of the modern Cup era—is enjoying his low-profile role with the Italian team, now able to focus strictly on sailing, while Max Sirena, the team director and skipper, is out front with sponsors and commercial partners. Even on the team's website, Spithill, a six-time veteran of the Cup and back-to-back winner, has no official title.

"The last few campaigns, I was running the team and I enjoyed that," he says, "but at the same time, I was involved in the commercial responsibilities and promotion for both the team and event. Max is responsible for this now, so I have more time to focus on sailing and design."

He's now in the afterguard with Francesco Bruni, with both sharing the driving. "It actually works pretty well because I have the ability to step off the boat and have a look. I get to see different styles

and techniques, which is a great way to develop the boat and grow."

He won't say who's faster between the two of them at the moment, but it doesn't matter because they're both on the same steep curve, learning and pushing each other. "Last time, I was really running the team, and I enjoyed that, but I didn't realize how much I really enjoy the sailing time. You can get dragged away in so many ways, so it really is nice now to really be able to focus on the sailing, especially with a boat like this because we just don't have much time. Everything's developing at a very fast pace."

His simple assessment of the AC75 thus far is that it is "awesome." At first, he says, he expected it to be like the AC50 or AC72, but it's completely different: "When you're moving the foil arms up and down, you're making a significant change in righting moment, and any change in cant angle of the board that's in the water also changes righting moment, so there are different forces. Just getting used to the heel is quite weird because we have this big force coming from the leeward foil. The touchdowns are quite different too. On a foiling cat, it's not that big of a deal when you touch down, but a big nosedive on these boats is dramatic because it's just one big hull, and once this happens and you stop, you don't have a wide platform for stability, much like a Moth."

He's not a fan of the rigs and mainsails, but says he understands the goal of trying to produce a mainsail that has the same characteristics of a wing and being able to raise and lower on the water. "Frankly, the hard wings are faster, work out cheaper, are less loaded and easier to trim."

The Gulf of Cagliari, on the southeast coast of the stunning island of Sardinia, has been kind to the team's development, providing a full range of conditions as they've gone from their little white missile of a concept boat to the real-deal 75. They can

"Personally, I didn't go with my instincts, on or off the water enough, and we made key decisions early on in the campaign that effected the end result."



sail year-round, in the morning's mistral or the afternoon sea breeze. "We've been out in some good breeze," Spithill says. "The limit here in Cagliari is the waves; it can get rough."

The winter training sessions have been focused exclusively on the boat, and as of January, not a single race mark had been set. In due time, and until then, Spithill can only imagine what will happen when four boats occupy the same water. "I'm not sure anyone can really say what it's going to be like," he says. "This is a new concept never tried before, with a huge foil arm suspended in the air and sticking out the side of the boat like it is now. In the past, when boats would come together, we'd touch hulls, but now, obviously, that's not an option. It just can't happen because it would be catastrophic. That's why April is important for everyone to see what the style of racing will look like and how it will work."

What we can expect from Spithill, most likely, is a more aggressive approach both on and off the racecourse. Oracle Team USA's fall to the sword of Emirates Team New Zealand is still fresh. "I don't ever let any loss go," he says. "Defeat is nothing but education. We were too conservative [in Bermuda]. Sometimes success can do that to a team. We were going for third win in a row, and it was a trap we fell into that we were not aggressive enough with our approach. Their campaign was anything but conservative. Personally, I didn't go with my instincts enough, on or off the water, and we made key decisions early on in the campaign that affected the end result."

With large-scale teams, as it was with Oracle Team USA, it's easy to end up in that middle ground. This campaign is a big increase in budget and personnel, and all of Luna Rossa's rivals "lack nothing," Spithill says. "With less than a year to go and limited cards to play, the decisions that are taken during this summer will determine who will get it right and who won't. I can't wait." ■

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Success Through Failure

The adoption of a “growth mindset” allows us to enjoy sailing more and improve our results

■ I recently heard an interesting story from a high school sailing coach. She had two good skippers on her team. The first one—we’ll call him Bill—came to the team with a lot of experience from Optimists and 420s, and he seemed to be confident and competent. He was clearly the best kid on the team in the fall and won most of the practices. Jeff was the other helm. He had less experience and less confidence than Bill, but he was open to getting better and enjoyed sailing a lot.

After practices and regattas, the coach would talk to the

skippers individually about the mistakes they made and what could be improved. It soon became clear that Bill was a little defensive about his mistakes and tended to suggest that outside factors caused his poor finishes. Jeff, on the other hand, was open to feedback from all sources, and was genuinely curious about how he could improve his decision-making and execution. Although less experienced, his attitude allowed a much faster pace of learning.

By the winter regattas, Bill and Jeff were both winning roughly equally. By the spring

events, Jeff was winning nearly all the time because he had continued to improve his game to the point where he overcame his lack of experience, replacing it with a disciplined yet open-ended approach developed by learning from his mistakes.

I have a similar story from my own background. When I was a freshman at Yale, I was pretty fast and good at tactics, but I tended to get into protests. Partly because I did not know the rules all that well, but mostly because I could not admit to myself I had made a mistake and should just do

my penalty turn. This went on for a couple of years, and my results suffered at times because I was not using my mistakes to learn. Finally, after a particularly costly disqualification, I realized that I needed to change my attitude toward learning. Yes, I needed to get better at managing risk when the situation involved a possible protest, but I needed to stop thinking that I knew everything, and that my mistakes were the fault of someone else. Although I did not know it at that time, I started down a path toward developing what is a popular



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term today: “growth mindset.”

What is your attitude toward failure? In sailboat racing, we fail all the time. Even top racers are consistently making mistakes large and small—take it from me. A growing body of research into learning and brain plasticity suggests that the manner in which a person processes mistakes and failure will impact their growth and future performance. I will be focusing on sailors, both elite athletes and weekend warriors, but these issues are relevant to other parts of our lives as well. I love it when sailing can be a metaphor for life.

Carol Dweck, a psychologist, and other researchers have shown that people applying a “growth mindset” are able to learn faster and improve further compared with those applying a “fixed mindset.” It is worth reading her research and listening to her podcasts and TED Talks because they are quite illuminating. Summarizing the main points, a growth mindset is a belief in process. Talent is not innate. Success comes from sustained effort and working through the inevitable challenges. The process is driven by growth and improvement, not success.

A fixed mindset is all about outcome. If you fail, you think all your effort was wasted. Talent is innate, so there is no way to improve beyond a certain point. It is not worth learning a new thing. You take failure personally—as I did in my early college years—and feel shame and embarrassment when you make a mistake.

We all have seen this effect in our local fleet. There will be some sailors who continue to improve faster than others, and other sailors who seem “stuck” at a certain level. In my experience, this is often caused by differences in the way sailors process their past performance. The sailors who get stuck do not really analyze their errors in a meaningful way—maybe because they are embarrassed by them. They tend to take failure personally. They prefer to focus on the good parts,

and write off bad parts to luck or outside effects. The sailors who keep getting better tend to take the opposite approach: Rather than being embarrassed about their mistakes or feeling shame, they see them as an opportunity to learn and improve. They do not take failure personally. They use their errors to learn real lessons that help prevent those errors in the future. In this point of view, mistakes are the catalyst to improvement.

We all have elements of both types of mindset, and the literature discusses a mixed mindset, which includes parts of both. We might use a growth mindset in only some situations, and we might revert to a fixed mindset in others. So there is a continuum, but the point is to recognize where we are on that scale. One thing I am confident about: By moving toward the growth mindset, we can improve our sailing and also enjoy it more.

How can we move toward a growth mindset in our sailing? To me, it starts with the debrief after the race. Try to be as objective as possible, even if the truth hurts. By stating aloud that our spinnaker hoists are slower than the top boats (which is objectively true), we are then free to find a solution. We are not bad people, or even bad sailors; we just need to improve this area. We can discuss with our crew how to do that without being emotionally attached. Let’s try sneaking the tack out a little sooner. Let’s try improving the blocks in the halyard system. Let’s try keeping the bow a little lower during the set. Let’s take some video of the top boat in our fleet to study how they manage the hoist. After that, we can dedicate practice time to improving the hoists. Then, we can test our new techniques in racing.

I’m confident that if we employ a process like this, we will find the right solutions to any challenge by seeking answers to basic questions: What is the problem? What are the potential sources of the problem? What resources are

The sailors who keep getting better use their errors to learn real lessons that help prevent those errors in the future. In this point of view, mistakes are the catalyst to improvement.

available to help show us how other teams do it? Then, with answers in hand, we can try the good ideas and fix the issue. It sounds so simple, but many of us are not open enough—to ourselves or our teammates—to clearly state there is an issue and commit to a solution without embarrassment or concern for blame.

One of the keys to a successful debrief is involvement of the whole team. Each person on your crew has a valuable perspective, even if they are less experienced, so make an extra effort to solicit input from everyone. Once the areas to improve are identified (make sure to discuss the positive areas as well), ask each crew member for their thoughts on potential solutions, and decide together how to proceed. Once everyone is on the same page, it’s an issue for the whole team to solve and not the responsibility of one or two individuals to correct.

The second key to a good debrief is to keep the atmosphere open and positive. By making it more comfortable for everyone to provide their input, you’re more likely to correctly identify the key issues and their potential solutions. This is a place where a coach can be extremely helpful. But even if one of the crew is running the

debrief, the same principles of openness and future action orientation can be employed.

I remember when I first started sailing J/70s. I was not used to a boat where wing-on-wing is sometimes the best mode. I had been sailing lighter, faster boats, where wing-on-wing never worked. It took me almost a whole season before I was able to embrace that wing-on-wing was part of the tool set needed to be successful in this class. I then realized I was way behind in this area, and I needed to develop my skills, just like a beginning sailor. So I set about turning this weakness into a strength. Our team would practice it every chance we got, even when it was marginal. I would talk to other sailors who were good at it. We had lengthy discussions within our team about when to use it and what method to use to deploy (jibing the main versus jibing the kite). Finally, after almost two years of focused effort, it is becoming more natural, our techniques are getting better, and I am no longer afraid of it.

If you are able to maintain a growth mindset, where learning is paramount, you can continue to improve as a sailor forever—this is the hopeful me talking. The other thing that a growth mindset gives us is a new way to view competition. In this worldview, you need competition to improve, and the better the competition, the more opportunities to get better. As long as we are able to not take the results personally. This is a big challenge for a lot of us. Our desire to improve and our curiosity have to be stronger than our fear of losing, as well as the associated shame and embarrassment. But if you can make the commitment to continual learning a growth mindset allows, you will feel “lighter” and less invested in the result—and thus be able to enjoy your sailing more. You will have good races more often because your skills are improving, and you will not feel so bad about the lost races because they are merely opportunities to get better—a virtuous cycle. ■



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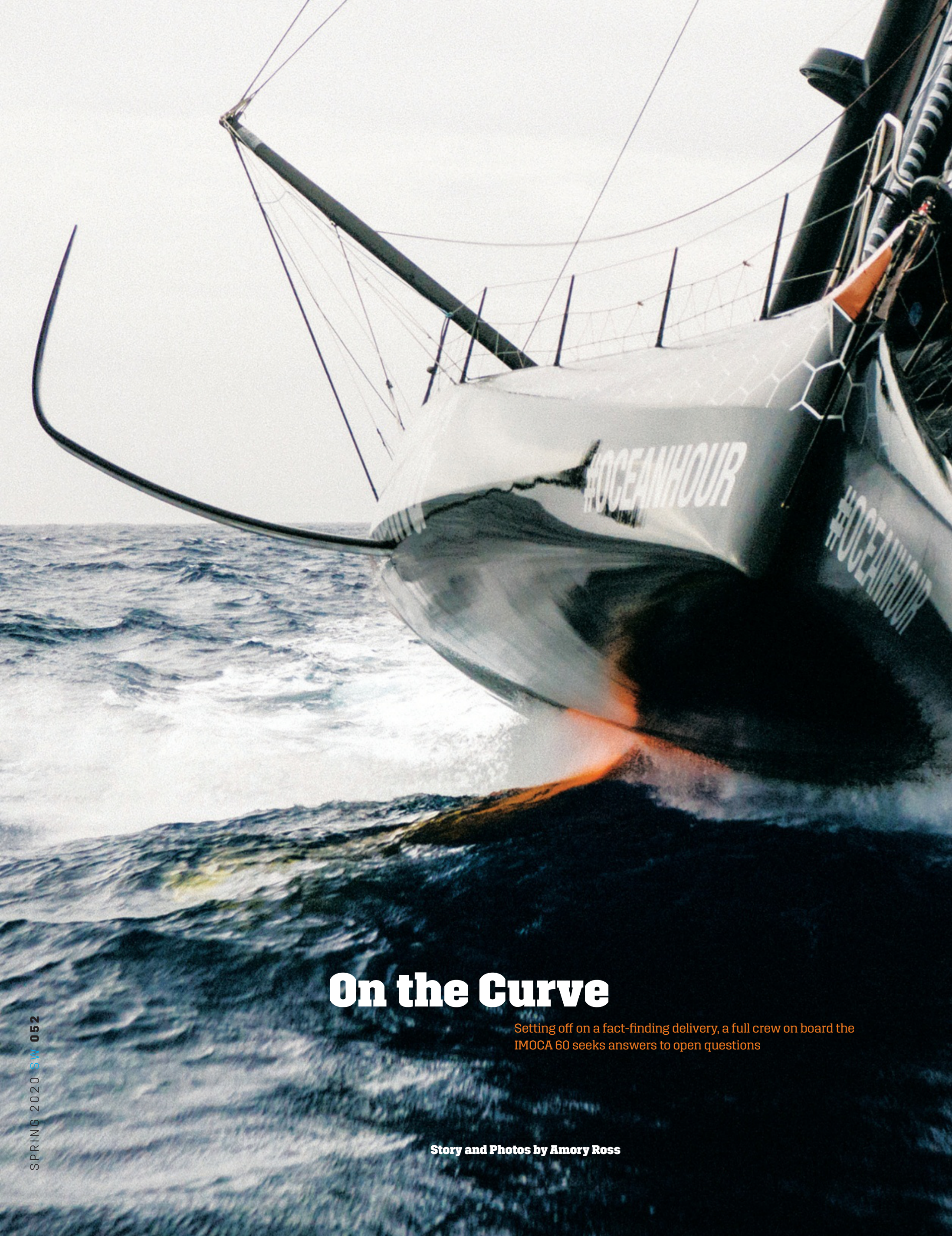


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On the Curve

Setting off on a fact-finding delivery, a full crew on board the IMOCA 60 seeks answers to open questions

Story and Photos by Amory Ross



11th Hour Ocean Racing Team's IMOCA trainer, 11.1, powers along in full canvas, riding on its first-generation foils.





The Ocean Race will be sailed with a crew of five, meaning watches will likely be manned by two sailors at a time. Limited visibility will require extra attention to the radar and AIS picture from inside the cockpit, particularly at night.



■ **It might be the first time** I've laughed from absurdity, with uncontrollable amusement at my surroundings and the general state of things.

The instruments have us consistently zooming at 30-something knots, but it's blowing only 20-something outside our vomit comet. We're not surfing waves. The Atlantic is flat, and our performance is 100 percent by design. We are foiling through a dark, moonless night at optimal speed in optimal conditions somewhere off the coast of Brazil, bound for France.

It's 2 a.m., and I'm lying on top of a pile of unclaimed gear bags and a thin foam pad that is supposed to be used on a bunk. But there is no bunk on this vessel,

and there is nowhere else to go inside this 60-footer designed for one sailor. There are six of us, caged in a loud and crowded space not much bigger than a cargo van. For the past seven days, we've all tried every nook. This is where I've landed, sliding around on the top of a ballast tank like a puck on ice. Sleep is impossible. I start giggling. I can't help it. The absurdity of it all is laughable.

Charlie Enright—lying next to me in the leeward bilge, nestled into a beanbag—is awake too, staring at the coachroof.

I've been through a lot with Charlie, but this is entirely new. The high-pitched whine of the foil next to my head echoes around the boat. It's turbulent, like a jet engine,

the hull violently slamming around as if driving on a potholed road back in Rhode Island. I wonder what exactly we are doing, how offshore sailing has evolved so quickly and so aggressively that we are now foiling across oceans. Only a few years ago, we were doing 19 knots in a Volvo 65 in these same conditions. And that felt fast.

Charlie, who had previously raced the boat doublehanded to Brazil during the Transat Jacques Vabre—for 14 days—must have heard my laughter because he grins, presumably familiar with my disorientation.

"The polars for the new set of foils show us in the 40s," he says nonchalantly.

I stop laughing and shake my head, wondering what that actually means.

A glimpse into the living space an IMOCA 60 offers a team of six. The boats are beamy but have low freeboard, internal water ballast and significant structure to handle the high loads of foiling; life inside is compromised.



The new foils Charlie referred to will be fitted to the team's current training boat, while the new boat that he and five other teammates will enter into the 2021 Ocean Race is being built. This edition of the round-the-world race will be contested with two fleets: Volvo 65s and IMOCA 60s. Charlie and his co-skipper, Mark Towill, twice sailed the Volvo Ocean Race with the 65—once with Alvamedica and once with Vestas 11th Hour Racing. This time, they're gunning for the win with a state-of-the art IMOCA 60.

We're on 11th Hour Racing's *11.1*, an older-generation IMOCA 60 purchased from singlehander Alex Thomson. Other than learning how to sleep, everyone on board is

here to soak in the experience for the first time—to learn how to survive, how to push and how to exist.

This is a new style of boat requiring a new set of skills. Each of us, regardless of how many high-speed sea miles we have or don't have, must now contemplate the foiling part of the equation: Angles and speeds are vastly different. Shorthanded sailing requires a new set of talents; everyone has to learn a lot about a lot—there are no traditional roles. We serve a new title sponsor requiring new priorities, and everyone feels an obligation to the larger global implications of sea and sustainability. We have an opportunity to make a difference in this world.

Besides the faces of my teammates, nothing feels familiar. We were in the midst of significant change, and the curve is rapidly shifting beneath us. Outside of a handful of French solo sailors, few people have come to terms with the sheer audacity of foiling across oceans. It is understandably difficult to comprehend—and even harder to achieve. But we have to start somewhere. We're on a delivery of discovery.

Food is fuel, it's as simple as that, so while it might seem mundane, the question of how much to have is taken seriously. Offshore sailors burn through insane calories, and nutrition goes hand in hand with

Skipper Charlie Enright acclimating to steering a tiller while looking forward through a window. Kyle Langford slides to the end of the deck spreader while releading an outboard sheet. Michael Menninger eats a freeze-dried lunch from the personal-size cooler.





Kyle Langford at the helm before a heavy-air jibe into the Bay of Biscay. Maneuvers are supposed to be simple on a boat designed for a singlehanded sailor, but doing it manually, and at pace, requires everyone in the cockpit, where elbowroom is limited.

performance. As a “media man,” food and supplies fall under my jurisdiction. I pick, pack and prep the meals because it’s a job nobody else wants. Fine by me—it gives me a “watch partner,” something to keep me honest and invested. It holds me to a routine. But this IMOCA 60 has no galley, sink or cooler, just a spigot and a few small containers. All of my old quantity-planning spreadsheets from previous races are for crews of 11 or nine, accounting for a full galley. Six people and a minimalist setup is all new to me.

For this delivery, we use freeze-dried meals, remnants from a past campaign, and each sailor decants each meal for him- or herself. This, however, produces a lot of waste, and we can’t be wasteful, so we

must try to find another way forward. By the end of the delivery, I will have a much better understanding of how much food six people consume and, more important, what this group of individuals likes and dislikes. We are aiming to work with brands to eliminate extraneous packaging or, even better, eliminate plastic entirely. In the future, we will be trialing reusable silicone bags that hold one meal for six.

Supplies are handled in a similar way. We’ve brought far more toilet paper, baby wipes, toothpaste, butane, etc., than we will need, but knowing how much we use in 15 days will allow me to understand how much of everything we will need come race day. It’s important to start building a food

and supply list for a typical race leg.

Another great unknown is how much foul-weather gear we will need. Extra gear is slow, but so too is being cold, wet and tired. The Volvo 70s were light. The less you brought, the lighter the boat, the faster you could go. The Volvo 65s were heavy and needed righting moment. The more you brought, the more you could stack, the faster you could go. The IMOCA class is back to situation light. The foils provide so much righting moment, and flight is so essential, that being light could be everything. This means scrutinizing the necessity of things such as spare clothes and foul-weather gear. During this delivery, I put on my dry top only a few times, just to go out and take photos

As IMOCA speeds steadily increase, so too does the frequency and amount of water over the deck. The corresponding design trend is to shelter crew from the elements.



on deck. We can do most of the sailing from inside the cockpit, which is totally covered. Gone are the days of being pelted with water and slammed with waves. We seriously consider having communal gear, used in those possibly rare occasions where one or two of us has to venture outside our igloo. If we don't absolutely need it, it stays off the boat.

