Wrested from a portion of what was a large, shoal, saltwater bay opening to the North Sea—the former Zuider Zee—is a monumental feat of Dutch engineering. This is the Ijsselmeer, a manmade, fresh-water lake of some 1,100 square kilometers (425 square miles). At the tip of a small peninsula jutting eastward into the Ijsselmeer, lies the town of Enkhuizen.

A port to hundreds of boats, Enkhuizen is also home to the Zuider Zee Museum, which houses a variety of exhibits. I’d traveled there for one exhibit in particular, however: The entire ground floor is the Ship’s Hall, a collection of wooden Dutch boats—the largest such assemblage anywhere.

I’ve always admired Dutch boats, which—among other things—included the first yachts in the modern sense. Indeed, the very word “yacht” comes from Dutch. The traditional Dutch boiers, botters, hoggars, and more, were all on display, along with more conventionally shaped craft. There were fishing boats and small workboats in addition to the yachts. The bluff bows, shoal draft, and massive leeboards of these vessels are well known, but seldom seen outside of Holland.

One of these boats in particular caught my eye. A classic Dutch boeiër 31 feet (9.5 m) overall, her varnished topsides and cabin gleamed. Her rudderhead was capped by an intricately carved golden bird of prey. In perfect shape, she appeared ready for a cruise. My friend, reading aloud, translated the extensive information on the plaque nearby.

Her name was Sperwer or sparrow hawk and thus the carving on her rudderhead. She’d been owned and sailed by a fellow named Merlin Minshall, who’d used her to explore the coasts and rivers of Germany and neighboring countries prior to World War II. And then things got interesting . . .

Continued on page 6
Early on as a Westlawn student, I’ve learned that visiting boat shows was a very good way to learn about industry and market trends, see new products and take a few days away from my land-locked office in Montreal.

But nothing beats an industry trade show to get down and detailed with marine component vendors and specialists covering the whole spectrum from design to construction. What makes these even better is that everyone who attends shares the same passion and could spend hours on end talking boat stuff.

Work having kept me away from IBEX this year, I was not going to miss the next event in the calendar and wait a whole year to get another opportunity to satisfy my thirst for up to date data on several topics of interest to me. Therefore, I decided to visit the Marine Equipment Trade Show (METS) held every year in Amsterdam at the RAI convention center. This year marked the event’s 25th anniversary and, while I knew that I was going to be wowed, I did not realize by how much until I stepped in the main hall that first day. I am sure I speak for all Westlawn students and alumni that also attended when I say that this trade show is fantastic!

Imagine over 1,300 exhibitors in several very large halls, displaying everything from propulsion systems, navigation, rigging, construction materials, design software, interior finish, lighting. If you need it to design or build a boat, you’ll find it at METS, represented by several vendors. Furthermore, the entire space is organized by country, meaning that most vendors from a given country are grouped together in their respective sections. As a result, it’s quite easy to find partners or potential vendors that you deal with back home, simply by visiting your country’s pavilion.

METS also has several speciality groups located in their separate pavilions to make it easy to connect with peer members. One example is the Super Yacht Pavilion where vendors from all over the world who serve the super yacht industry can be found. I must admit that I was particularly impressed with this section of the show because I rarely get opportunities to interact with vendors serving this industry segment. I could not but be impressed with the marvels of engineering meticulously displayed by the more than one hundred vendors who were displaying their wares: gyro stabilization systems, ship control systems, generators that could power your whole block, windshields that bend and twist every which way . . . astounding, really.

The Construction Materials Pavilion is another excellent area to visit. My travelling buddy and I (Lorena Kreuger, Westlawn Elements graduate and Director of the Kalmar Shipyards in Brazil),

Continued next page
In A Rut?

As I write this I am at my annual pilgrimage to Amsterdam and the Marine Equipment Trade Show (METS). The event is not just a show; it’s a gathering of all the people that have influence in the European boating industry. I had the opportunity to meet Vanessa Davidson from the Marine Industry of South Africa who proceeded to tell me how happy her five students were with Westlawn’s Elements of Boat Design. These students were very motivated in the beginning of the class and have “plateaued” if you will as the class went on. Vanessa feels it’s her job to get them motivated again to press on and complete the course. Are any of you in that situation? Are you feeling a bit overwhelmed in your studies or your current project? I recommend a boat show! The season is upon us and whether it’s a trade show, or a consumer show, get out there, smell the fiberglass, see the new innovations and spend some time in your chosen trade. It’s a great opportunity which many of us don’t take the time to explore. We all need a “revival” at some time or another, and for us the season is upon us. Visit www.boatshows.com for the latest NMMA schedule. For non NMMA shows, you’ll have to check your local information. So, my advice is go to a boat show, and call me in the morning, you’ll be glad you did!

check out ABYC’s facebook page

Sincerely,
John Adey, ABYC President

had an opportunity to discuss and interact with a number of materials specialists and discovered new products with excellent potential applications.