Developing the ideal watch system is one of trial and error. We cheat a bit here. There are always two of us on deck, with four sailors running independent four-on/four-off watches and a single rotation every two hours. Charlie and I float. I obviously won't be able to float when we get down to racing, so the number of available bodies actually drops to five. The watch

system will need a lot of attention, but it feeds directly into the one burning question on everyone's mind, especially after our Chinese jibe in the middle of the night: How much do we trust the autopilot?

It's impossible to predict when the aged autopilot will decide to go on break, but it generally happens when you least expect it. Usually, by the time you figure out it's not "doing its thing," it's already too late. This time, it's a 2 a.m. carve-down that goes well past the point of no return. We jibe, the boom swings across, and the boat is on its side. The major problem is that the leeward rudder, which was our windward rudder, is in its raised position, and the windward rudder, which was in its down position, is useless.

Standing in waist-deep water at the back of the boat, we struggle to wrestle the upright rudder to get it down; there are a lot of moving parts in the rudder system that make it difficult to move under load. Plus, we've never done this before, so it takes longer than it should. Eventually, Charlie is able to pull on the half-lowered rudder to bear away, it's a quick reminder that we have lots to learn.

The autopilot is—for now—untrustworthy, at least to us.

Race organizers want to limit autopilot usage to maintain a clear point of differentiation with the rest of the offshore-racing world. The feasibility of that for five sailors is uncertain, however. We spent a lot of time under autopilot during our delivery

Abby Ehler on the bow for a sail change. Usually this kind of work is reserved for bow specialists, but with five crew, everyone must do everything. It takes a while to get used to going fast on autopilot, and nobody touching the tiller.





sprint. Driving when you can't see is really hard, and the IMOCA 60 is designed with autopilot in mind. Visibility is second. It gets more complicated too when we consider the race's desire to attract existing Vendée Globe IMOCA's into the event. These boats are already fitted with autopilots, and asking teams to remove or nullify their systems—when they were fundamentally built around them—is difficult. There's no question that the autopilot would be used, but there's also no question the human hand would be faster, fatigue and visibility aside.

Fatigue is a big deal, by the way, and it comes with a lack of sleep. On this trip, we are scattered around inside like rolling

pebbles. Every time I look, somebody is on the move, trying some other place, a different position—nothing works. Collectively, sleep is elusive, and it will be even more of an issue as the foils get bigger. The way the boat moves and the way it sounds when you're foiling make sleep problematic. The singlehanded guys don't use bunks, and there's a decent chance we won't either. That's because berths take up a lot of space, and with the IMOCA 60, getting weight outboard is no longer a requirement. It's more about fore-and-aft trim. I envision beanbag chairs and extreme exhaustion as the new norm, the price to pay for crossing oceans at 40 knots.

Remember, this is a fully crewed adventure on a boat made for one. The paradigm has shifted here. We are no longer defined by our position on the roster. We have to do practically everything. With so few people, one must be good at every position. Charlie, for example, can now repair a watermaker, navigate, and hoist a J3 from the pedestal or bow. Everyone needs to understand everything in a completely different way.

The IMOCA's might be 60 feet long, but in terms of usable interior, they are actually much smaller. With the high speeds these boats maintain and their unpredictable mannerisms, no one risks going forward on deck or down below. If you must do something

Abby Ehler contemplates her surroundings, which is harder to do when you can see only the horizon. With the unpredictable foiling, maneuvers and sail changes must be done downspeed. Charlie Enright tidies up the sail stack after a reef. Above him, the rotating mast is twisted to windward.



out of the cockpit, we must either turn downwind or slow down. Things that were traditionally forward, such as the plumbed head, would be unusable at speed, so it simply doesn't exist on the boat. Instead, we use a rubber bucket placed in the bilge. Private moments are always in close proximity to someone else. It's uncomfortable to start, and uncomfortable to finish, but there is no better solution.

We're uncertain how hard our boat can be pushed, and consequently, we're just getting to know its potential. In the Vendée Globe, solo sailors spend most of their time throttling back and letting the autopilot lead because they are designed to be ultra-light for the midlatitudes and reefed for the

extremes. We, on the other hand, will inevitably spend most of our time throttling forward, with both hands on the helm. Class rules state that the rig and keel must be one-design, but their actual limits are largely unknown. We will add fiber optics to our mast and foils to start visualizing stresses in real time. With a full crew pushing the boat beyond known limits, we could be faster, but we also might be at risk of breaking the boat. We are cautious on our way north, but relative to other IMOCA's around us, also delivering to France, we feel fast.

We arrive after 14 days on board. Our bodies are wrecked, on account of little sleep and much discomfort. These boats will be difficult to race and endure, but we

have started learning—and acclimating. For a collection of veterans used to having a lot of the answers, there is much uncertainty.

It's this adventure into the unknown that attracts us to this next Ocean Race. We have a blank slate. What better way to begin than with a 15-day trans-Atlantic bringing us through almost every climate and every condition? Deep summer to deep winter. Sailing upwind, across the wind and downwind. Through the trade winds, the Doldrums and the Bay of Biscay.

As we debrief in Lorient, following the long and varied trip with an unfamiliar craft, it really feels like a wildly new chapter in a repetitive book. Exciting, revolutionary adventures are ahead. ■

While under the enclosed cockpit roof, the sailors are reminded of how wet they'd usually be.

TINY GIANT AMONG GIANTS

THE STAR SAILORS LEAGUE FINALS
IS AN ASSEMBLAGE OF SAILING'S TOP
TALENT—PAST AND PRESENT—WHERE
EVEN THE ROOKIES STAND TALL

BY CAROL CRONIN



Brazilian standout Henrique Haddad was one of several “rookies” invited to compete at the Star Sailors League Final in the Bahamas.

PHOTO: SSL/MARC ROUILLER

AT

the 2019 Snipe Worlds in Ilhabela, Brazil, I'd heard a lot about the Brazilian sailor with the nickname "Gigante." Given the crew is usually the smaller of a Snipe team, and with a name like that, I'd always assumed he was the bigger of the two when I saw them together. Two months later, however, as we walk side by side across the parking lot of the Nassau Yacht Club in the Bahamas, we're practically eye to eye. It's Brazilian sarcasm, he tells me, with an engaging grin. "I've always been small, since I was a child. So, it's a kind of joke."

Henrique "Gigante" Haddad, the relatively unknown 32-year-old Snipe World champion, groomed in the rich South American one-design sailing scene, is one of several rookies in the Bahamas attempting to make a name for himself among the elite of the once-Olympic Star Class. He's an invited guest at the annual Star Sailors League Finals, and on the day we meet for a late-afternoon coffee, he's not only survived the qualifying races, but he's soared into the top 10. Admittedly, he's not much of a Star sailor, but over the past few days, he's proved himself plenty capable of competing with the other invited skippers, as well as the legitimate giants of the Star class. For the regatta, the diminutive skipper teamed up with crew and countryman Henry Boening. Where Haddad lacks street cred

The Star Sailors League's marque event in the Bahamas is an invitational gathering of one-design champions past and present.

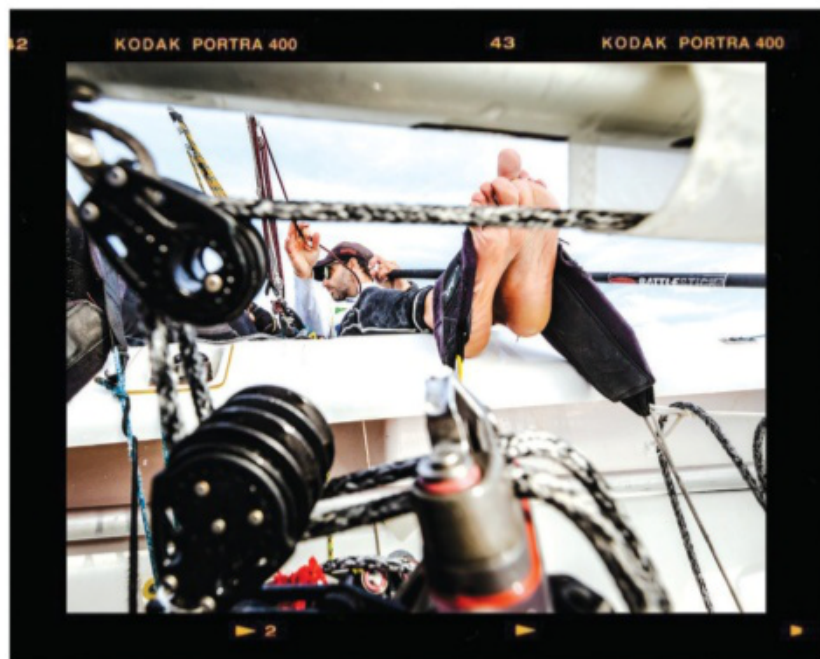
**PHOTOS: SSL/GILLES MORELLE (BELOW),
SSL/MARC ROUILLER (RIGHT)**

in the Star, Boening is highly decorated. "Magilla," as he's known, has twice finished second in the SSL Finals, as well as the 2019 Star World Championship.

The Star Sailors League Finals is an invitation-only regatta, contested in Star boats. Its stated goal is far more inclusive than the choice of boat might suggest: to celebrate the champions, or the "stars," of sailing and also to "create those of tomorrow." That's how the tomorrow guys like Haddad get their invites. The League Finals are four days of racing on Montagu Bay, where 23 teams are winnowed to 10. On the last race day, three knockout races determined the final four, and after that, it's a one-race-wins-it-all shootout.

The first pool of coveted invitations goes to sailors at the top of a league-managed global-ranking list, which is updated weekly and includes more than 50,000 sailors from 36 classes and disciplines. The next group of invited skippers have either recently won a major event or hail from a developing country (or both), ensuring a range of experience. For this 2019 edition, Haddad is one of them. The other rookies are Oskari Muhonen, a Finn sailor from Finland; Jee-min Ha, a Laser Olympian from Korea; and Ricardo Fabini, a Snipe champion from Uruguay. All three are paired with a competitive Star crew from a different country. New boat, new teammate, sometimes drastically different native tongues...what could possibly go wrong? Star boats are notoriously difficult to sail, so the class veterans have a definite advantage—even though some of their Olympic medals and gold-star emblems were won before three of these 2019 newbies were born.

Haddad is a full-time sailor who represented Brazil at the Rio Olympics in the 470, finishing 23rd of 26 teams. The 470 is a boat he says is "like a drug," one he genuinely enjoys racing, and while he hopes to compete in the 2020 Tokyo Olympics, a disappointing pre-Olympic result this past summer has led him into racing other boats. "What helped me is that I sailed a lot this year," he tells me,





his brown eyes locked on mine, his smile mixing matter-of-fact with a dose of humility.

In September 2019, he and his teammates finished 13th at the J/70 Worlds, and then shortly thereafter, with only a few weeks of practice, he won the Snipe Worlds. There were plenty of Snipe class legends there too, including Haddad's Olympic coach, Alexandre Paradede—the 2001 Snipe World champion—and his Olympic 470 teammate Bruno Bethlem, himself a two-time world champion Snipe skipper. Beating his tuning partners, who he likens to older brothers, was fulfilling, he says. "It means I learned a lot with them, and I have a lot of respect."

Unlike the other SSL Final rookies, Haddad lives in a country rich with Star sailing royalty and traditions. Brazil is home to the supremely talented Grael family (Torben and Lars in the Star, Martine in the 49erFX), as well as the most successful Star crew in the world, Bruno Prada. Haddad says Prada was instrumental in getting him up to speed in the Star, but even after enlisting Boening, who sails out of the same yacht club in Rio de Janeiro, he didn't think they should even bother to practice ahead of the

event in the Bahamas. "Let's go there and have fun," he remembers telling Boening, "because I thought it was almost impossible to be competitive at my weight."

For the record, he's roughly 143 pounds wet.

"The 470 guys who come [to the SSL], they have a lot of difficulty," he says, "but Bruno told me that the races would be inside [Montagu Bay], where it's going to be shifty. Magilla said I could be competitive, so then I asked him, 'OK, how many days you can spend with me?' And he said, 'About 20.'"

He had his first crack at the Star in November, only a month before the championship, he tells me. He pauses to sip his coffee, unaware that he's crumbled my misconception that the Bahamian event was his first time in a Star boat. "I did two regattas at my club," he says, "one with Magilla, and the other with Bruno."

He reminds me that Rio de Janeiro's 30-boat Star fleet is revered around the world. "Many guys enjoyed that I had this possibility, so they helped me a lot—sharing and helping me train, and giving me some tips about the boat. The Star fleet in Brazil, it is quite strong."

Twenty days of practice in the boat is a drop in the bilge compared with the experience of Star sailing legends, but it was more than twice what the other three newbies managed—combined. Without that practice, he says, his performance in Nassau would be “very bad, for sure.”

After three days of racing, however, he says he’s feeling really competitive and understands the boat. Haddad then credits his teammate for much of this new confidence. “Magilla, he has a really good feeling about the boat. He asks me: ‘How is the rudder? How is the pressure on the boat?’ So I tell him, and he is just working on that.”

Boening also explains what each change does to the boat. Haddad talks to him a bit about settings or mast rake, but in the end, Haddad has the last word: “I just tell him what I’m feeling.”

The Star is different from any other boat he’s sailed, but he refers to it as a big Snipe. “But [downwind in] a Snipe, when you put the bow up, the boat doesn’t go,” he says, while in the Star, “it helps to go up higher and then quite lower, and so on.” Initially, he also struggled to feel connected to the boat upwind because he had to lengthen his hiking straps so much to compensate for shorter legs.

Nevertheless, he expects that much of what he is learning in Nassau during the League Finals will eventually help him in the 470—and with every other boat too. “It’s really incredible to feel the boat, the pressure, the settings. Many friends say that the Star is the best school because it has a huge main, and that’s true. It is unbelievable how you can feel the pressure and then talk about it, with running backstays in our hands. It’s not easy to keep going fast, but it’s easy to feel when the boat is overpowered or not powered enough.”

Before qualifying for the Finals’ finals, Haddad is confident that he and Boening can remain in the top 10. “Each day I’m feeling better,” he admits. “I hope that tomorrow may be better...that it’s going to be easy.” He smiles to indicate this is more sarcasm.

Easy? Not a chance. Better? Yes. Much better. The young Brazilian skipper and his crew win the first race of the day and finish fifth in the 10-boat quarterfinals. They’re the only newbies to advance to the next round. The breeze drops for the one-race semifinals, the lightest conditions of the week, and after struggling with acceleration off the starting line, they finish last—cementing seventh overall. But the top-six teams, collectively, have won a total of nine Olympic medals and 14 world championships. The four finalists all have gold stars on their mainsails, indicating a previous Star world victory.

What is it like sailing against such a legendary lineup? Haddad

says he doesn’t think about who he is racing against—at least not while he’s on the water. “Obviously, I ask Magilla where is some guy, but more to know about the course,” he says. “I don’t think, *Who is this guy that’s next to us?* I’m sailing, just like it was a nice night.”

Ashore, with all the sailors staying at the same hotel, it’s a different story. “When we have a breakfast together, or gather after sailing, we realize who we are sailing against,” Haddad says, his gaze wandering across the yacht club’s pool deck. The other teams have already returned to the hotel. “It’s really interesting to have breakfast with Hamish Pepper, also Mateusz and the others.”

When asked if he knew many of the legends before arriving here, he shakes his head. “Only the match-racing guys: Taylor Canfield, also Torvar Mirsky and Ian Williams. Oh, and Fabini, from the Snipe. The other guys—no, I didn’t.”

And then, brown eyes locking on me once again, he names an absent Star legend. “To be here with these kind of guys, for me it’s really interesting because my father is one of the best friends of Torben Grael.” Haddad’s father covered the two Olympic Games (1996 and 2004) as a journalist, when Grael won his two Star gold medals. “This is my memory from when I started sailing: It was just after the gold medal of Torben and Marcelo, and my father had just come back from the Olympic Games. So I grew up watching them. To be here, fighting with these guys in the Star class 20 years after, is something that for sure I never expected. Because of my weight, I couldn’t imagine one day to be sailing in Star.”

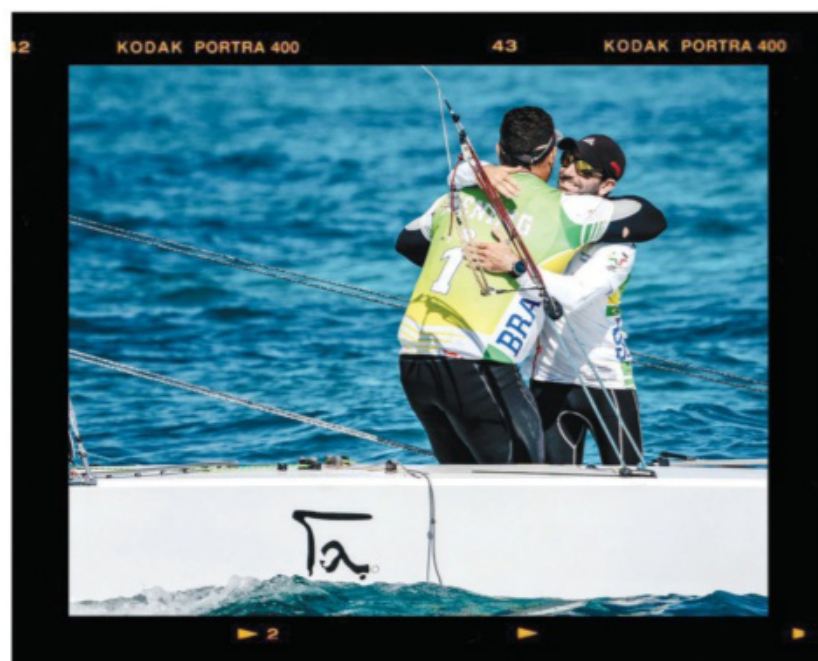
And though he’s already shattered my misconceptions about his rookie status, something he says makes me certain that Haddad will live up to his nickname in the coming years. “I really enjoy sailing,” he says, eyes twinkling and grin stretching even wider than usual. “I pass almost 24 hours thinking about it, how to make things better and how to make the boat go fast. These days here are helping me a lot. And I’m sure that tomorrow, I’m going to feel even more comfortable than I am today.” ■

MANY FRIENDS SAY THAT
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TO KEEP GOING FAST,
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THE BOAT IS OVERPOWERED OR
NOT POWERED ENOUGH.



Henrique Haddad, relatively new to Star Sailing, was paired with veteran Star crew Henry Boening, and despite minimal time together in the boat, the pair finished seventh of 23 teams, even winning one race.

PHOTOS: SSL/MARC ROUILLER







TO THE

THE INTERNATIONAL **MOTH** REMAINS
THE PINNACLE OF SMALL-BOAT FOILING,
WITH DEVOTEES COMMITTED TO “THE
PROGRESSION” BY CHRIS MUSELER
PHOTOS BY MARTINA ORSINI

FLAME

Tom Slingsby put on a master class at the
2019 Moth World Championship.



THERE IS AN EYE-OPENING

video clip posted online from the last day of the 2019 Moth Worlds in Perth, Australia. The drone follows Tom Slingsby as he tears across the finish line, winning the whole enchilada with two races to spare. In a class now populated with high-net, young professional sailors, to win 12 straight races is mind-blowing alone, but the most incredible part of this visual is the outrageous speed. Slingsby's foils are just shy of perching the surface; there's minuscule drag, there's a slight twitch on the helm, and his go-for-it hiking posture is inspiring. In 20-plus knots of breeze, Slingsby, in this moment, and the entire week, is redlining his torpedo-shaped Exocet Moth.

Those who are loyal to the foil, and particularly to the International Moth, say the investment in time and equipment is worth the reward.

Talk about sending it.

This is a big deal. Slingsby and the rest of the top 10 at the worlds were doing nearly 20 knots upwind, a 2-knot difference from a year earlier. Downwind, they're pushing 30. It's hard to imagine so much progression can come out of such a small package, but the Moth—which has influenced modern foiling, from the America's Cup to the little productions Skeeta and UFO, and even windfoiling—is still the highest-profile foiler on the planet. This, despite being crazy expensive at \$30,000 for a new boat.

This is also a big deal because the class continues to push the high-performance fringe of the sport, from foil technology and design to sailing techniques. Incremental changes that have added up to the gains Slingsby and his buddies demonstrate have come from deck-sweeping sails,

“aero packages” that reduce wind drag, and ever-shrinking foil shapes.

But let's be real. Who can actually do what gold medalist and Cup winner Slingsby does? Very few. First, the cost of a new—or even a good used boat—is ridiculous. And the time commitment? From my two years of Moth sailing, I know the investment in time on the water alone. Simply learning how to jibe (for me, more than 21 sessions of extended lunch breaks and evening sessions) is impossible for most working folk. And don't even mention the amount of time it takes to set up, tweak, and repair these intricate and delicate carbon machines.

Despite all these barriers, however, the class continues to grow internationally, with 122 competitors signing on to be part of Slingsby's Southern Hemisphere Slaying. There are

rank-and-file American sailors who have accepted that racing a Moth is worth every penny and minute they can muster to get around the racecourse. It's just super-addictive, and yes, where there's a will there's a way to do it at your own pace and within your own budget.

Dan Flanigan, one of the few Americans to compete in the Perth Worlds, says, "If you sail once a month, it will take five years to get around the course." He was 79th of 122—and pumped with his finish.

Flanigan, 28, is an engineer and recently started his own engineering, design and build company called Kroova, in San Diego. He kept an educational and witty log of his first worlds experience in Australia. It was classic Mothie: "I had some control issues (read: multiple pitch poles and crashes)...I told my fiancé I was currently 32 out of 60 in the Silver Fleet, and from 34th on, it was DNFs and UFDs. 'What a weird class,' she said. I couldn't agree more!"

Flanigan's self-deprecating tone is common language in a scene where the learning curve is so steep, so demoralizing, that to simply survive the process is a badge of honor. It's entry into a community that knows the regular feeling of dopamine releases while screaming along on every downwind leg. Flanigan knew he was progressing when he reported he was 30th of 60—but remember, the DNFs started at 47.

"It was functionally too early for my first worlds," says Flanigan, who since this past winter has been practicing after work and on weekends with 10 or so Moth sailors in San Diego. "For most people at their first worlds, the minimum sailing time has been two years. If I could let go of the feeling of being beat, I would improve quicker than the guys around me."

Such an attitude allows him to keep an eye on the prize: progression.

Progression is a big buzzword in Moth sailing. It's challenging to simply trim in the sail and get underway, then there's

PROGRESSION IS A BIG BUZZWORD IN MOTH SAILING. IT'S CHALLENGING TO SIMPLY TRIM IN THE SAIL AND GET UNDERWAY, THEN THERE'S PERFECTING YOUR TURNS, THERE'S KNOWING YOUR CONTROLS AND SHIFTING THROUGH THOSE GEARS RAPIDLY INTO AND OUT OF A TACK.

perfecting your turns, there's knowing your controls and shifting through those gears rapidly into and out of a tack, which, by the way, is the Holy Grail for those in the middle to bottom half of the fleet. "Once you get your first foiling tacks," Flanigan says, "it's a huge drug, a chemical reaction that happens inside you."

About half of the silver fleet at the worlds had the "ability" to foil tack. Moth sailing is an endless progression, and Flanigan and others simply enjoy stumbling down the rocky path. "It's easy to say, 'Don't focus on the results,' but it's hard to feel that. With the time you spend, you want to do well," Flanigan says.

When he had a good race, he would round a mark with a whole new group of competitors. "I thought, *This is a massive improvement*. I made five foiling tacks the whole regatta, but it was huge gains."

Flanigan's goal, of course, is to "learn the boat as fast as possible, with having a job, a functional relationship—while being completely obsessed—and sail the boat as fast as possible." He hopes five years of this approach will give him the skills to compete at the worlds each year, the rewards, he says, of hard work and commitment to fitness.

But Flanigan is not there

yet. He's on the steep end of the curve. His professional skills, though, make him a keen observer of the progression at the top of the worlds fleet. "Aero is getting more and more important as apparent wind-speed gets above 30 knots upwind," he says. Flanigan is using a Mach2, upgraded with the ubiquitous bow sprit that holds the wand out farther for steadier ride-height control in choppy conditions. The Mach 2.5 has no compression struts at the mast step, allowing deck-sweeping sails to take a more refined shape. Wing bars are now flared down at the back side to line up better with apparent wind while sailing upwind. "They're playing with lift and righting moment," he says, referring to the leeward wing bar lifting and the weather wing bar pulling down.

Although Slingsby and others in the top 20 raced their Exocet Moths, from Britain, and the once-dominant Mach2 is regularly in the hunt for titles, there are more new designs than ever, allowing for fine-tuning to the sailor's weight and strength. Matt Chew, of Australia, was eighth in a Paul Bieker-designed Moth. Bieker is an innovator who has created a flush-deck Moth that has so little area for its width, many say it looks way too long to be class legal. There's a lot less aero drag, but the new deck-sweeper sail also has no impediments such as a raised forward deck to get in the way of a perfectly fair shape. The Bieker's flat top helps advance the deck-sweeping concept. The effect of the new sail design is twofold: The end-plate effect reduces drag; and the lower center of effort allows for increased drive force for the same righting moment.

Because the boats are going faster, the foil shapes are changing too. Luka Damc has quickly dominated in this space with his Swift Foils, which were on the majority of the top 10. The chord lengths on the vertical foils are shorter and, especially where they meet the horizontal element, are much thinner. When you see



The many faces of the International Moth sailing community reflect the diversity of those drawn to the high-tech class. Young, fit, technical and a willingness to be humbled are common traits.





Slingsby riding ridiculously high, he is trying to get every millimeter of his vertical appendage out of the water—to reduce drag. When you’re going 30-plus knots, a few less millimeters of vertical foil in the water is a big reduction in hydrodynamic drag.

The breeding pool for American Moth sailors has been small and continues to be a moving target. Two winter series, one in Southern California and one in the Florida Keys, are really the only gatherings where racing Moths is a “thing.” But these and other pockets of Moths might be breeding something even better: stoked sailors.

“Personally, I had lost the joy in sailing,” says Helena Scutt, an Olympian who stopped a Nacra 17 campaign last year and then decided to focus on her engineering career. “Last year I started a journey with the Moth to put the fun back in sailing. I never want to lose that again.”

Scutt purchased an Exocet during her campaign, believing her foiling skills would translate to Nacra sailing. The campaign is over, and now she’s trying to get better in the Moth in the San Francisco Bay area. She’s an Olympic-caliber athlete, but even Scutt is on the same learning curve as every Moth sailor. “I’ve been knocked down so many times,” she says, “but I come out of the water with a grin and say, ‘That was an awesome wipeout.’”

Scutt, who is also the US Moth Class president, finished eighth overall in September’s North American Championship in San Diego. She is progressing nicely up the curve. “It was my first real Moth regatta,” she says. “I’m just analyzing where the gains and losses are. Boathandling is low-hanging fruit.”

The Waszp is essentially a production version of the Moth, and groups in the United States have had an easier time attracting females to the fold. Scutt points to a few Moth-specific challenges that favor the Waszp for some sailors. “The expense is a factor,” Scutt says, adding that a lot of

other boats are cheaper than a Moth and “almost as much fun.” Experience in high-performance boats, like skiffs, is helpful in foiling but not prevalent among female sailors. Scutt says this has nothing to do with “capability.” It’s a matter of exposure. And being an equipment-based development class also doesn’t play into the current skills of female sailors. She adds that these factors are historical and that Moth sailing “exaggerates these factors.”

Scutt encourages all Moth sailors to reflect on the opportunities that got them into the class, and then spend a little time exposing new sailors, especially women, to the Moth. “Share your knowledge, give them a chance to try it and get hooked.”

Still, Scutt says the Moth is the tip of the spear in performance sailing. “The Moth came out of sailing; now foiling is more ubiquitous,” she says. “When I think of sailing and foiling, it’s a pretty cool time to be around and flying. A couple of years ago, we never would have imagined this.”

Moths are surely the most expensive bit of singlehanded monohull sailing kit you can own, though the price of recreational foilers is getting more reasonable. But in Mission Bay and Key Largo each winter, there will be 20 or 30 Moth sailors of every ability ripping around, tuning up, and helping one another tweak a gearing mechanism for the wand or repair a push rod on their main foil flap. Some will try to play with the likes of Slingsby, while others will simply enjoy their progression.

Flanigan’s last few posts from the worlds speak to the average Moth sailor’s attitude. “Missed tack, flipped at top mark.... When I say I have ‘good pace upwind,’ I understand fully that it is relative only to the bottom half of the fleet.” With his best race in the silver fleet being a seventh of 61 (DNFs starting from 36th), his closing comment is, “This was an awesome event.”

Slingsby, of course, would agree. ■



“The Progression”
Moth sailors speak to is one of commitment, boathandling and a lot of boatwork.

■ Dave and Peter Askew—brothers in their mid-50s, with two years between them—have been distance racing for decades, their accomplishments on the water blossoming in both scale and caliber. Over the past two years, however, the Askew brothers have progressed well beyond the relative comfort and familiarity of the Great Lakes, questing top results in each and every one the premier international offshore races. To do so, the brothers recruited a crew deep in experience, acquired a used Volvo 70, and laid out an ambitious plan to win all the Northern Hemisphere's greatest races: the Caribbean 600, the Transatlantic Race, the Rolex Fastnet Race and the Rolex Middle Sea Race. They came close, winning three of four (a drifter of

a Middle Sea Race was not Volvo 70 conditions).

"Winning the Fastnet was—by far—the biggest sailing event of my entire life," Peter says. "I remember watching it as a kid. It was always a race I paid attention to." He can now be reminded of the race every time he looks at the inscription on the Rolex timepiece he now wears proudly on his wrist. "It's a point in my career I will never forget."

I first met the Askew brothers when we crewed for Bill Martin in the 1984 Canada's Cup. As youngsters, they'd

raced Lasers, Interlakes and Flying Juniors, but that year, they were in college and spent the summer working on Martin's Two-Tonner, *Stars & Stripes*. We won a grueling challenger trials but lost in the final match. They were enthusiastic and reliable crewmates, and over the next few summers, they delivered and worked on raceboats throughout the Great Lakes.

David Askew considers his experiences with Bill Martin as his true formative years, as well as the stepping-off point for a long-term sailing career. "The next thing I know, I'm racing

with all these guys I idolized as a kid," he says. "I was in the candy store, and I wanted to be the best sailor I could."

He laughs now, he says, because he never wanted to own his own raceboat. Why would he when had easy access to top boats raced by top-shelf crews?

The Askews had solid sailing backgrounds before launching their business careers. In 1980, their father, Lawrence Askew, founded USALCO, a chemical company that processed aluminum and other materials used to purify the lake waters of the Midwest. The company eventually moved to Baltimore and grew. The brothers each graduated from the University of Michigan, with David earning a mechanical engineering degree and Peter a degree in anthropology. Both married at

Brothers of the Watch

With a shared commitment to their offshore racing program, these Midwestern kinsmen are now reaping the rewards of their success



David and Peter Askew grew up racing and working on big boats on the Great Lakes before careers and family took priority. With an ambitious campaign and an all-star crew on board their Volvo 70 *Wizard*, the brothers checked off the majors on their bucket list, including winning the 2019 Rolex Fastnet Race, the first American entry to do so since 1989.

PHOTOS: PAUL TODD/OUTSIDE IMAGES



A FAMILY AFFAIR

When Jane Gibbons was diagnosed with lymphoma five years ago, she channeled her efforts to help others with blood cancers by getting involved with the Leukemia Cup Regatta in New Jersey. She inspired other sailors, including her two grandsons, to sail and raise funds in support of The Leukemia & Lymphoma Society (LLS). “The work of LLS is very important to our family,” said Jane.

Help other patients and their families who are on the front lines of the blood cancer battle. Register and raise funds for a Leukemia Cup Regatta, and involve your family and friends. **Visit LeukemiaCup.org**



Jane Gibbons
with her grandkids

Upcoming Events

March 21, 2020

Isles Yacht Club
Punta Gorda, FL

April 3-5, 2020

Fort Pierce Inlet State Park
Fort Pierce, FL

May 2, 2020

**Connecticut River One-Design
Leukemia Cup Regatta**
Essex Corinthian Yacht Club
Essex, CT

May 2, 2020

Bahia Corinthian Poker Run
Bahia Corinthian Yacht Club
Corona Del Mar, CA

May 29-30, 2020

Eastport/Annapolis Yacht Clubs
Annapolis, MD

May 30, 2020

Lake Canyon Yacht Club
Canyon Lake, TX

May 30, 2020

Royal Vancouver Yacht Club
Vancouver, BC

May 31, 2020

**Hot Ticket Harbor 20
Leukemia Cup Regatta**
Bahia Corinthian Yacht Club
Corona Del Mar, CA

June 5-6, 2020

New York Yacht Club
Newport, RI

June 6, 2020

Elliott Bay Marina
Seattle, WA

June 6, 2020

Bahia Corinthian Junior Regatta
Bahia Corinthian Yacht Club
Corona Del Mar, CA

June 7, 2020

Seattle Yacht Club
Junior Regatta
Seattle, WA

June 27, 2020

**Lake Champlain
Leukemia Cup Regatta**
Burlington Harbor Marina
Burlington, VT

June 27, 2020

Chicago Dock Dash
Columbia Yacht Club
Chicago, IL

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relatively young ages, raising families as they built the company. Competitive-sailing aspirations shifted to the back burner.

They're now equal partners in their father's company, which currently employs 250 people and produces more than a million tons of chemical products per year. The company's move to Baltimore allowed David to settle in Annapolis, closer to the action. Ultimately, it was David's wife, Sandy, who suggested they get back into sailing.

"We should get a boat because our kids ought to be brought up as sailors," she suggested.

David agreed, of course, and they bought a J/120. "That's our humble beginning," he says. "We just kind of progressed through bigger boats. It was always a family thing."

They campaigned a J/122 before eventually making the grand-prix leap to the TP52. "My brother had more time to sail with me," David says. "We had a dream as kids of doing the big ocean races. We knew we needed the right boat."

They then set their sights on the Transpac Race and acquired *Bella Mente*, built in 2008 by American yachtsman Hap Fauth. "[He'd] done everything to it to make it a good downwind boat for the Transpac," David says.

In their first try, they won the Barn Door Trophy, awarded to the first boat to finish. "[At the time] we were building up a pretty good crew who were always keen to do long-distance races, so in fall 2017, we thought we needed to get a Volvo 70," David says.

They purchased the highly optimized *Groupama 4*, winning boat of the 2011-2012 Volvo Ocean Race, skippered by Frank Cammas. "Relative to the cost of building a new boat, it was cheap," David says. "The 70 is the perfect size. The real expense is campaigning the boat and hiring the crew."

With the exception of themselves, they now race with a team of 13 professionals and specialists. "On a boat with so few people, everyone on the

boat has to work well together," David says, "although everyone has their little quirks. It's like a small military squad. They can all do each other's jobs, but they specialize in certain areas, like mechanical systems. They can keep a boat going no matter what happens."

Where do the Askew brothers fit into the squad? "Our main job is to make sure the boat gets to the starting line," David says, with a laugh. "We write checks."

Kidding aside, he says they both steer, spending about half of each watch on the helm. When they're not on the helm, they're grinding winches or trimming sails. Sheets are never cleated. "We work the boat really hard," David says. "We have to be in some kind of shape to grind winches. If someone is missing from the handles, you are expected to jump in there."

For *Wizard's* 2019 trophy haul, the crew roster included Volvo Ocean Race veterans Charlie Enright and Mark Towill. Will Oxley, of Australia, a highly experienced veteran of the offshore game, is the team's navigator. Richard Clarke, of Canada, an Olympic Finn sailor and round-the-world veteran as well, is also a key member of the team. Roy Pat Disney and Ralf Steitz joined the *Wizard* crew for the Fastnet Race.

"The number of people we have sailed with over the years has been absolutely amazing," Peter says. "It's special to sail with guys with so much experience, guys who are at the top of their game."

Naturally, surrounded by such experience, the ride is often thrilling, Peter says. "After three days of going 28 knots, you get a little frazzled, but you never feel out of control," he says. "We take a reef pretty early in 20 to 22 knots."

His brother has a different take: "The amount of energy this boat has is amazing. I couldn't even look up at the top of the mast when we were reaching along in 30 knots of wind because it was moving around like I've never seen."

During the 2018 Rolex

When they're not on the helm, they're grinding winches or trimming sails. Sheets are never cleated.

Sydney Hobart Race, David recalls the adrenaline of racing in 30 knots: "The sea state was all screwed up, and we were planting the bow into the waves. Our Number 3 [headsail] exploded. Everyone looks around and says, 'Hmm, maybe that's telling us something.' The next thing might be the rig, so we throttled back. To me it seemed like the boat might explode. Literally. I couldn't understand why the boat did not break; it just kept going."

David admits it took several more races to finally feel comfortable with the energy in the boat and its ability to withstand punishing conditions. "The guys who race these boats around the world understand this, and that is why they are able to do 600-mile days," he says. "With

this type of sailing, the weakest part of the boat is the crew."

While the Volvo 70 was essentially a one-design purpose-built boat for the round-the-world race, the Askews have had to adapt it to handicap-rating rules, which is a challenge unto itself, given the different rules used by events. "For different regattas we use different rules," David says. "We have different modes regarding sail selection. For example, if we are going to be doing windward-leeward courses, we will sail with a masthead code zero; but if we are going into the North Atlantic, then we have a lot of reaching sails. We have a thing called a 'J zero' that we put out on a strut to leeward. In ORR, we can't use it. I wish there were just one handicap-rating rule, but it seems every part of the world has its own rule."

The Askews and their team have received several honors for their achievements. World Sailing presented them with the 2019 Hempel Team of the Year Award; the New York YC awarded the brothers with the Mosbacher Trophy; the Royal Ocean Racing Club named *Wizard* the RORC Yacht of the Year; the Bayview YC honored them with the R.W. Jeffery Memorial Trophy; and, at this writing, the two brothers together are one of three finalists for US Sailing's Rolex Yachtsman of the Year award. For these motivated sailors, 2019 was an outstanding year, with many goals accomplished, and they will continue to be in the forefront of racing for the next several years, they say. David will join Sandy on her IC37, while Peter plans to continue campaigning *Wizard* in the Pacific and Caribbean.

Yes, for the Askew family, the sailing never stops. ■



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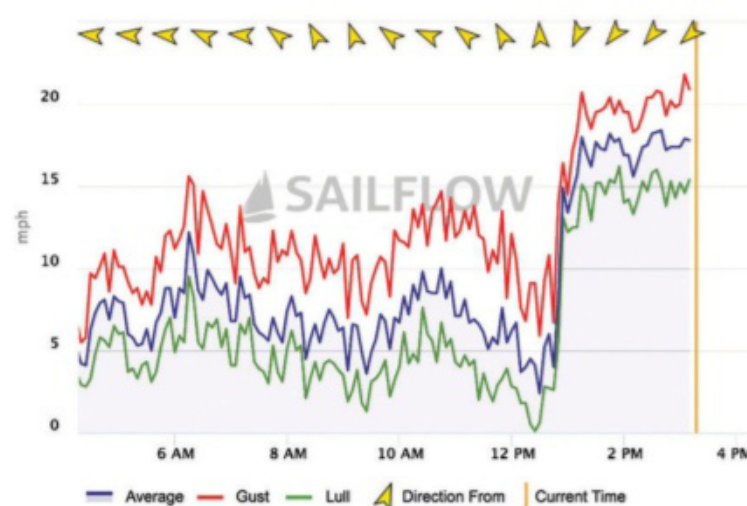
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Time to Upgrade

A movement is afoot to groom the landscape of community sailing centers across the United States using better boats and top-level instruction

■ “Transformational” is only a word—unless it sticks. Tom Siebel wouldn’t aim lower. He’s had a great run in tech, lately in artificial intelligence, and he’s out to make a difference. Typical of tech-sector folks, Siebel is fond of another word: disruption. Here’s a guy who has sailed all his life, raced MOD70 trimarans, campaigned a J Class yacht, raced whatever because “sailing is magical,” and now,

in partnership with US Sailing, he’s launched a nationwide initiative funding quality boats and quality coaching for community sailing venues: the Siebel Sailors Program. Two more words—opportunity and diversity—are also in play. Familiar words. Some people hear them too often, to no effect. What we haven’t seen before is what is on tap now—well-funded levels of resource

and support. Maybe, just maybe, this has legs.

As skies warm and the season kicks off, there will be networks operating around five regional centers, including the Columbia Sailing School in Chicago and DC Sail in Washington, D.C. Two more are in the lineup, South-Central Florida and the Pacific Northwest. The Siebel Sailors Program soft-launched this

past fall on San Francisco Bay, where three fleets of new RS Fevas took to the water, and young Anna Novolt, drying off from her first sail, was inspired to declare, “I don’t know when

Natalie Novolt and Enya Hanrahan christen one of Treasure Island Sailing Center’s new RS Fevas, acquired under the Siebel Sailors Program.

PHOTO: KIMBALL LIVINGSTON

I've been more excited about a boat."

And for once, the boat is key—but there's much, much more.

Twenty-one years ago, Carisa Harris Adamson founded the Treasure Island Sailing Center, where she and Siebel recently presided over the ceremonial launch of the Siebel Sailors Program. Adamson has nurtured her baby against long odds. In welcoming Siebel as a bolt from heaven, she noted that community sailing efforts "have done the job of growing the base, but we have difficulties keeping kids." In particular, programs lose tweens when they outgrow their singlehanded trainers and perhaps have the skills for a big-kid boat, but they're too scrawny to right the boat from a capsize. Then they struggle, or disappear. Not only in community sailing.

The junior program at my yacht club, St. Francis, has stumbled over this for years. And I'm careful in what I'm about to say, because the longer someone has been in youth sailing, the more likely they are to growl if you suggest a new type of boat. But the Feva—a doublehander with an asymmetric spinnaker for apparent-wind sailing—is going to matter. Scrawny kids can right it from capsize. If that was their only special quality, it would be enough, but Fevas are also a fast, 21st-century answer to how to hold a kid's attention. Fevas are already big in Europe and growing in the United States. Siebel is taking them national, targeting that vulnerable middle school age, and I'm a believer. More on the boats later.

The Siebel program developed through brainstorming with leadership at US Sailing. How can it make a difference? Today, the manager for the national initiative is Blair Overman, and coming from a community sailing background herself, she says: "It's not as though Siebel Sailors will be teaching anything drastically different. Rather, we're

Programs lose tweens when they outgrow their singlehanded trainers and perhaps have the skills for a big-kid boat, but they're too scrawny to right the boat from a capsize.

intentionally hiring high-level people to work with kids who may not have had high-level teachers before. Beginners at sailing centers sometimes get the least of the instructors, but our beginners are going to get the best." Think less chalk talk and more engagement; some coaching to win but a lot of adventure sailing.

"Each region is different," Overman says. "They have different paths, but the goals are the same: to appeal to more kids, and more kinds of kids, and to keep them coming back and to connect with their families. That won't come easily. There's no formula. We're attuned to training instructors in how to interact with people who are different from them. This is not just about sailing.

It's about recognizing that a kid who shows up lethargic and cranky maybe hasn't had a meal all day, and until that kid is fueled up, there's no use trying to teach."

Situations of that sort are sure to arise, because one of the conditions for a program to be accepted is a promise that at least 50 percent of participants will come from disadvantaged neighborhoods. "Stacey and I invest in new things," Siebel says. "We don't give to the opera. We try to create, so what we're doing in creating the Siebel Sailors Program is consistent with the giving we've done before."

For example: A Siebel-funded campaign educating adolescents about the ugly realities of methamphetamine use ran in eight states and dramatically reduced methamphetamine usage. "It wasn't about scaring kids straight," Siebel says. "It was about teaching the consequences of meth as a consumer product, what it does to your body, your life, your looks. Methamphetamine rates in Montana dropped 70 percent."

Siebel-funded stem-cell research has produced its own dramatic results in cure rates for specific cancers, so why not take a shot at a Tom Siebel obsession, the transformative power of time on the water under sail? "You want to know that it can scale," Siebel says. "We bought 125 boats for five hubs in the first year. In 2020, we want to double down with another five hubs and another 125 boats. And my hope is that in 10 years, this will be transformative nationally. I started sailing on Lake Michigan with my dad when I was 8. When I was a teenager, the other kids and I would look for a buster so we could go out in a gale and get our teeth kicked in—the teamwork, the terror, the joy...yes, nothing short of magical."

At the Columbia Sailing School, Kurt Thomsen sees the Siebel program as fitting right in. "We have STEM teaching, but it's always been a problem getting scholarship money to bring

in the kids, and we're hoping this means we can expose more of them, and then pay attention to the kids who take to it. Last year, we had 600 in our field-trip program, and we were able to get them sailing maybe one time. Now we can do more, and for a lot of kids, the Feva is the perfect stepping stone."

Brian McNally, at DC Sailing says: "I can't overstress how grateful we are to be able to engage kids we'd otherwise have missed. We've had just 20 FJs for all our adult and kid programs, including 10-week spring and fall high school sailing for 30 schools—the entire tristate area. With Fevas we can teach advanced skills, and yes, it matters to have top-level coaching."

The format is to equip each Primary Center with Fevas and to equip each Supporting Center with Fevas for adventure sailing, also for racing as opportunity presents. Chris Childers is the Siebel coach for San Francisco Bay, with TISC as the hub and Alameda Community Sailing Center (in the East Bay) and Golden Gate Sailing Foundation (in the West Bay, at Golden Gate YC) in support. Childers believes that "Fevas are the perfect boat to start kids in doublehanded sailing at an age when they're very social and want to be with other kids. They can begin doublehanded sailing earlier than they would in a boat like an FJ. We can do more to develop them going forward. Imagine the cohort of sailors 20 years from now who have been doing apparent-wind sailing their whole lives."

The chair of the junior program at an establishment not far from Golden Gate YC, also party to the conversation, was heard to mutter something like: "Apparent-wind sailing? Trainer for the 29er? That's exactly why we're getting Fevas for ourselves. Bring it on." ■



Both trimmer and helmsman must keep an eye on the spinnaker to maintain its designed flying shape. If it doesn't look or feel right, it's probably a windshift, so don't wait to make an adjustment.

PHOTO: PAUL TODD/
OUTSIDE IMAGES

■ The spinnaker provides an excellent cue to driving well downwind. With its light material and large projected area, it can tell you a lot. Does it look powered up and smooth? Is it falling out of the sky and wrinkly? Is there a sudden luff curl with no ease? Is the kite trimmer easing with no curl forming? Vince Brun once told me that the spinnaker is designed to have a flying shape, and you always want to keep it powered up enough to maintain that shape. If you're going really low in lumpy conditions, and the kite's bobbling all over the

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place and it looks distorted, you're not sailing it how it was designed. Conversely, if you're sailing too hot of an angle, you're not only sailing extra distance, but the overtrimmed kite is choked and the leech is hooked. It wasn't designed to be trimmed that tight. Between those two extremes, there's a sweet spot, and that's where you want to be.

Here's the cycle for typical displacement-mode sailing: Let's assume that you're sailing with the chute in its proper flying shape, and you're doing 6 or 6.1 knots. You get a nice puff, you bear away and soak low. At some point, the speed is going to crash. You need to head up before that crash happens.

Better drivers will head up just before the spinnaker trimmer starts getting light on the sheet. The first clue is that the kite starts to lose a little pressure. You can tell because it starts to look slightly less

firm, and will eventually start drooping and then wobble. It also might get closer to the boat as it droops. Just like upwind, the speed goes down slowly at first, from 6 knots to maybe 5.9 or 5.8, and then it drops dramatically.

Don't get fooled into thinking that if you wait long enough at this low angle, the speed will come back. The only thing that could potentially save you is a puff or header, but this is rare. You have to be prepared to scallop downwind. Instead of crashing the speed, head up right when you see the speed start to drop rather than waiting until the speed gets low. Or better yet, if you have a keen feel or have noticed the pattern for the day, head up just before the speed drops more than a tenth or two.

The best drivers communicate with the crew about intended driving to get help with crew weight—or they let

Better drivers will head up just before the spinnaker trimmer starts getting light on the sheet. The first clue is that the kite starts to lose a little pressure. You can tell because it starts to look slightly less firm and will eventually start drooping and then wobble.

the spinnaker trimmer's calls guide the crew. Either way, it's faster if you have a coordinated effort of steering with your weight.

If you want to steer up, have the crew lean to leeward. If you want to go straight, make sure the boat is flat. If you want to bear away, have a few people move slightly to windward. Make sure your steering and the crew's weight shift work together. If they're out of sync, you'll be working against each other.

As you head up, aim a degree or two higher than the optimal angle to power the kite back up and get the speed back up to 6 or 6.1. Once everyone is hiking, you'll start soaking again, all the while watching the spinnaker to determine when to come back up to your baseline angle. A well-coordinated team helping steer the boat at the perfect time is very fast. The crew should be alert

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SLIDE BETTER,
ROLL BETTER
OR FLY BETTER...**

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IT.



and listening to clues and conversations between the trimmer and the driver. There's a tendency on a lot of boats for idle crews to sit on their bottoms downwind, but if the boat's setup allows, it's good to have the crew on the balls of their feet, crouched low and clear of the helmsman's line of sight forward. Being ready to shift and adjust their weight immediately will make a big difference when shifting between different modes. Ideally, with dynamic crew-weight movement, there will be minimal—if any—rudder movement, which we know is fast.

Just like sailing upwind, managing shifts and steering correctly through them also separates good drivers from great ones. For instance, I'm sailing along and suddenly, the spinnaker luff curls, even though the trimmer hasn't eased the sheet. I just got a header. That wind-angle arrow

pointing from the back corner of my boat just went forward. Downwind, that's good, because I want to sail headers, but I'm now sailing too high with a curl.

Not-so-great drivers will allow the trimmer to bring in the sheet, compromising the flying shape and sailing extra distance. Most likely, the speed will increase, but now you're not sailing the best VMG. Better drivers will bear away, make the curl disappear, and maintain the spinnaker's flying shape.

It also really helps if the spinnaker trimmer communicates with the driver, saying something like, "Nice header here," which cues the driver to immediately bear off. If the driver is looking at the spinnaker with the same intensity they look at the jib telltales upwind, they will probably detect the shift at the same time the trimmer gets it, and immediately bear off without having to be told or having the

If the driver is looking at the spinnaker with the same intensity they look at the jib telltales upwind, they will probably detect the shift at the same time the trimmer gets it.

trimmer make an adjustment in the spinnaker sheet.

Let's now look at the opposite situation. I'm cruising along, everything's nice, and the spinnaker trimmer has the ease/curl/trim cycle going, as they should. There's a nice pattern to the puffs, but on the next ease, there's no curl. The trimmer eases some more, but still no curl. I just got a lift.

That wind arrow shifted back toward the rudder, making me sail closer to dead downwind. It's as if I bore off with no wind-shift. Now I'm sailing lower and slower. What to do?

Because the wind shifted back behind the boat, and because the spinnaker sheet has been eased, the spinnaker is no longer at its perfect flying shape (and remember what Vince Brun told us already). This one is a little harder to detect, but if you are dialed in and watching the kite, along with using your peripheral

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The WEST SYSTEM Fiberglass Boat Repair Kit has everything to you need to repair cracks and scrapes, gelcoat blisters, loose hardware, delaminated decks and panels, damaged keels and holes up to 1" diameter in solid laminates up to 1/4" thick, and smaller holes in thicker laminates. Each Fiberglass Boat Repair Kit contains eight packets of WEST SYSTEM 105 Resin and 205 Fast Hardener, fiberglass fabric, adhesive filler, fairing filler, glue brushes, mixing pots, a reusable mixing stick, an application syringe, three pairs of protective gloves and illustrated instructions for completing a variety of common fiberglass repairs. All components are contained in a sturdy, resealable package that can be easily stowed aboard your boat.



vision to see the trimmer repeat his or her easing cycle, you'll know you got a lift.

It's not as obvious as getting a header when the chute luff starts to curl. But another sign to help you decipher the lift is that the boat suddenly feels a bit dead, like you hit a lull. Lulls and lifts actually feel decidedly similar. Both require you to head up to keep moving well. But tactically it's nice to know the difference in case you want to jibe.

Like getting a header and immediately rolling into a tack upwind, if I'm thinking of jibing downwind and get a lift, it's the perfect time to roll straight into the jibe. I save degrees in the turning radius, which is fast, and I'm sailing the headers as I'm supposed to be doing downwind. Exiting jibes onto headers feels great, and you can instantly tell you're doing the right thing because you'll feel the power in the boat and

you'll be aiming more toward the leeward mark.

I will never forget training against Paul Foerster and Bob Merrick in Sydney, Australia, before the 2000 Olympics, where they won a silver medal. Every day we had a long downwind sail to the practice area, and of course we raced the whole way out. We had to make good use of our time.

During the downwind shifty sail, whenever I thought, *Did I just get a lift?* and I started to head up, I heard their sails popping onto the new jibe. Looking under the boom, I would see them sailing away on a header, having gained a few lengths. A few minutes later, the same thing would happen. They were so in tune with the wind angle, instantly jibing on the lifts and gaining huge. If you are sailing on the super-long tack or happy with where you are going, head up when lifted to keep speed. But if you are

Exiting jibes onto headers feels great, and you can instantly tell you're doing the right thing because you'll feel the power in the boat and you'll be aiming more toward the leeward mark.

thinking of jibing or the lift is huge, jibing immediately is a big gainer.

Upwind and downwind, precision driving is the result of the driver thinking about their angle to the wind, heel angle and speed. You're never going to get it perfect the entire race, but no one else is either. If you can keep the boat in the sweet spot 90 percent of the time, taking into consideration all of the factors discussed above, and everyone else is doing it less of the time, you're going to beat them.

Next time you steer a boat, pay more attention to the jib telltales upwind and the spinnaker downwind, and let them guide your decisions while feeling the speed and power in the boat. Drive with more precision picturing the wind angle as an arrow pointing at your boat, and try your best to keep the boat in the sweet spot at all times. ■



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FROM THE EXPERTS **TACTICS**
BY MIKE INGHAM

Clear Calls, Clear Tactics

Good onboard communications require using the right words at the right time

■ Imagine this scenario: You get a nice start, tack to port and are executing your strategy to go right. Congratulations. Suddenly your bowman shouts: “Starboard tacker!” Your tactician failed to account for the possibility that the boat to leeward might tack.

“Should I tack?” you ask urgently, hoping for some help.

“No, don’t tack!” your tactician responds. He wants to stick to the go-right plan. But now it’s definitely too late.

You shout, “Tacking!” and then shove the helm over hard. It’s the only option that does not end with a repair bill. The lousy lee-bow leaves you pinned and going the wrong way.

Changing tacks or jibes, and continuing or staying on the same tack, are the two major tactical moves in every race, with each modified by qualifiers. When changing tacks, a timing or placement qualifier modifies the execution. For example, “lee-bow tack” hands control to the driver to tack in a specific spot, whereas “tack in 3,2,1” plants the tack where your tactician specifies. When “continuing,” the qualifiers are modes. It might be a sustained “height mode,” for example, which allows you to stay above a leeward boat, or it might be a temporary mode change through a maneuver, such as calling for a “duck.”

Consistent phraseology is important. Suppose you’re in the same situation going right, but this time the other boat is identified as a potential problem. The “if-then” statement language should be as simple as possible while still describing the situation, making the call, and reinforcing the call with a

short explanation.

Let’s revisit the situation: The tactician says: “There’s a blue boat below. When they tack they will be a starboard problem.”

The right call should be: “If they tack, then duck.”

Leave a short pause to let it sink in, then provide the explanation: “Our plan is to go right, so stay on port whatever happens.” There is no doubt what the next move will be, and everyone is ready. Your bow person knows to keep an eye on that boat, and can say, “Blue boat is tacking” as soon as he or she sees any hint of a tack.

At which point your tactician says, “Duck.” Almost simultaneously, your driver reinforces the plan while starting the turn and easing the main by saying, “Ducking.” Besides reinforcing the call, the explanation defines the desired outcome, and thus, it leaves wiggle room for your driver to make an audible. Suppose the blue boat has a bad tack.

As before, your bowman says, “Blue boat is tacking,” followed by “duck” from your tactician, but this time, the driver sees a fumbled tack and says, “We can cross.” By doing so, he overrides the duck and everyone goes back to their jobs.

If-then statements are not only for traffic-management situations; some days wind-shifts come quickly, and you’ll want to handle them proactively. For example, “If you get a big header, auto-tack,” your tactician says on one of those blustery and shifty days.

“Copy. I’m rolling into a tack when the jib backs,” the driver replies. He or she is confirming the call while also alerting the

rest of the team. The trimmer keeps the jib uncleated, ready to release.

The bowman calls, "Big puff coming in 3,2,1—puff on!" Your driver says, "Tacking!" without having to bear off trying to re-fill the jib while waiting for a call. Moments later, you're up to speed on the new tack.

Wind and traffic are in constant change, so our if-then statements must be adaptable. Let's look at our first scenario again: This time, the blue boat doesn't tack early, and now you are both almost to layline. "If the blue boat tacks, then we lee-bow," your tactician declares. "We are already right, and we don't want to get stuck overstood."

The crazier the wind and the closer the traffic, the more urgent it is to give a clear if-then scenario, but even without urgency, it's comforting to hear. "We are playing oscillations," the tactician says, restating his pre-race strategy. "We are at 305 degrees, up 5. If we get to 300 or below, then we tack." Stating the next move allows your team to focus on speed with confidence, knowing the tactician is in full control.

Whether forgetting to make the call, or not stating it, the lack of an if-then warrants a reminder from the helmsman to spur the tactician into action by asking, "What are we going to do if the blue boat tacks?" Some calls might be the start of a conversation. "If the blue boat tacks, we are going to lead her back," the tactician might say.

"I though we really wanted to go right?" someone asks.

"Oh, yeah...right," the tactician says before correcting himself: "If the blue boat tacks, we are going to duck."

Similarly, a tone of uncertainty should spark a strategic reevaluation discussion: "If the blue boat tacks, then we duck," your tactician says, but this time, he appears anxious.

"You don't sound so sure," the skipper replies, which should start a deeper conversation.

"Yeah, I'm not so sure. It

looks kind of glassy ahead," the tactician says, confirming they could use some help. Fortunately, if your tactician forgets, makes a suspect call or things are getting tricky, it's never too late to ask questions to make sure there's a plan and a path to execute it.

Some tactical calls have more than one "if" variable. For example, "If the blue boat tacks, or if we get a header, then tack," gives several reasons the team should expect to tack. Some calls combine a few "then" moves. "If the blue boat tacks, then duck and go into height mode" keeps you from falling into the backwind of a boat that is just ahead of the blue boat.

Plan B is your predefined if-then after a start. It's mostly a statement about how much you want to execute your first move. When it's imperative to go right, for example, Plan B might be: "If we are second row, then still expect to tack promptly, even if we are tacking into bad air." Alternately, if the right is not worth fighting for, Plan B softens: "If we are second row, then we will hang in there until things thin out."

To close any communication loop, a simple "copy" works fine. Even better is something along the lines of: "Copy. Ducking when the blue boat tacks," which confirms that you really know what the plan is. At times, as the helmsman, I am so focused on going fast that I inadvertently tune out everything else. Having heard no confirmation, a loud: "Hey, Mike. You got that?" leads to me sheepishly ask for a repeat. Never assume a call is heard and confirmed.

If-then statements put you in charge of the part of the race that's in your control. You can't control your competitors; expect the unexpected because their move will often make no sense. Mother Nature is going to throw her curveballs despite what your wind app says. As you progress around the racecourse through traffic and shifts, if-then statements manage both anticipated and surprise changes perfectly. ■

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Sail Controls, Cause and Effect

To be consistently fast around the racecourse,
tap into the right mode for the right time by
making the right adjustments

■ After a successful day of one-design racing, I'm often asked: "What base numbers do you use?" and "What were your rig settings today?"

These are common and valid inquiries, and like tuning guides, they're a great place to start when initially setting up your boat. But at the end of the day, your better-than-average speed usually comes down to knowing how to adapt, on the fly, to changing conditions. It sounds

pretty simple: First, identify the problem—inability to point, lack of speed—and then look critically at your setup to find a solution. But there's a lot more to it than that.

Let's start with a basic principle: A boat is either looking for power, in perfect power or overpowered. You must be able to recognize which is the case in order to figure out which changes to settings must be made to improve your speed



The Etchells is hypersensitive to subtle control changes, requiring a top crew to constantly adjust and evaluate when switching between modes.

PHOTO: PAUL TODD /
OUTSIDE IMAGES

and VMG. From there, you must understand cause and effect: “If I adjust this, then that happens.”

Make sure you’re clear about what each control does and how it affects the sails,

Better-than-average speed usually comes down to knowing how to adapt, on the fly, to changing conditions.

the boat’s balance, and thus, VMG. Remember, for the most part, only slight adjustments are needed to make a change. Following the KISS (keep it simple, stupid) rule, here’s a quick guide we use on our Etchells, but much of it is applicable to other boats.

Traveler: Changes power by adding or reducing heel and changes weather helm. It can add drag to the sail plan if too high.

Mainsheet: Changes power by adding or reducing heel and weather helm. Also tightens the forestay because the mainsail’s leech shares some load with the backstay.

Cunningham: Depowers the mainsail as it pulls the draft forward, thus flattening the sail aft. Generally reduces drag and removes “overbend” wrinkles from excessive backstay.

Outhaul: Changes the mainsail camber down low. Increases or decreases power and drag.

Backstay: Changes the mainsail cambers more uniformly. It also changes the twist in the mainsail leech as

the mast bends. It can rapidly affect power, which is helpful when increasing or reducing heel. It also tensions the headstay, which controls power in the jib.

Jib sheet: Changes leech tension while also slightly changing the cambers. Be careful not to ease the sheet too much, or you can make the top flatter with twist while keeping the bottom to full.

Jib lead: Changes depth and power in the jib, mostly in the bottom two-thirds. It changes twist, so make sure you check the jib leech after adjusting the leads.

Jib halyard: Similar to the cunningham, it changes the draft position and overall depth of the sail. Beware that as you tighten the jib halyard, the leech can get tighter, reducing twist.

Inhaul: Changes the proximity of the jib leech to the mainsail while also changing the angle of the jib to the wind, allowing you to point higher when used. If you are overpowered and the mainsail is depowered to the point that it luffs, let

off the inhaul until the main settles down.

Jib tack (cunningham): Tightens luff by pulling draft forward, and flattens the back of the sail slightly. It can also create a small amount of twist.

Mast ram: Changes the cambers of both sails. It bends the mast down low. In the mainsail, it affects fullness in the lower sections, and in the jib, it affects headstay tension. Letting the mast bend farther causes the headstay to sag farther.

Let’s now take a look at these adjustments in action on the course. You’re going upwind shortly after the start in a tight lane, and you need to sail a little higher to hold that lane. Accept that you will go a little slower by sailing higher. If it’s windy and you are overpowered, you can generally sheet a little harder on both sails. That increases power, but by sailing higher to the wind, you are reducing power. Generally it will be a small net loss in VMG as you sail slightly higher and slightly slower, but you

Second Opinion

Andrew Palfrey, a two-time Etchells World Champion, Star Olympian and grand-prix coach, offers these tips for better upwind speed.

Balance and power, in harmony, are key. Keep in mind the vertical distribution of power, particularly when overpowered. For example, in higher true windspeeds, keep depth and driving force low in the sail plan to get through waves, while ensuring that the upper part of the sail plan is all about reducing drag.

Develop a tuning guide specific to your boat. Every boat will have a slightly different balance due to the slightest difference in the underwater foils.

Invest time (and even some money) on the basics of accurate foil and mast alignments. This is the building block of consistent performance. This is my primary focus when I am involved in a new build.

It is getting easier these days to quantify fast sails (and even rig to foil alignment) digitally. If you are high and fast, take a photo of both sails and the major controls, such as the backstay, traveler and inhaul. Simple apps to analyze sails such as the SailCloud are available for a fee. It is no longer the realm of only the sailmaker or pro coach. This will really help when you get your next new sail. Compare the two scans, and you are in a much more informed position to make any changes to mast setup or to discuss things with your sailmaker. Get facts and data before opinion.

When moding one way or the other, too often people overreact. If moding fast-forward in a boat like an Etchells, aim for only a 1 to 2 percent increase in forward speed. This is the slightest press into the jib, with the major controls sympathetic to the mode. Otherwise the resultant heel and change in balance will have a negative effect. **Keep asking questions**—that is what the best sailors do.

will hold your lane, which will net-gain you VMG later.

In some cases, such as in flat water where there is little chop or waves to slow you down, you can simply sail higher and flatter to achieve this mode without changing anything. While you decrease power in the sail plan by sailing higher into the wind, you also reduce leeway because the boat will be sailing flatter. If the power is perfect and the boat feels balanced, a tiny pinch in on the jib and either a tad of traveler up or mainsheet tension will do it. Pulling the traveler up or tightening the mainsheet adds power to the back of the sail plan, making it easier for the boat to head up.

In chop or waves, mainsheet on often works well, but when it starts to get bumpy, traveler up is better because you often need twist in the main to help reaccelerate after hitting a wave.

If the boat is underpowered, ease the backstay. This will

round up the sail plan in both sails, creating more weather helm, making it easier to head up. As the backstay is eased, the main leach gets tighter and the sail gets fuller. It also adds sag to the headstay, which results in additional shape and power in the jib. Pro sailor, Steve Hunt, a four-time Etchells champion, cautions that the backstay and mainsheet always go hand in hand; if you adjust the backstay, immediately consider adjusting the mainsheet.

Now that you've held your lane and are now free to go anywhere. The left side of the course is favored, so you need to sail "fast forward" to the left. This is accomplished by sailing slightly lower but faster through the water. It's a similar VMG to the mark, but it gets you the positioning farther to the left side of the course. If overpowered, add backstay and let the traveler down. Just "lay" on the jib slightly, making the

The backstay and mainsheet always go hand in hand; if you adjust the backstay, immediately consider adjusting the mainsheet.

leeward telltales start to dance. Easing the traveler and pulling on the backstay will reduce power and drag in the back of the sail plan, allowing the boat to bear away slightly without healing over more. That results in a faster lower mode. If the power is perfect, just the smallest change is needed. Ideally, keep the same amount of heel. If the power is perfect, you likely don't want to change the backstay and negatively affect the jib. In this situation, a little traveler down works well. Simply bear away and reduce the drag in the main ever so slightly.

If you're underpowered, you can try simply bearing away slightly. Then the boat will heel somewhat and likely accelerate. Make sure that the jib isn't sheeted too tightly or it might stall. A small ease of the mainsheet can also help; it will help increase headstay sag, thus powering the jib up even more. ■

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Disp	1,240 lb
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SA	168 sq/ft



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LOA	16' 0"
Beam	7' 6"
Draft up/down	6"/22"
Disp	275 lb
Sail Area(main & jib)	185



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LOA	16' 9"
Beam	6' 3"
Draft up/dn	9"/3' 9"
Disp	575 lb



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Draft up/dn	6"/4' 6"
Weight	515 lb



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LOA	18' 0"
LWL	16' 8"
Beam	6' 0"
Draft up/dn	7"/3' 10"
Weight	500 lb



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Beam	8' 6"
Draft	4' 6"
Disp	2,600 lb



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Draft up/down	16' 5' 0"
Disp.	4,250 lb



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Beam	5' 10"
Draft	2' 5"
Disp	1,350 lb



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SA	140 sq/ft
Draft up/dn	6' 3"



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Beam	5' 8"
Hull Weight.	420 lb
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Beam	6' 6"
Draft up/dn	5' 4' 11"
Weight	700 lb



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Draft	3.3'
Weight	1479 lb
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LOA	22' 6"
LWL	16' 9"
Beam	7' 0"
Draft: full	3' 0"
Disp.	3,000 lb



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LOA	15' 6"
LWL	13' 6"
Beam	5' 0"
Draft up/dn	6"/3' 3"
Weight	381 lb.
SA (main & jib)	128 sq. ft.



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SHIELDS CLASS ASSOCIATION
Eric Anderson, President
eric.anderson@form10.com
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LWL	20'
Beam	6' 5"
Disp	4,600 lb
Draft	4' 9"



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Beam	13.5"
Draft	17"
Mast Height	54"
Disp.	9 lb



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LOA	29' 10"
Beam	5' 10"
Draft	3' 10"
Disp	2,300 lb
SA (main & jib)	305 sq/ft
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LOA	34' 6"
LWL	29' 6"
Beam	11' 0"
Draft	6' 6"
Disp	7,750 lb



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Hull weight	243 lb.
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Bullseye National Championship

Aug. 7 – 9 • Fishers Island, NY
2018 National Champions: Chris & Kathryn Collings of Beverly Yacht Club, Marion, MA

Colgate 26 - Offshore Sailing School Performance Race Week

Apr. 19 – 25, 2020 • Fort Myers Beach, FL
2019 Winners: K. Denney, S. Bethune, P. Bethune, D. Bohl, M. Dominguez, B. Gladstone

Comet International Championship

Jun. 15 – 21, 2020 • Bermuda
2019 International Champions: Rudy Bailey & Corey Bean of West End Sailboat Club

Day Sailer North American Championship

Jul. 22 – 26, 2020 • Eugene, OR
2019 NA Champion: Craig Lee of Scuttlebutt Sailing Association

DN Ice Yacht Racing Association 2020 North American Championship

Jan. 20 – 24, 2020
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2019 NA Champion: Ron Sherry

Ensign National Championship

Aug. 8 – 13, 2020 • Marquette, MI
2019 National Champion: Bud Brown of Toms River Yacht Club

Flying Scot NA Championship

Jul. 11 – 17, 2020 • Westport, CT
2019 NA Champions: Zeke & Jay Horowitz of Sarasota Sailing Squadron / College of Charleston YC

Ideal 18 NA Championship

See you in 2020! • Larchmont, NY
2018 NA Champions: Cardwell Potts & Ted Ferrarone of Larchmont YC

Int'l 210 National Championship

Aug. 14 – 16, 2020 • Cohasset, MA
2019 National Champions: Mike Blackwood, Steve Ticknor & Tom VanderMolen of Gull Lake YC

Isotope NC Governor's Cup

Jun. 26 – 28, 2020 • Henderson, NC
2019 Champion: Eric Rasmussen

J/105 North American Championship

Oct. 29 – Nov. 1, 2020 • Annapolis, MD
2019 Champions: B. Stone, N. Breault, B. Higgins, S. Johnstone, H. Richartz, J. Sahagian of St. Francis Yacht Club

Lightning North American Championship

Aug. 9 – 15, 2020 • Cleveland, OH
2019 Lightning North American Champions: Ched Proctor, Samuel Blouin & Monica Morgan

MC Scow 50th National Championship

Aug. 19 – 22, 2020 • Fontana, WI
2019 National Champion: Erik Bowers of Minnetonka Yacht Club

RC Laser Mid-Winter Regatta

Feb. 29 – Mar. 1, 2020 • Marco Island, FL
2019 National Champion: Gerry Cobley

S2 7.9 Annapolis NOOD

May 15 – 17, 2020 • Annapolis, MD
2019 Class Champions: Scott Derby & Tyson Connolly

Shields Ocean – Great Lakes Challenge Cup

Jun. 26 – 28, 2020 • Marion, MA
2019 Champions: Tom Hirsh & Tim Dawson of Newport, RI

Snipe 2020 Western Hemisphere & Orient Championship

Sep. 22 – 26, 2020 • Boston, MA
2019 National Champions: Tomas Hornos & Kathleen Tocke

Star World Championship

Nov. 13 – 21, 2020 • Miami, FL
2019 World Champions: Mateusz Kusznierewicz & Bruno Prada of Poland

Thistle 75th National Championship

Aug. 1 – 7, 2020 • Rocky River, OH
2019 National Champions: Greg Griffin, Mark Reddaway and Amy Thompson

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San Diego Yacht Club
Coronado Yacht Club

Annapolis, MD

May 1 - 3, 2020
Annapolis Yacht Club

Chicago, IL

June 12 - 14, 2020
Chicago Yacht Club

Marblehead, MA

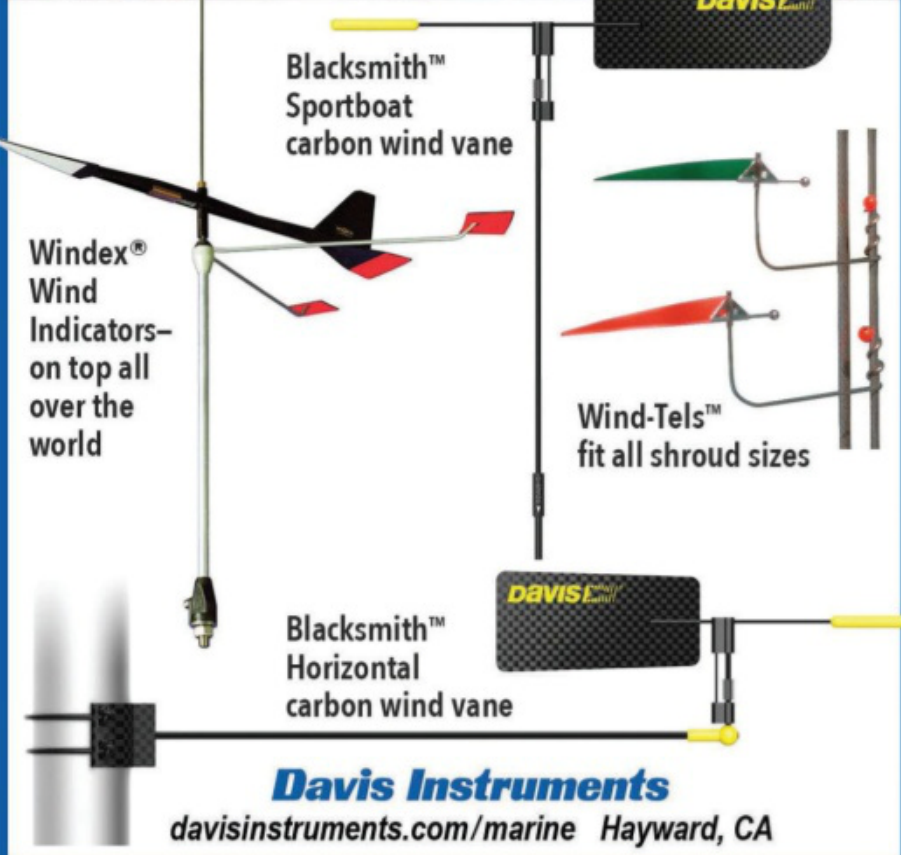
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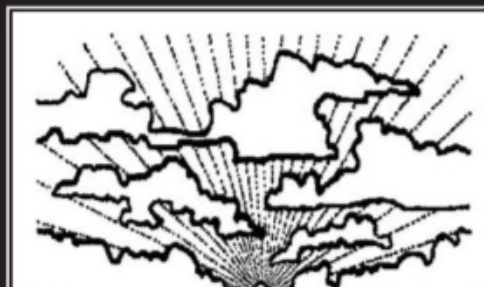
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Number 50 ■ Spring 2020

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The Stradivarius of Drums

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A transcript of a 1979 phone conversation between Jan, Meade and Joel Gougeon which takes place just hours after a freighter rescues Jan Gougeon from his capsized trimaran, *Flicka*, in the Atlantic Ocean.

105 or G/flex?

Each system has its advantages. Don Gutzmer explains how to choose the best epoxy for the project at hand, with a fun quiz at the end.

Avoiding Respiratory Irritation

Glenn House offers guidance preventing overexposure to epoxy vapors in your workshop.

Laminate Repair: Infusion vs. Wet-Bag

What is infusion? How do you repair an infused part? What's the difference between a vacuum-bagged repair and an infused repair? Rachael Geerts breaks it down.

Sea Hood Repair

Terry Monville replaces the rotting core material on the sea hood of his J22 sailboat, *This Little Piggy*.

Morning Sun

An Iosco County youth group builds a plywood kit boat, gets proficient with power tools, and learns how to work cooperatively in tight quarters.

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Joshua mixing a pot of 105/206 epoxy.

Editor's note: safety glasses should always be worn while working with epoxy.

River Hornet

A MiniMax Hydroplane

By Jeffrey Carpenter

In late 2018 my son and I were given a unique opportunity by the Michigan-based Water Wonderland Chapter of the Antique and Classic Boat Society (ACBS) to build an 8' MiniMax hydroplane based on original plans from the early 1960s. Almost anything from that era seems to be popular again. Maybe it's nostalgia or maybe the designs of that groundbreaking decade were just ahead of their time. Either way, the MiniMax's appeal seems as relevant today as it did in 1962. We accepted the challenge without hesitation.

The youth-centric building project commenced in February 2019 at the Grand Rapids, Michigan Boat Show. We were in front of a live audience, and ACBS members generously donated wood and fasteners. Sons and daughters participated and even younger siblings got involved. Those initial marathon building sessions were the start of a nearly seven-month journey to complete our boats.

Joshua and I wanted this boat to last for generations and knew that the most effective defense against deterioration was to encapsulate the structure in a waterproof coating. We were both new to boat building and restoration. The volunteer advisors from ACBS, many with a lifetime of experience, suggested WEST SYSTEM® 105 Resin and 205 Fast or 206 Slow Hardener to waterproof our hydroplane.

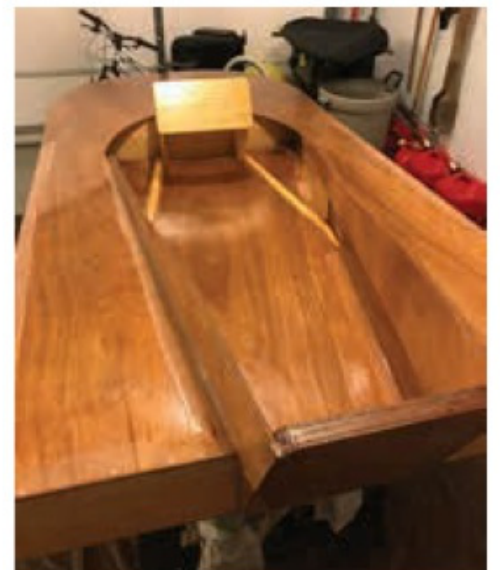


Cover Photo: Joshua and his MiniMax.

A coating of neat epoxy was brushed onto the boat.



After brushing the epoxy on, Joshua tipped the coat with a section of a 300 Roller Cover with a clamp for a handle.



The assembled mini max boat with a coat of neat epoxy.



Rolling out fiberglass to reinforce the bottom of the boat.



Epoxy was rolled on to wet out the fiberglass reinforcement.



Joshua putting his new build through its paces.



One proud kid—as well he should be.

As fabrication moved forward we found many practical uses for epoxy: sealing the flotation compartments, applying fiberglass cloth to the bottom of the hull and critical seams, adding strength to the transom, and ensuring that every square inch of the boat was waterproof. If you have not experienced a small hydroplane it must be stated that you need a swimsuit and a positive attitude as you will get wet. It's all part of the fun.

I have always wanted to try out the process of vinyl wrapping and decided this would be the perfect test case. We selected Edgewraps of Ashley, Michigan and Joshua worked with the staff to design his own custom wrap. The styling is quintessentially 11-year-old boy—lime green, blue, black, and chrome with plenty of hot-rod inspired flames. It's named River Hornet.

Will this boat stand the test of time? Absolutely. The epoxy served as a perfect base for the wrapping process after wet sanding with 220-grit to ensure smooth vinyl adhesion. Under the three coats of epoxy is plenty of fiberglass reinforcement and a lot of sweat equity—perfect for a youth-centered project. Our MiniMax is rigged with period-correct controls, many from Portage Bay Systems of Seattle, Washington, and a restored 1956 Sea King 12hp outboard (manufactured by the Gale division of OMC) that Joshua helped tear down and re-assemble. The motor is complete with a modern safety lanyard and yes, more lime green paint.

This project demonstrates that the next generation of inventors, fabricators, and builders is ready, willing and able to learn new skills. The experience deserves to be celebrated and we hope more youth become interested in this or any similar endeavor.

In August 2019, Joshua displayed his finished hydroplane at the 42nd annual Les Cheneaux Antique and Wooden Boat Show in Hessel, Michigan located in Michigan's beautiful Mackinac Straits region. He represented his accomplishment alongside several other youth projects and their families sponsored by ACBS. The conversations with attendees about their own childhood boating experiences alone was worth the effort. I am proud of Joshua—he is my son after all—but I am equally as proud to have confirmed that today's youth are just as capable as ever.

Thank you for sharing in our journey and best of luck with your own inspired projects.



David Petro-Roy, a member of the Mattatuck Drum Band, and his repaired 1837 Eli Brown rope tension drum.

The Stradivarius of Drums

By David J. Petro-Roy

I restored my 1837 Eli Brown rope tension drum using WEST SYSTEM® Epoxy to repair a longitudinal crack running about a third of the way around the drum shell.

From at least the late 1600s to about the mid-1800s, the Brown family of Windsor (now Bloomfield), Connecticut made rope tension drums to supplement their income as farmers and coopers. Over time, these drums have become highly sought after. Their unique sound and rarity has earned them the distinction of being the Stradivarius of rope tension drums.

To date, only about 90 of the Brown family drums have been accounted for. Some are owned by museums and historical societies. Others, such as mine, are in private collections. Many others are owned and still played by ancient fife and drum corps such as the Mattatuck Drum Band (mattatuck.org) of Waterbury, Connecticut who, having been formed in 1767, purchased many Brown drums new. I am proud to be a member of the Mattatuck Drum Band and I will be playing my restored drum in future parades and concerts.



The drum in its purchased condition.



The drum has been stripped in preparation for the repair.



Another of my projects using WEST SYSTEM was my mailbox post. I was tired of the snow plow trucks knocking down my mailboxes so, as a hobbyist welder, I built a mailbox post

out of steel using square tube, box tube and angle iron. I wanted the post to look like wood. To avoid grinding an excessive amount of welds, I affixed a number of components as well as all the trim work using Six10® Epoxy Adhesive. I believe I achieved my goal. WEST SYSTEM products are "bulletproof" and my post has already withstood our first major snow storm here in the northeast.



The drum had a severe crack a third of the way around the drum on the grainline.



WEST SYSTEM 105/205 was injected directly into the crack and clamped to cure.



Surviving FLICKA's Capsize

Part 1

On Wednesday, June 20, 1979, while sailing in a qualifying race for the OSTAR (Original Single-Handed Transatlantic Race), Jan Gougeon's self-designed and built 31' trimaran FLICKA was capsized by heavy seas in the North Atlantic. Jan survived on the overturned plywood/epoxy multihull for four days before he was rescued by a passing freighter. The following is the transcript of a phone call between Jan, his brothers Meade and Joel, as well as fellow multihull designer/sailor Mike Zuteck. Their discussion takes place on June 26, 1979, just hours after the freighter that rescued Jan delivered him to dry land.

FLICKA was never recovered.

We've divided their lengthy discussion into two parts. In this first installment, Jan discusses FLICKA's capsizing, what it was like surviving in the upside-down trimaran.

Jan Gougeon: The wind is shifting around to the Northeast so I figure if I can make good enough time I can get across the Gulf Stream before the Northeast wind. Absolutely, if it is blowing strong out of the NE you just don't go across the Gulf Stream. It's that bad.

So, Wednesday morning after I got my sun sights... going there was really a hassle

but on the way back, man, I had the sun sights right. I was really gung-ho on the navigation thing. I was getting close to the Gulf Stream and it was getting pretty late and the wind was picking up strength. I decided I wouldn't sail across and instead I would hove to.

I was hove to and playing around with letting the boat lay beam to the sea. That

was absolutely treacherous. A trimaran, one thing it can't do is lay beam to the sea in any condition. It absolutely can't do that.

Meade Gougeon: What was happening?

Jan: OK, here's what the deal is when you lay a beam to the sea: as the wave comes it picks up the center hull and the outrigger. There is no weight on the outrigger but you are heeling 50 degrees instantly. That's the flow of the trimaran—you can't be beam-to-sea, you've got to be nose-to.

Right away I said, Huh, I can't be beam-to-cause I'm going to tip over instantly. So I put the main[sail] up and put two reefs in the main and took all the headsail off and the two reefs in the main. I tied the tiller over.

It was absolutely perfectly sitting there. And then I went down below and made something to eat and the boat almost tacked on me. So I said, boy, if it ever tacked on me, it would bear off on the other tack and go roaring off downwind and tip over on the other tack. I took the ties off the tiller and I let the tiller go stop-to-stop. It still stayed beautifully head-to-wind. It was sitting there like a duck on a pond. The motion was so comfortable and everything.

All of a sudden the sun came out so I ran down below, grabbed my sextant, got up there and took a sight. I was working out the sun site down below and all of a sudden a wave a little bigger than the rest came along and broke just as it got under the boat. I mean, it flipped me over so fast that there was no... the centrifugal force was so great that it would be like the Loop-O-Plane [carnival ride]. You're standing on the bottom of the boat looking down at the water but you are not falling down yet, you know what I mean? In other words, the boat isn't using its outrigger at all.

The proa* is the way to go. Absolutely, it is the way to go. I've got this neat boat all

dreamed up already. I'll show you when I get home. It's self-rescuing, self-righting, won't sink, and you can get out of it. It's got all the answers to everything in this multihull thing.

Anyway, the trimaran—no one has figured out the answer until now. No one has said why they tip over; I absolutely know why they tip over. I can make a little model and a diagram and show you instantly why they're absolutely treacherous if you leave them beam-to-sea. Absolutely treacherous.

Now, the next thing is, what you do right now, is lookup in the catalog for *Adagio*** and you order one of the hand-held VHF radios. You do it today, don't wait until tomorrow. You do it today. You don't buy any flares. You take all the flares you own and throw them in the Saginaw River. Take all the smoke signals and throw them in the Saginaw River. Take all that space [the flares used] and put radios there. Radios are the only thing that work.

Get this little hand-held VHF radio and build a little plywood box that it goes in. The top of the box is glued right in there with 1/16" birch plywood and it is tied in the boat somewhere so it stays dry. All that happens now—if you ever flip over or anything—just take your jackknife and cut the top off, take out this little VHF radio and you can talk to the ships. I actually shot a flare so close I thought I was going to burn the ship up. It didn't see me. The only flare to get are the parachute flares. If you're going to have flares, have parachute flares.

Adagio sailing in the Gougeon Brother's Multihull regatta in 2019.



*Proa—a boat with a single outrigger/ama.

** Adagio—Meade's 35' trimaran, designed and built by Meade and Jan Gougeon in 1969. It is still competitively racing on the Great Lakes.

Meade: So, how did you finally get hold of this guy?

Jan: OK, Gram [the Gougeons' maternal grandmother, Olive Delong] is up there. You got to believe that she's there. It's the only way. This ship was further away than the rest and the ships sailing along. By this time, I decided that the only way anyone is ever going to see me is I'm going to build big piles of stuff on my boat. So I started dismantling the boat and putting it all on the bottom. There is stuff stuck all over: foul weather gear flying off, little shrouds. I'm working so hard building all this stuff on the bottom of the boat that I don't—

Meade: OK, is it rough now or what?

Jan: Oh, it was blowing 24 knots. The seas are crashing right over the boat. You can't even imagine what it's like to build this stuff.

Joel Gougeon: How did you hang onto it?

Jan: It was just, you know, bare guts and, you know. When it's your life, it gives you a great amount of strength.

Meade: Have you got lines strung around the boat?

Jan: No, you can't do any of that. You're just lucky to even hang onto the boat.

So anyway, it took me one day. When the boat tipped over the mast imploded and then came up to leeward and busted one of the trampoline boards, so I used that as a spar. It took me the better part of a day to erect that with three ropes. You can imagine what it was like. I finally got that thing up. I also took the speedo[meter] tube out and I put my man-overboard pole in the speedo tube, see, with a flag flying.

I saved three lights and I immediately took them in the cabin and took them all apart. I silicone-greased everything. I saved my silicone grease. Of all the lights, I had actually three good working lights.

Joel: Did you have to dive underwater to get in your cabin?

Jan: No. I was inside when I tipped over, see, so I had to cut my way out. I didn't want to dive out because there was so much stuff crashing around underneath the boat I was afraid that something would stab me or something underneath there. So I cut a

hole in the back bunk that I could [use to] get out onto the boat.

Joel: So you had a handy saw or something there, hey?

Jan: I had my toolbox in there. Rip open the toolbox and there's anything you need. So I took a chisel and a winch handle on the bottom of the boat through the ¾" plywood and I cut a nice hole that I could get in and out of. Once I had that, I no longer had to actually get in the water for anything anymore as far as the lookout thing. The only time I ever got in the water was to rig stuff.

Meade: OK, are you in the Gulf Stream now, is it warm?

Jan: No, actually I'm not in the Gulf Stream but it's still warm. I think I was in the Gulf Stream, on the fringes of it, when I tipped over. But the wind blew me out of it and then miraculously enough the wind blew me back. When they picked me up four days later I was almost in the same position as when I tipped over.

The interesting thing is that I'm tipped over, right? And they pick me up and as I get up on the bridge, there's these two little spars moving along up ahead of us. He's five miles away and its *AZULAO**—Nick Clifton and *AZULAO*.

I talked to him on the telephone and stuff. He had spent a couple of days with me in Bermuda working on my self-steering and helping me to do stuff and figure out how to make it steer better and all this neat stuff. He was very understanding. He had great amounts of grief that I had lost my boat and everything.

Meade: In other words, you talked with him on the telephone?

**AZULAO—In 1977, Nick Clifton capsized his trimaran AZULAO and drifted in the Atlantic Ocean in a life raft for three days before being picked up by a freighter. His boat eventually washed ashore in England. It's unclear whether Jan is referencing the AZULAO that had previously capsized, or Clifton's later Dick Newick-designed AZULAO II*



Flicka was built in the Gougeon Brothers boatshop on the Saginaw River in Bay City, Michigan.

Jan: Yeah, I talked with him on the radio.

Meade: When you were upside down?

Jan: I was on the ship.

Meade: Oh, you were on the ship. OK. Oh, I see.
All right.

Jan: It was right after I got rescued. I mean, I'm still watching my boat disappear, dying slowly in the wake.

Joel: Did it sink or is it still out there floating?

Jan: Oh, it's still floating around. The cabin—the problem is the rear window, plastic window, was leaking pretty bad. I had boards jammed up against it to slow it down, so probably by now that back compartment is flooded and it's gone down. I had to bail it out like once in the morning and once at night, that one compartment.

Meade: What compartment is this now?

Jan: Well, where the window is in the back bunk, I had a hanging locker there. That [provided] great amounts of buoyancy to keep the stern up. But it would leak, oh, maybe 15 gallons of water a night.

Meade: Did you... Actually were you able to sleep very well during the four days?

Jan: Well, I was comfortable but I didn't spend much time sleeping because I'd go to sleep for a few minutes and then I'd get up and watch—the only chance to see something. If you went to sleep for 15 minutes a freighter would come steaming right by. I'll tell you the real scary thing is how many freighters there are. Unbelievable amounts of ships cruising around out there. I mean, the chances of getting run down while you're single-handing...

Joel: How many flares did you fire? You fired every flare you had?

Jan: Yeah, I used them all up on the ships that came first and they were all gone. [I] threw the flare gun away. I had two fire extinguishers. The first one, I used that up and then I dove underneath and got the next fire extinguisher. When the ship came I was getting ready to get my propane tank. I was going to rig up, you know, a fire thing with the propane tank because I had lots of propane. Figuring I could get some of the... I had some sea boots laying around and stuff. I could hang something and get a black, smoky thing burning to attract attention.

Mike Zuteck: Well, what do you reckon it is, [the freighters] don't have guys on watch? You mean they're just not watching?

Jan: Yeah, they're not watching. This one ship, the first officer was actually up and he saw me. He was further away than most of the other ships and he saw me.

Meade: So this was a big tanker that picked you up?

Jan: Pretty good size, an old one but a big one. I ate more in two days there... It's like Grandma DeLong feeding you. They're not happy unless you eat five times as much as you possibly can shovel down. You're so full you're begging to get out of there and they bring you another course. They bring you steak, fish and potatoes, and more fish, and ice cream.

Meade: You must have been pretty whipped though by the time they picked you up.

Jan: Actually, I was doing pretty good. I was pacing myself. I was concentrating on all the survival stuff and everything. I mean, I had the boat. Once I'd gotten the hole in the boat I was in danger if the wind shifted. The rig was acting as a sea anchor, keeping one side of the boat beam-to the seas. If the boat were all of a sudden to drift around somehow, water would be coming in the hole that I cut to get out. So I built a shutter for it that I could open up during the day to ventilate the cabin. The first day of course I got everything soaking wet back there getting in and out of there and stuff.

Meade: In other words, your mast was kind of dragging on the shrouds out there?

Jan: Yeah, right. I cut the one shroud loose so that the thing would get far enough away from the boat not to bang and crash.

Meade: Yeah, right.

Jan: After the first couple of days, the mainsail was gone, but the headsail was still streaming out there with the backstay to hold [the mast] at the right angle to where the boat drifted, about perfectly. I saved all my money, and passport, and travel checks, and everything. I've got everything, all my papers, my wallet, keys, all that stuff. I've still got them, miraculously enough.

I decided my next boat not only has to be self-rescuing and self-righting and go fast, but it has to be trailed behind my

Honda. So the displacement of the boat with no food or crew has got to be about 600 pounds. Wait until you see this thing I dreamed up.

Joel: When did you get off the ship? Just a few minutes ago?

Jan: Oh, it was about twelve o'clock today. But I was going through Customs and Immigration and they might—they still have the Search and Rescue [alert] from New York. It's got some urgent message for me but I haven't been able to actually get the message yet. So there is the slight possibility that I might get my boat back but it's about a thousand to one odds.

Joel: They didn't have a boom or anything so they could haul aboard any of your other stuff? Sextants and all that?

Jan: No, they couldn't. They had to come and get me in a lifeboat. It was too rough, you know.

Joel: So you lost everything besides your wallet?

Jan: I saved my sextant and I saved [now retired GBI tech advisor] Jim Derck's compass and his foul weather gear.

Right. The most tragic and the most heartbreaking thing though is to stand on the bridge of a freighter and watch your beloved piece of work drift away behind you and know that pretty soon it's going to be sunk and gone and all that.

Editor's Note

In part II, Jan goes on to discuss the failure of his EPIRB unit, what he learned from surviving FLICKA's capsize, and his conviction that all multihulls should be self-rescuing.

105 or G/flex?

Take the quiz

By Don Gutzmer - GBI Technical Advisor



“Should I use the 105 System or G/flex® Epoxy for my project?” This is a great question. Here’s what a Technical Advisor thinks about when recommending one type of WEST SYSTEM® Epoxy over another. Let’s start by comparing the handling characteristics and mechanical properties of both the 105 System and G/flex. This will show you the advantages of each and when one system is better suited over another for your project.

105 System

WEST SYSTEM 105 Resin mixed with any 200 Series Hardener has a viscosity similar to 50-weight motor oil or warm corn syrup. It is pourable and great for coating or bonding applications. The 105 System is versatile because you can select one of four hardeners for the working time you need. If clear coating, choose 105 Resin and 207 Special Clear Hardener. The epoxy can be modified with any of the six WEST SYSTEM Fillers to create a thickened adhesive or fairing compound. For information on fillers, see my article “The Basics of WEST SYSTEM Epoxy” in *Epoxyworks* 49.

Additives can also be used to modify the mixed epoxy, such as 420 Aluminum Powder, 422 Barrier Coat Additive and 423 Graphite Powder. You can

tint epoxy with a variety of pigments or dyes up to 2% by weight while still maintaining similar structural properties.

The low-viscosity of the 105 System is advantageous for easily wetting out fiber reinforcements such as fiberglass and carbon fiber. Because of the lower viscosity, it releases air more effectively to ease self-leveling.

Consider what mechanical properties you need from an epoxy system when deciding on which formulation is best. On the next page is a comparison chart of the physical properties of various WEST SYSTEM Epoxy formulations.

You will notice that when cured at 72°F (22°C) for two weeks, the 105 Resin System has a compression strength of around 11,000 pounds per square inch, or psi, and tensile strength around 7,000 psi. The ultimate tensile elongation averages 4% for 105 Resin and 200 Series Hardeners.

Using the epoxy for fastener bonding takes full advantage of its mechanical properties. Hardware on the deck of a boat can be under high load. The high tensile strength the 105 System provides is needed to prevent failure of the fasteners. For most general applications, the epoxy is stronger than what is ultimately needed for bonding and coating.

PHYSICAL PROPERTIES	105/205	105/ 206	105/207	105/209	650	655
Mix Viscosity @ 72°F (cPs)	975	725	760	650	15,000	Gel
Pot Life of 100 g @ 72°F (min.)	12	21.5	22	62	45	45
Specific Gravity of Cured Resin	1.18	1.18	1.15	1.16	1.11	1.11
Hardness @ 2 weeks (Shore D)	83	83	84.4	82	75	75
Compression Yield @ 2 weeks (PSI)	11,418	11,500	11,043	11,960	5,268	5,268
Tensile Strength (PSI)	7,846	7,320	6,748	7,280	3,440	3,440
Tensile Elongation (%)	3.4	4.5	3.8	3.6	32.7	32.7
Tensile Modulus (PSI)	4.08E+05	4.60E+05	4.40E+05	3.98E+05	1.44E+05	1.44E+05
Flexural Strength (PSI)	14,112	11,810	11,324	12,459	5,192	5,192
Flexural Modulus (PSI)	4.61E+05	4.50E+05	4.12E+05	3.97E+05	1.56E+05	1.56E+05
Heat Deflection Temperature (°F)	118	123	117	117	127	127
Onset of Tg by DSC (°F)	129	126	116	122	138	138
Ultimate Tg by DSC (°F)	142	139	116	130	154	154

Another thing to consider when determining if the 105 System or G/flex is a better option is the substrate you'll use. The 105 System will bond well to most substrates like wood, fiberglass, concrete, and ceramic. G/flex bonds better to certain high-density woods, plastics or metals.

Now let's talk about what G/flex Epoxy has to offer.

G/flex Epoxy

There are two versions of G/flex: 650 and 655. The liquid version, G/flex 650, has a viscosity similar to honey and the thickened version, G/flex 655, is similar to gelled toothpaste. Both versions of G/flex can also be modified with any of the six WEST SYSTEM Fillers and any 400-series additives mentioned earlier. Using a high-viscosity system for bonding offers the advantage of bridging gaps.

The base resin of G/flex is much higher in viscosity than the 105 System.

We prefer G/flex for bonding together dissimilar substrates such as metals and exotic woods. G/flex epoxy's advantage is that it can bond to many substrates, even those that are considered difficult: white oak, Ipe, damp woods, aluminum, copper, stainless steel, PVC, high-density polyethylene, polycarbonate, and many others.

The toughness of an epoxy formulation is measured by tensile elongation and strength. G/flex was formulated to have a high ultimate tensile elongation of around 30%. If you are bonding to stainless steel that has been sanded with 80-grit, the average tensile adhesion for the 105 System is 1,000 psi and for G/flex it is 2,400 psi. G/flex has a tensile strength averaging 3,400 psi and a compression strength of around 5,200 psi.

Do you think like a Technical Advisor?

Put your knowledge of the 105 System and G/flex to the test. Select between 105 System or G/flex epoxy for the most suitable epoxy for these real customer applications.

1. I need to bond an aluminum jib car track onto my fiberglass sailboat. Which epoxy is recommended?

105
SYSTEM or **G/flex**

6. I want to coat the edge of a wooden paddle to minimize impact damage. Which epoxy should be used?

105
SYSTEM or **G/flex**

2. I have a small damaged area on my carbon fiber mast that I'm going to repair with carbon fiber cloth. Which epoxy is recommended?

105
SYSTEM or **G/flex**

7. What epoxy formulation is best for embedding boat cleat fasteners into my deck?

105
SYSTEM or **G/flex**

3. Which epoxy is recommended for applying fiberglass cloth to a cedar strip canoe?

105
SYSTEM or **G/flex**

8. I need to repair the crack on my sailboat's keel-to-hull joint. Which epoxy is recommended?

105
SYSTEM or **G/flex**

4. My high-density polyethylene canoe has a crack on the hull side. Which epoxy do you recommend to repair it?

105
SYSTEM or **G/flex**

9. I need to bond the plywood transom onto my Hypalon dingy. Which epoxy is best?

105
SYSTEM or **G/flex**

5. I need to fill a river table with epoxy. Which epoxy is best?

105
SYSTEM or **G/flex**

10. What epoxy is recommended to coat a fiberglass boat, creating a barrier coat?

105
SYSTEM or **G/flex**

**Did you
answer
them all?**
No peeking!

Answers

1. *I need to bond an aluminum jib car track onto my fiberglass sailboat. Which epoxy is recommended?*

G/flex is recommended for bonding dissimilar materials like aluminum and fiberglass because it is a toughened system. The 30% elongation allows the flexibility needed for bonding materials that may move at different expansion rates.

2. *I have a small damaged area on my carbon fiber mast that I'm going to repair with carbon fiber cloth. Which epoxy is recommended?*

The 105 System is a better option for repairing carbon fiber because it provides higher mechanical properties. The carbon spreader can be subject to high loads, and the 105 System's average tensile strength of 7,300 PSI and average compression strength of 11,500 PSI provide the mechanical properties needed for a lasting repair. It will also easily wet out and saturate the carbon fiber cloth.

3. *Which epoxy is recommended for applying fiberglass cloth to a cedar strip canoe?*

The best option for fiberglassing a cedar strip canoe is 105 Resin and 207 Special Clear Hardener. The 105/207 will easily wet out lightweight fiberglass and provide a clear epoxy coating. G/flex will give the canoe a cloudy, caramel hue and its high viscosity makes it difficult to quickly wet out fiberglass without entrapped air bubbles.

4. *My high-density polyethylene canoe has a crack on the hull side. Which epoxy do you recommend to repair it?*

For repairing a cracked HDPE canoe, G/flex is the best option. Proper surface preparation is crucial to ensuring a successful HDPE plastic repair. For bonding to high-density polyethylene, we recommend an alcohol wipe and then flame treatment with a propane torch. Move the flame at a rate of 12 to 16 inches-per-second over the repair area, similar to the speed you would use for spray painting. Flame-treating oxidizes the surface, improving the epoxy's adhesion. A heat gun will not improve adhesion to HDPE; a propane torch is needed.

5. *I need to fill a river table with epoxy. Which epoxy is best?*

A low-viscosity, clear epoxy is needed for castings in river tables. 105 Resin/207 Special

Clear Hardener is the best WEST SYSTEM option. The epoxy can be tinted to the desired color, and its low viscosity makes air bubbles easier to remove. For most casting applications we recommend ¼" maximum thickness per pour.

6. *I want to coat the edge of a wooden paddle to minimize impact damage. Which epoxy should be used?*

For the end of a wooden paddle, G/flex 650 should be used to take advantage of its toughness for greater impact resistance. It quickly builds up to a thick coating that helps absorb shock from impacts during use. As a thin coating, the epoxy deflects without cracking, maintaining adhesion to the wood beneath, when the wood gets dented.

7. *What epoxy formulation is best for embedding boat cleat fasteners into my deck?*

The 105 System will provide better holding capacities for fastener bonding and can be thickened with a high-density filler for bridging gaps. G/flex can also be used in hardware bonding but the 105 System is stronger.

8. *I need to repair the crack on my sailboat's keel-to-hull joint. Which epoxy is recommended?*

G/flex 655 is recommended for repairing a cracked keel-to-hull joint. To prevent G/flex from running or sagging on a vertical surface, add 406 Colloidal Silica filler to achieve the desired consistency. G/flex's high tensile elongation, allows it to endure more movement or flexing before failure offering better adhesion to dissimilar substrates.

9. *I need to bond the plywood transom onto my Hypalon dingy. Which epoxy is best?*

G/flex bonds well to Hypalon that has been sanded with 80-grit. Any time you need to bond dissimilar materials, consider G/flex as an option.

10. *What epoxy is recommended to coat a fiberglass boat, creating a barrier coat?*

The 105 Resin is an excellent barrier coat for fiberglass hulls. You can add the 422 Barrier Coat Additive to create an even more effective moisture barrier. This system's low viscosity also makes it easier to roll onto large surfaces.

Now, a long answer to the short question, “Should I use the 105 System or G/flex?” The answer depends on multiple factors. What are you bonding to? Do you need a low-viscosity epoxy? Should the epoxy have high mechanical properties like tensile strength and compression strength? Does the epoxy need to be able to move or flex? Does the color of the epoxy matter? What will the cure temperature be? As a Technical Advisor, I quickly think through all these things when helping our customers make decisions on which epoxy formulation to select for their project.

For some applications, either epoxy system will work. However, if you get into a project and are not sure which WEST SYSTEM Epoxy product is your best choice, call our toll-free Technical Service line: 866-937-8797. Our goal is for every customer to have successful experiences using WEST SYSTEM products.

How did you do?

10
CORRECT

You're well on your way to being a superb WEST SYSTEM Technical Advisor.

6-9
CORRECT

You've definitely been around the block a time or two, but practice makes perfect.

0-5
CORRECT

You're a novice to WEST SYSTEM, but don't worry, the pros are only a phone call away.

Avoiding Respiratory Irritation

By Glenn House - GBI Health and Safety

When our team of experts select the raw ingredients for WEST SYSTEM® Epoxy products, we strive to achieve excellent physical properties with the lowest possible risk to human and environmental health. There is a safe exposure level for most substances. The more toxic the substance, the lower that level will be. Overexposure occurs when the safe exposure level is exceeded. When this happens, the substance can impact your health.

Hazardous substances can enter the body through skin absorption, ingestion, or inhalation. The route for a particular substance depends on its physical characteristics and how it is being used. This article will focus on a less common route of overexposure, inhalation. We'll discuss how to prevent inhaling epoxy vapors and reduce your risk of respiratory issues when working with epoxy products.

Low VOCs

Our epoxies have very low VOCs (volatile organic compounds), and any evaporation takes place quite slowly. However, if epoxies are heated or if workspace ventilation is inadequate, the risk of overexposure by inhalation increases.

Breathing highly concentrated epoxy vapor in a small, unventilated workspace such as a

Organic vapor respirators should be worn when working in a small, unventilated workspaces.



boat interior or small workshop, can irritate the respiratory system and cause sensitization. This is a type of allergic reaction resulting from the immune system overreacting to a substance. If you've already been sensitized to epoxy, exposure to low concentrations of epoxy vapors can trigger this type of reaction very easily.

Even with low VOCs, epoxy vapors can build up in confined spaces. Providing ample ventilation when working with epoxy in confined spaces is important in preventing overexposure. Effective ventilation can range from basic floor or window fans to expensive, high-tech air-filtration and

exhaust systems. If you can't adequately ventilate your workspace, be sure to wear appropriate respiratory protection. We recommend an air-purifying respirator with an organic vapor or multi-contaminate cartridge.

Pots of curing epoxy can get hot enough to ignite surrounding combustible materials and give off hazardous fumes. Because of the complex variety of fumes given off by exotherming epoxy, standard respirators are ineffective. Therefore it's important to place pots of mixed, exotherming epoxy in a safe and ventilated area, away from people and combustible materials. Dispose of the solid mass only after it has completely cured and cooled.

Partially Cured Epoxy Dust

Sanding partially cured epoxy produces airborne dust, which increases your risk of exposure by skin contact, inhalation or ingestion. Although epoxy is often firm enough to withstand sanding within eight hours after application, depending on the ambient temperature it may not cure completely for up to two weeks. We never recommend sanding until the epoxy has at least cured overnight, and longer if the cure is taking place in a cooler environment. The dust of epoxy that hasn't completely cured contains unreacted hazardous components. Never overlook or underestimate this hazard.

Do not breathe the sanding dust of partially cured epoxy because the chemicals in epoxy remain reactive until they have fully cured. Serious health problems can result from sanding partially cured or "green" epoxy. If inhaled, these dust particles get trapped in the mucous lining of your respiratory system where the reactive chemicals can cause severe respiratory irritation and/or respiratory allergies. To avoid this, provide good ventilation and wear a dust/mist mask or respirator when sanding any epoxy, especially partially cured epoxy.

The approved respiratory protection against epoxy dust, wood dust, and nuisance dust is a dust/mist mask or respirator with an N95 rating or better.

The Scoop on Epoxy Fillers

WEST SYSTEM fillers present few concerns in the way of acute hazards. However, as is the case with just about any nuisance or respirable dusts, long term or repeated exposures can result in chronic respiratory problems or worsening of existing lung conditions. Smokers, and others whose lungs

An N95 dust/mist mask is effective for preventing the inhalation of sanding dust.



are under strain, are far more likely to develop serious respiratory problems if fillers are inhaled. A particulate dust mask can help prevent inhalation of airborne fillers.

Don't Spray Epoxy

Although it is possible to spray WEST SYSTEM Epoxy, we strongly recommend against it. Leaving aside the practical difficulties such as equipment expenses, the associated health and safety issues are enormous.

To effectively spray epoxy and obtain a desirable finish, it must be atomized. As epoxy leaves the spray gun nozzle, it is reduced to tiny droplets (spray mist). Most of the spray mist that doesn't land on the surface remains airborne before settling to the ground. While the mist is suspended in the air there is a tremendous risk of inhalation. This can cause respiratory tract irritation, burns, sensitization, chemical pneumonia, and other serious health complications. Spray mist settling on unprotected skin or eyes can result in eye injury, skin sensitization, and allergic reactions. Spraying also increases the amount of hazardous volatile components released from the epoxy compared to other application methods.

In addition, using solvents to thin the epoxy so it can be sprayed poses dangers to health and safety. Solvent-related hazards would be similar to those of any spray painting operation and involve serious health and explosion risks.

Conclusion

Inhalation is one of the less common routes of epoxy overexposure, but should still be taken into serious consideration when setting up your work area and selecting personal protective gear. Visit the Safety pages at westsystem.com or call our Technical Staff at 866-937-8797 for answers to any concerns you have about using epoxy safely and appropriately.

Laminate Repair: Infusion vs. Wet-Bag

By Rachael Geerts - GBI Technical Advisor

Many products, especially boats, are now being manufactured with a process called Vacuum Assisted Resin Transfer Molding (VARTM), also frequently referred to as infusion. The main topics of this article are: what infusion is, how to repair an infused part with vacuum bagging vs. infusion, and the results of our study comparing a vacuum-bagged repaired laminate and an infused repaired laminate.

What is Infusion?

Infusion uses a vacuum to create a pressure differential between the part and a resin bath which pushes the resin into the dry laminate, wetting it out. To make an infused part the reinforcement fabric and coring are laid dry into a mold with vacuum bag, release fabric, flow media, etc. laid on top of the laminate. Then the vacuum bag is sealed and vacuum is pulled on the part. The vacuum removes the air from inside the bag so the pressure of the atmosphere acts as a clamp on the part and creates a pressure differential that allows the epoxy to be pushed into the part. The assembly is checked for leaks before the feed line(s) can be opened to infuse the part.

A low-viscosity epoxy is needed to effectively wet out the fibers during the infusion process. In general, a system with a mixed viscosity of 300-400 cps or lower should be used. WEST SYSTEM® 105 Resin mixed with any of the 200 series hardeners has a viscosity of about 650-975 cps at room temperature. Therefore, we do not recommend 105 Resin for infusion. In addition to requiring low-viscosity systems, the infusion process limits what fabric (weave types and weight) and what types of core material can be used so that the resin can flow through and wet them out. While this process works well for manufacturing composite parts, do these parts need to be repaired using the same method? No.

The rest of this article assumes that you are already familiar with the vacuum bagging process. For more information on, or to learn about, the vacuum bagging process please read my article "Vacuum Bagging Basics" in *Epoxyworks* 49.

Repair Concerns

Strength

Strength is determined by the materials and workmanship of the repair. Reinforcement fibers take most of the loads in a laminate, so using the same type of reinforcement will help make the repair successful. A fiberglass laminate should be repaired with fiberglass, and a carbon laminate should be repaired with carbon. Additionally, matching the fiber-to-resin ratio (commonly referred to as the fiber weight percent) of the original laminate will help maintain the strength of the repair. Using a different reinforcement material or more layers than needed in the repair area can create a hard spot and can cause cracking or other issues around the edges of the repair. Typical fiber weight percents are 35-50% (hand-laminated), 60-78% (vacuum bagged), 70-78% (infused) by weight. The higher percentage of fiber will result in higher stiffness and strength for the same overall thickness.

Stiffness

Stiffness is driven significantly by thickness. When asked what weight fabric to use on a repair we recommend focusing on maintaining the original thickness rather than trying to match a specific weight of reinforcement fabric. For instance, a 1/4" thick fiberglass laminate may need to be repaired. One could use a few layers of a heavyweight fabric like WEST SYSTEM 737 (17 oz. non-woven biaxial E-glass fabric) or multiple layers of a lighter weight fabric like WEST SYSTEM 742 (6 oz. woven E-glass fabric). Both are fiberglass so the strength will be nearly the same but the time spent doing the repair will vary. Areas that have more contours or where the laminate is thin are best repaired with lightweight fabrics. Meanwhile, laminates that are thick or are relatively flat, like our 1/4" fiberglass laminate example, might be better repaired with heavyweight fabrics to quickly build up the total thickness.

Matching the original thickness of the laminate will ensure that the repair laminate has similar stiffness as the original laminate surrounding the repair. This will prevent cracking around the repair

Product	Fabric Weight	Hand Lay-up Single Layer Thickness*
740 Glass Fabric	4 oz.	.008"
742 Glass Fabric	6 oz.	.010"
702, 703 Unidirectional Carbon Tape	11 oz.	.015"
729, 731, 732, 733 Glass Tape	9 oz.	.017"
745 Glass Fabric	10 oz.	.016"
727, 737 Biaxial Fabric	17 oz.	.035"
738 Biaxial Fabric with Mat	23.9 oz.	.042"

*Average of multiple layers applied by hand lay-up

area due to differences in stiffness that can cause a stress concentration or “hard spot.”

To determine the number of fabric layers required to achieve a specific laminate thickness, divide the thickness desired by the single-layer thickness of the tape or fabric you intend to use. The table above gives the average thickness of a hand laid laminate, so you should take into consideration the fact that vacuum bagging the laminate will consolidate it about 5%-10%.

The fiber weight percent, the ratio of fibers to epoxy by weight, affects the thickness. When vacuum bagging or infusion processes are used to increase fiber weight percentage, the amount of resin is reduced. This results in a thinner laminate and needs to be accounted for when determining the number of plies.

Weight

Although the weight of the repair may not be a concern, it is important to remember that the properties of a laminate are affected by the fiber weight percent. The fiber weight percent is the ratio of fibers to epoxy by weight. As described above, the fiber weight percent can vary depending on the application method. The overall weight of the repair is influenced by the materials selected for the repair, and just like the strength of the repair, it is also influenced by the workmanship. We can control our fiber weight percentage which improves the properties of the repair laminate.

The Repair

Surface Preparation

The damaged laminate should be removed and then beveled out to increase the surface area for bonding the new repair. The surface should be beveled at a minimum of a 12:1 ratio. When repairing a cored laminate, the core thickness should not be included in the bevel ratio, only the skin thickness of the repair area. Read section 4.1 of our *Fiberglass Boat Repair and Maintenance Manual* for more about beveling the surface. The bonding surface should be

sanded with 80-grit and cleaned of all contaminants and loose debris. After this step, the processes differ between infusion and vacuum bagging.

Vacuum Bagging

For a vacuum-bagged repair, the layers of the laminate should be wet out and laid down one at a time to build the laminate. Then the vacuum bag consumables (peel ply, breather, vacuum bag, etc.) are applied and the vacuum is pulled down.

There are several disadvantages and advantages to the vacuum bagging process. The application of epoxy can cause more of a mess than infusion. This process also results in varying fiber weight percent and is more susceptible to a higher void content. However, the fiber weight percent can be better controlled by measuring and mixing only enough epoxy to wet out the fabric. For hand-laminated parts, this is typically about 50% by weight of the total laminate. Once the vacuum is pulled down on the part, the laminate will be compressed, squeezing out the excess epoxy which is absorbed by the breather fabric increasing the fiber weight percentage. The vacuum bagging process is also more user-friendly for the do-it-yourselfers because it requires less vacuum pressure and gives a wider range of materials that can be used in the repair laminate compared to infusion.

Infusion

Infusion also has its own disadvantages and advantages. The infusion process requires a higher vacuum pressure and can end up using the same amount or even more epoxy than a vacuum-bagged repair. Extra resin is needed to fill the feed line(s) and have enough left in the bucket so that no air is pushed into the part, which can create voids in the laminate. More vacuum pressure is needed to create the pressure differential that drives the resin into the laminate and to keep the part consolidated. This also means that the repair area needs to be sealed really well. Any air leaks could cause dry spots (areas not wet out well with epoxy), affect the consolidation of the laminate and cause

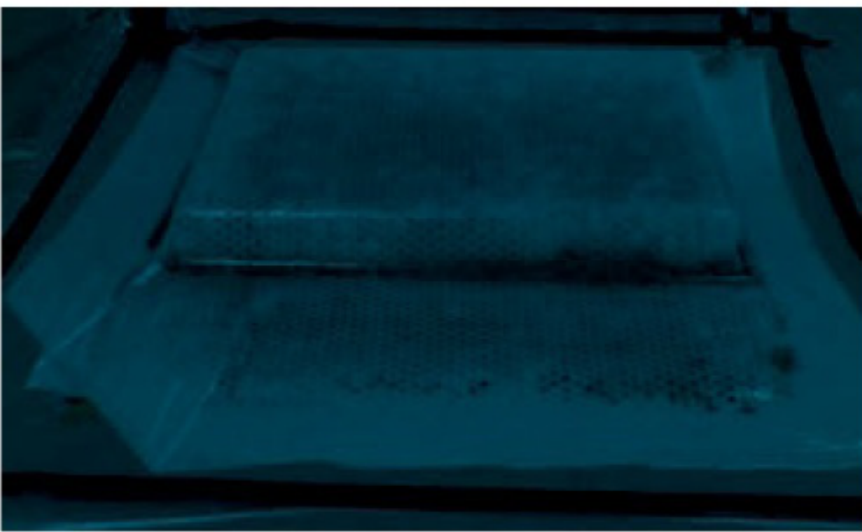
other issues. Sealing a cored laminate can be a challenge. If the core is open-cell, the repair area would need to be sealed off with resin to even have a chance at pulling good vacuum pressure.

Solid laminates might not be quite as challenging to make vacuum-tight but still could be difficult depending on the backing material. Backing materials only need to be used if the repair is on a hole in the laminate. Manufacturers have the benefit of being able to do the repairs in the mold, so the backing of the repair is the mold surface. For the average do-it-yourselfer, making a mold to put the part in to do the repair is not a realistic option. You may be able to shape a piece of foam or wood and seal it with a coat or two of epoxy to use as a backing for the repair. Just remember that it needs to fit well and be sealed around the edges to create a vacuum-tight surface for the repair. There are also fewer materials to choose from and the process can be more complex with different infusion manifolds. The benefits of infusion include fewer voids, cleaner processing, and no wet laminating work.

Our Test

We wanted to perform a comparative study on repairing a laminate that was originally manufactured using the infusion process, with an infused repair and a vacuum-bagged repair. As we discussed earlier, surface preparation is critical to any repair and that process is the same for both methods, so our goal is to compare the properties of the laminates. The easiest way to do this was to fabricate two test panels, one infused and one vacuum bagged. For this comparison, we made cored laminates that consisted of six layers of 10 oz. glass fabric on either side of a Baltek TM 1.5" AL600 (AL600 is a factory-applied coating to reduce resin absorption) balsa core.

In our test, we used the same glass fabric and epoxy in each panel to provide the needed strength aspect of a good repair. By building up the same number of layers of fiberglass in each panel, we were able to determine if the thickness of each laminate would be the same which is required to achieve the same stiffness. For the vacuum bagged panel, we calculated the amount of resin needed to attain a 45% fiber weight percent to thoroughly wet out all the glass fabric and core. We then used the vacuum to compress the laminate to result in a fiber weight percent that was the same as the infused panels. With the infused laminate, greater emphasis



The vacuum bagged laminate

The infused laminate



was placed on vacuum-tight sealing and infusion manifold positioning. Because of its higher viscosity, we weren't able to use the 105 System for the infused repair. We used our PRO-SET® INF 114/INF 226 Infusion Epoxy instead. Both methods successfully created similar cored laminates.

Considering the properties discussed in this article are what makes a successful repair laminate and allowed us to make a vacuum-bagged laminate that would have the same properties of the infused laminate. The laminates were solid and structural, and we were able to match the properties between the two repair methods. Fiber weight percent and thickness are given in the table below, and since they are equal the strength was matched by using the same fiberglass and the same core material, although the infused panel did use more resin in filling the core.

In conclusion, a vacuum-bagged repair on a laminate is just as effective as an infused repair. The WEST SYSTEM 105 Resin/200 series Hardener in a vacuum-bagged repair should have similar or better properties than most infusion resins. If you have questions about repairing a laminate, contact us by email at support@westsystem.com or call us at (866) 937-8797.

	Vacuum-Bagged Repair	Infused Repair
Fiber % by Weight	74%	74%
Thickness	0.158 inches	0.158 inches
Epoxy in Core (unsealed)	0.031 fl. oz./in ²	0.075 fl. oz./in ²
Vacuum Pressure	20 in of Hg	29 in of Hg

Sea Hood Repair

By Terry Monville - GBI Technical Advisor

This Little Piggy racing on Tawas Bay, Michigan.



After a few years of racing on the J22 *This Little Piggy*, the owner was ready to take a step back and gave me the first option to purchase it. I took advantage of the opportunity. As with many boats I've owned over the years, the first couple winters I plan on spending money upgrading and doing repairs. Not that a lot has to be done, but a few changes in hardware placement and re-bedding the deck hardware are at the top of my list.

The sea hood of the J22 is the control center with mainsail, jib, and spinnaker halyard cleats along with the pole topping lift and cunningham. In the early days of J22 sailing, everyone was sorting out the best placement for hardware on the sea hood.

By the look of the number of holes punched in the hood and refilled, every idea was tried. Today there is one ideal hardware layout and I'm about 95% there. I just needed to re-bed and add two upright blocks for the jib and spinnaker halyards.

Looking at the hood from the top it was obvious that two holes had been filled with an adhesive caulk, which had failed, and water was getting in. Most of the other holes were filled with a popular epoxy putty and appeared to be in good shape. Removing the sea hood, I was surprised to find many of the epoxy putty-filled holes had leaked, which was signified by the dark core around them. It was time to get to work. Fortunately, I could



The top of the epoxy putty repair.



You can see, with the skin removed on the underside of the hatch, the darker, more rotted wood around the column of epoxy putty.



A moisture meter measures the conductivity within a laminate and therefore can be helpful in determining where there is saturated core.

do the repair from the backside since it was not gel-coated. I removed all the hardware and planned out where I would need to remove the core based on its color and readings from a moisture meter. I cut the fiberglass skin back a bit from where I planned to remove the bad core. Using an oscillating saw with a fine-tooth blade, I cut through the fiberglass with good speed and control. After making my cuts all the way around the area, I used a wood chisel to pry up an edge of the fiberglass and peel it off.

The next step was to remove the core. Using the oscillating saw, I cut an outline of where I planned to remove the core. I then scraped and pried out the old core with a wood chisel. Removing it in nice straight lines with square corners made cutting the replacement material that much easier.

After removing the bad core, I let the surrounding core dry and then sanded the fiberglass smooth from where the core was removed. To prepare for the new fiberglass skin, I used the oscillating saw with a sanding pad adapter



Rotten and saturated core was cut away so replacement core could be installed. The area was then sanded with an oscillating saw.

to sand a 12:1 taper, with a generous radius on the fiberglass around the cutout area.

Next, I cut and fit the new balsa core into the areas where the bad core was removed. I used three layers of 10 oz. fiberglass to create the same laminate thickness as had been removed. I cut the first layer to cover the area out to the end of my taper, with the next layer cut slightly smaller and the third slightly smaller than the second. I used release fabric over the repair area to smooth the edges and prepare the surface for the finishing steps. This was cut just bigger than the overall repair.



Multiple areas had damaged core and needed replacement.

Now everything was ready to be put together. I used unthickened WEST SYSTEM® Epoxy to wet the balsa core on the sea hood, and the edges and side of the new piece of balsa. On the sea hood fiberglass surface, I used epoxy thickened with 406 Colloidal Silica Filler to the consistency of mayonnaise. This mixture fills imperfections and makes a nice bedding material.

With the fresh core material in place, I filled any gaps between the old and new core with the thickened epoxy and let it cure. The new balsa was thicker than the old, so after the epoxy cured I sanded it down to the same thickness as the old core. I then laminated the three layers of fiberglass and covered it with release fabric. If the coring had been the original thickness, I could have done the bedding and glassing at the same time. After the laminate cured, I removed the release fabric and was ready to install the hardware.

In a future *Epoxyworks* issue, I'll cover hardware bonding and installation on my J22.

Morning Sun

a Workstar 17

By Chris Smith

*The completed
Workstar 17.*

Small communities benefit when local groups work together to produce results greater than the sum of their individual efforts. Three organizations combined their efforts to create such synergy in a coastal county on Lake Huron. The Iosco County Family Court, local Elks Lodge 2525 and Heritage Coast Sailing and Rowing (HCS&R) combined efforts to develop a positive training program for youthful offenders and provide a staunch safety boat for the new not-for-profit sailing school.

The Juvenile Enhanced Accountability Program (JEAP), a Family Court Program, gives youthful offenders a chance to complete their court-ordered community service, in this case, by building a boat while increasing their manual and group skills. Elks Lodge 2525 has a long and laudable community service history. They have worked with the JEAP program for several years providing funding, project identification, and adult supervision.

Heritage Coast Sailing and Rowing, a 501(c)(3) not for profit, was expanding its community boatbuilding program to include a sailing school operating on Tawas Bay and needed a safety/coaches boat. The boat needed to be safe, stable, have a two-crew capacity (crew, plus up to five rescued from the water), be easy to get in and out of, and be built by a moderately skilled crew.

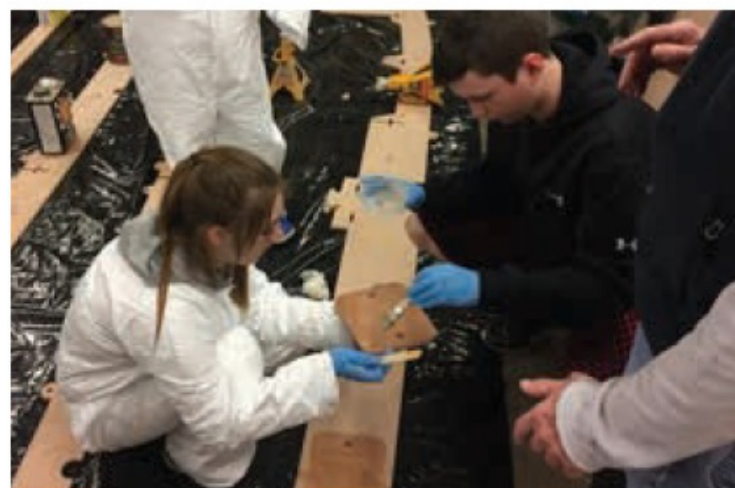
A Working Boats UK Ltd. designed plywood/epoxy kit boat, the Workstar 17, met the criteria. It was being used by police departments, towboat companies, and outdoor education schools. The group purchased an instruction license. Hewes and Company of Blue Hill, Maine prepared the kit.

The Workstar 17 became the eleventh boat built by HCS&R. All eleven were built using WEST SYSTEM® Epoxy, Gougeon Brothers, Inc.'s Technical Support services, and their extensive assortment of how-to literature.

Five general activities were involved in the building process and are summarized by the photographs. The designer's instructions provided an excellent step-by-step guide.

Cutting out parts

The kit arrived as 20 sheets of plywood with the individual parts nested and tabbed in the sheets. Each piece was first labeled, then carefully cut out and set aside in sub-assembly groups.



Top: Pieces were labeled, cut out and then grouped for easier assembly.

Bottom: Parts being coated with unthickened epoxy.



Epoxy wetted T-pegs were driven into slots through the butt straps and into the parts being joined, ensuring vertical alignment as well as strength.

Longitudinal sub-assemblies

Parts assemblies that run the length of the boat were built on the shop floor because it was relatively large and flat. The boat's sides, bottom, longitudinal stringers, and rub strakes were all done in the same way. Each sub-assembly was first dry-fit, then the joint edges and butt strap areas were coated with unthickened WEST SYSTEM Epoxy. This was followed by a coat of thickened epoxy. Epoxy wetted T-pegs were driven into slots through the butt straps and into the parts being joined, ensuring vertical alignment as well as strength. Weights were used to ensure horizontal alignment.

Joining frames, longitudinal stringers, sides, and bottom

Temporary legs were attached to two frames to obtain a good working height. After dry fitting, the longitudinal stringers, the sides, and bottom were added utilizing tabs, slots, and a wedge system. Locking pegs ensured good alignment. Bottom and side seams will later be armored with 17 oz. glass tape and the entire bottom will be clad in 10 oz. glass fabric.



Fillets were applied along the joints along with 17 oz. fiberglass tape for reinforcement on major joints.

Fillets, sole, and seats

The hull was turned over and extensive epoxy fillets added to the egg-box structure. Major joint fillets were also strengthened by 17 oz. tape. The sole, seats, and control console were added again using the tabs, slots and wedge system.



Primer being sanded before final coating.

Finish

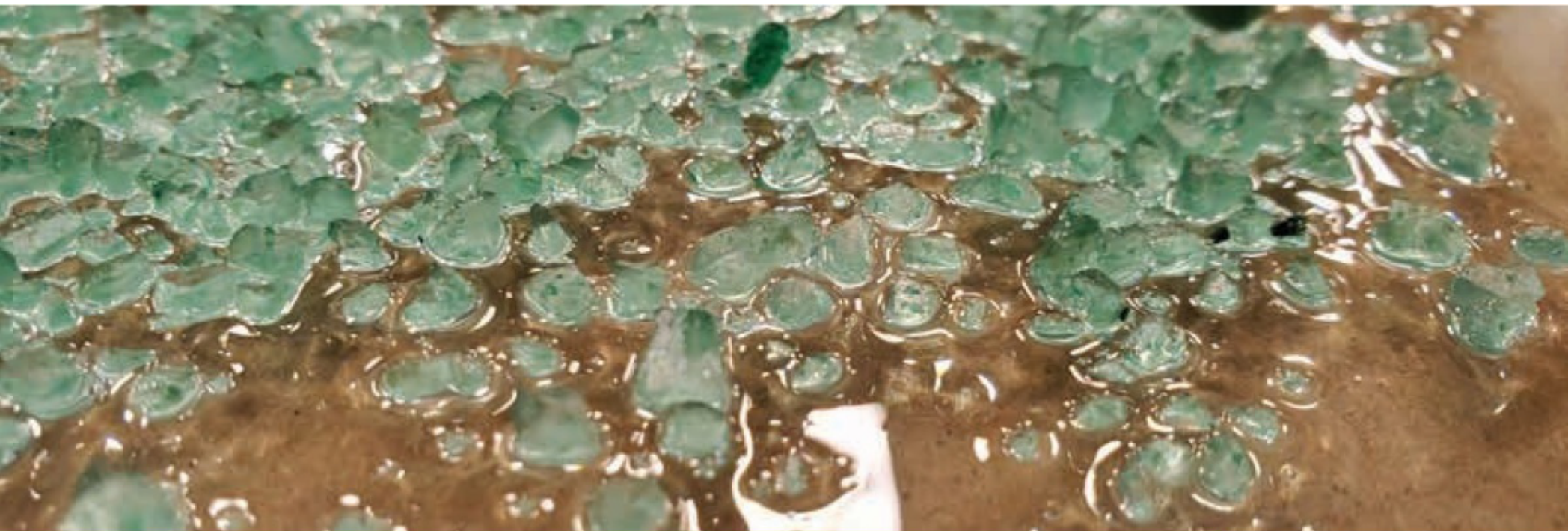
The entire boat was covered with two coats of WEST SYSTEM before the finish coats of two-part primer and paint were applied. The youth named the boat *Morning Sun* and chose its colors, the colors of a sunrise.

Building the boat was a powerful lesson for the youth involved. They followed a plan that converted a pile of plywood and strange-looking parts into a well-built, functioning boat. They witnessed and participated in countless decision-making discussions, all very calm and focused on the outcome. They learned how to work together in tight quarters. They became proficient in the use of several hand and power tools. They saw the benefits of cooperative effort and synergy.



Boat building participants.

The three groups worked together to successfully build a second boat from scratch, a 1944 Lowell Coast Guard dory. All have expressed interest in maintaining the collaboration and continuing the program and relationship for interested, youthful participants.



Rock salt used for the lost method of creating nonskid.

Creating Nonskid Surfaces

By Greg Bull - GBI Technical Advisor

Nonskid surfaces may need to be replaced because they are worn down from years of use, or were removed during a deck repair. If you want to match an existing pattern, flexible molds are available for matching a production boat nonskid pattern or for use if a molded appearance is desired. Molded non-skid surfaces are often very open making them easier to clean and they have a more finished appearance (See *Epoxyworks* 22, "Repair Non-Skid and get Professional Results"). For applications where it is not practical to use molds, or a simple and functional non-skid surface is desired, there are some easy options.

It is important to note that when applying a nonskid surface with epoxy, you'll need to make it pretty rough because epoxy requires a UV-protective topcoat (typically paint). The topcoat will fill in or smooth over some of the new nonskid texture. Here are three different methods for creating nonskid with epoxy that do not require the use of a mold.

Textured Roller Cover

A simple method for creating a nonskid surface is to use a textured roller cover designed for painting rough surfaces. Be aware that if you slide on this type of surface it can also remove your skin. Mix WEST SYSTEM® 105 Epoxy with the WEST SYSTEM 200 series hardener of your choice, then stir in a filler such as 406 Colloidal Silica. The epoxy should be thickened enough so when you roll it on it will stand up and stay there, not slump or smooth back down.

A conventional paint roller (not a foam roller) with a longer ($\frac{3}{8}$ " or $\frac{1}{2}$ ") nap will also give a good nonskid surface. You'll need to experiment with the thickness of the thickened epoxy to get it to stand up and stay standing as it's rolled onto the surface. Both types of rollers require some experimenting to determine the right epoxy thickness and surface texture. Do some test panels or test areas to get the look and texture



Textured roller

$\frac{1}{2}$ inch nap roller

$\frac{3}{8}$ inch nap roller



Texture built with a roller cover for aggressive nonskid.

Grit media texture



Salt texture



you want. The tests need to be completed all the way to painting the topcoat. Keep in mind that it can be difficult to abrade a textured epoxy surface, but this is necessary so that the paint will adhere to the epoxy and protect it from UV exposure (which degrades all epoxies over time). A 3M Scotch Brite™ pad or a wire bristle brush can be helpful when trying to abrade the epoxy's textured surface.

Nonskid Additives

The next method is to use the epoxy to bond a nonskid additive to the existing surface. There are additives designed for paints that will work very well with epoxy. I've found that the coarsest additive available works the best. Here again, because adding a coat of epoxy and paint over the grit media smooths out the roughness to some extent. The coarse nonskid additive can be blended into the mixed epoxy resin and hardener, then rolled onto the surface.

An alternate method is to sprinkle the nonskid additive onto the uncured epoxy surface and allow it to tack up, but not completely cure, before applying a thin coat of epoxy on top to sandwich the nonskid material between epoxy layers. This will allow for a chemical bond between the layers of epoxy and save on sanding.

The nonskid material can be as simple as sand from a hobby store to Awlgrip® Griptex® nonskid additive from a paint store. If you're opting for the hobby store sand and applying the nonskid surface to wood that will be bright finished, you can get it to look uniform by sifting the sand through an old flour sifter or a piece of screen to ensure the granules are close to the same size. Any unevenness in grain size will be less noticeable on a painted surface.

The Lost Method

The final method I'll describe is what I call the lost method. Apply the epoxy to the surface and then broadcast a grit media such as sand, sugar, or salt onto the uncured epoxy surface. After the epoxy cures (usually the next day) clean the grit media away.

For a more aggressive nonskid surface, use salt or rock salt. For smoother nonskid surface, use granular sugar or sand. Be sure to apply the grit media uniformly across the entire surface so that when washed off with water or brushed off and vacuumed away, the surface texture is consistent. The resulting surface will have hollows or craters whereas the other two methods create bumps on the surface. The lost method surface is a little harder to keep clean because the tiny hollows catch water and dirt, but it still makes for a great nonskid surface.

Choosing Your Media

I have used these different methods for nonskid surfaces for different applications.

For a teak and holly cabin sole I did, where I want to see the beauty of the wood, I put the nonskid onto the holly strips and not on the teak surface. Nonskid is less apparent on lighter colored surfaces. If the nonskid is across the whole surface it may look a little cloudy or hazy, and you wouldn't be able to see the wood as well. Smoother nonskid media like sand or sugar works best to achieve this.

For the deck of a boat, a coarser surface is needed. In this case, I'd choose a more aggressive nonskid material. This could be crushed walnut shells or even a coarse sandblasting media.

There is no single way to achieve a good nonskid surface. Experiment with these materials and methods to determine the best approach to getting exactly the nonskid qualities you want.

Readers' projects



Jamie Wilkins of Wilkins CraftWorks in Elk Rapids, Michigan built this 17.5' Down East-style lobster skiff to enjoy on northern Michigan's small lakes. To construct the hull, he milled and dried white cedar from trees he'd removed from a building site. The boat features a lot of brightwork, including a mahogany transom, breasthook and gunwales. It's powered by a 60-horsepower Evinrude outboard. wilkinscrafterworks.com



Plywood Camper

Doug Redfield of Bellingham, Washington built his camper with marine-grade maranti plywood, G/flex® Epoxy for the assembly and joinery, and WEST SYSTEM® 105 Resin/205 Fast Hardener for coatings. He laminated a layer of light fiberglass cloth on the top, front, and sides.



For information about WEST SYSTEM® products or technical information for a building or repair project, Gougeon Brothers offers a range of detailed publications that can help you get started. These publications are available at your local WEST SYSTEM dealer or by contacting Gougeon Brothers. They are also available as **free downloadable PDFs at westsystem.com**.

How-to Publications

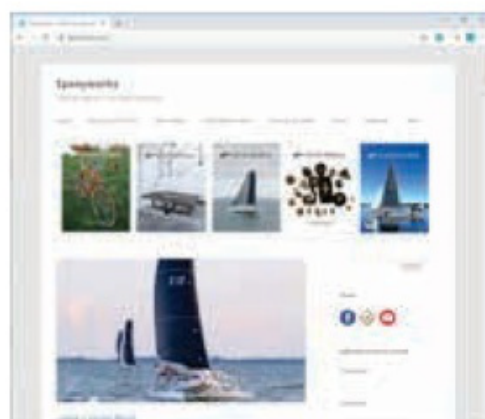
002 The Gougeon Brothers on Boat Construction—A must for anyone building a wooden boat or working with wood and WEST SYSTEM Epoxy. Fully illustrated composite construction techniques, materials, lofting, safety and tools. 5th Edition, revised in 2005.

002-970 Wooden Boat Restoration & Repair—Illustrated guide to restore the structure, improve the appearance, reduce the maintenance and prolong the life of wooden boats with WEST SYSTEM Epoxy. Includes dry rot repair, structural framework repair, hull and deck planking repair, and hardware installation with epoxy.

002-550 Fiberglass Boat Repair & Maintenance—Illustrated guide to repair fiberglass boats with WEST SYSTEM Epoxy. Procedures for structural reinforcement, deck and hull repair, hardware installation, keel repair and teak deck installation. Also, procedures for gelcoat blister diagnosis, prevention and repair and final fairing and finishing.

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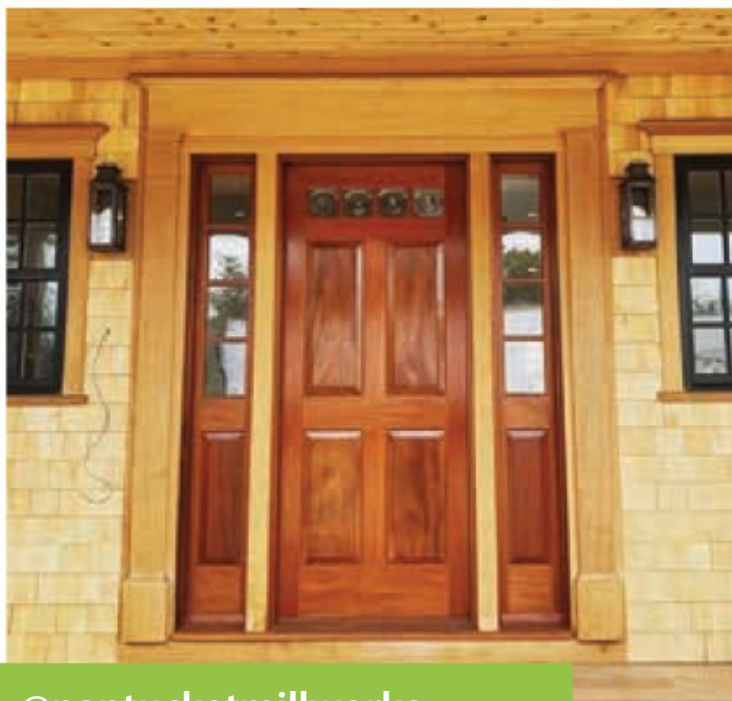
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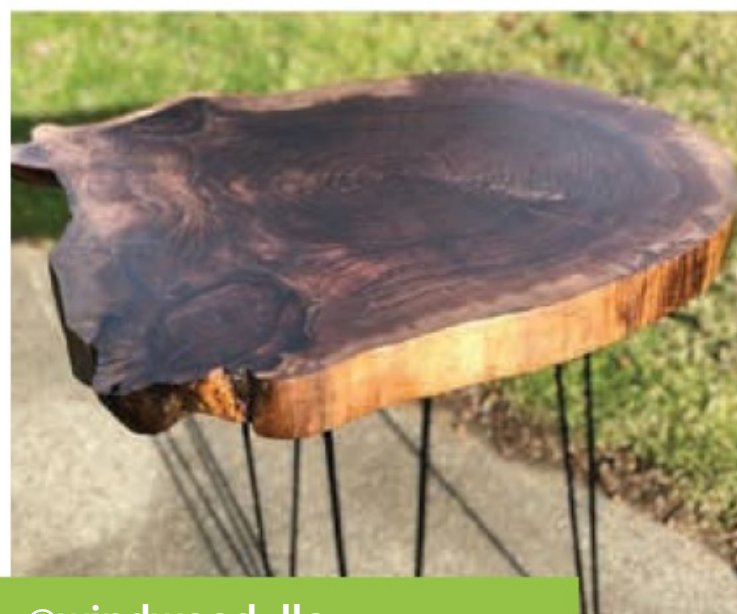
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