Of course, no event is complete without the required student dinner! Ries Plevier (Module 4 student—all but design thesis—sailor and boat builder) graciously organized the event at a most excellent restaurant serving the local Dutch fare. I believe that I speak for everyone when I say that a very good time was had by all. Everyone has a different story and to meet and greet in this way, sharing our passion for boats and people around them, from all walks of life, is what it’s really about.

Final words about Amsterdam: if you’ve never been, METS is the perfect reason for you to go next year and to spend a few days walking around and taking in the local museums. Not to miss: the Maritime Museum which was completely redesigned a few years ago, is an excellent example of how museums can engage visitors in engrossing and interesting ways.

I certainly hope to see lots of you next year: I for one am sure to go again!

You can find more information on the METS at www.metstrade.com
Once again IBEX 2012 proved to be the place to be to learn about equipment and hardware, building supplies and techniques, CAD software and design and troubleshooting techniques. With hundreds of seminars on almost every possible subject relating to boat design, construction, repair, maintenance, operation, and much more, Westlawn students couldn’t find a more valuable show to attend in the U.S.

Westlawn director, Dave Gerr, presented seminars on wet exhaust systems and on fin-keel structural engineering. He also presented an analysis of the tragic capsize and sinking of the 34-foot Silverton Kandi One, to the U.S. Coast Guard accident mitigation seminar (see page 14). IBEX is the place where industry comes together not only to learn new things but to consult on ways to improve the boating industry and enhance boating safety.

The Westlawn and ABYC booths were busy with many students stopping by to visit, to ask questions and to help out manning the booth. Several students were amazed to find themselves chatting with such design notables as Dick Newick, Kurt Hughes, Nigel Calder, Eric Sponberg, Ed Sherman, Jay Paris and more. One student commented that, he’d never had a chance to talk to a real naval architect before, and he’s just spoken to four of them!

Naturally, we held our student dinner at IBEX. But—this year—there was a difference . . . Everyone had such a good time that we had three student dinners! Yes, we had a student dinner every night of the show. There weren’t many topics relating to boat design that weren’t covered during those three dinners, not to mention tall tales, sea stories and jokes (good and bad). We’ll certainly be having our student dinner again next year (or will that be three?)

www.ibexshow.com

Dave Gerr Presenting a Seminar

The ABYC/Westlawn Booth
Westlawn has taken strong steps designed to lower education costs and assist students to follow their dreams and attain their goals. These steps include new discounts for ABYC members, Westlawn’s unique zero-interest tuition payment plan, and finding ways for students to obtain otherwise expensive design software at low or zero cost.

### ABYC Members get a 20% discount on all Westlawn courses
All ABYC members (except for student members) receive a 20% discount on all Westlawn courses. Contact Westlawn student services to confirm eligibility and apply: info@westlawn.edu

### Westlawn offers a ZERO-INTEREST tuition payment plan
for all four modules of our professional diploma program, Yacht & Boat Design, for our short course, Elements of Technical Boat Design, and for all our continuing-education courses. Complete details are on the enrollment form for the course you are interested in. Monthly payments are low. The goal is for our students to complete their studies at affordable prices and with no student-loan debt.

### FREE Student AutoCAD!
Westlawn has arranged for active Westlawn students to download AutoCAD online directly from Autodesk. This is a full version of AutoCAD student release. It is not a trial version. Active Westlawn students can log into the designated sign-up page through the Westlawn student forum. This is the lowest cost for full AutoCAD ever—no cost! The commercial price of AutoCAD is $4,195, an enormous savings.

### Orca3D Hull Modeling and Rhino General 3D-Modeling Software at Deep Discounts!
In addition, Westlawn has arranged with DRS C3 Advanced Technology Center for deep student discounts on the Orca3D hull modeling plug-in software for Rhino, plus Rhino in addition, if needed.

- Orca3D Level 1 (hull design and fairing with intact hydrostatics and stability) is $1,390 commercial but just $125 for Westlawn students, a $1,265 savings!
- Orca3D Level 2 (all of Level 1 plus speed/power analysis and weight and cost tracking) is $2,780 commercial but just $250 for Westlawn students, a $2,530 savings!

Orca Level 1 is all that’s required to complete Westlawn studies, but it makes sense to take advantage of this student discount to get Level 2, which will make your advanced work go more quickly and will serve you well in your career.

You need the general-purpose Rhino (Rhinoceros) 3D modeling program to run Orca3D. If you don’t already own Rhino, DRS C3 Advanced Technology Center has arranged a special Westlawn discount package price for Orca3D plus Rhino, as follows:

- Orca3D Level 1 & Rhino $288 (commercial price $2,385)
- Orca3D Level 1 & Rhino/Flamingo/Penguin/Bongo $558 (commercial price $3,085)
- Orca3D Level 2 & Rhino $401 (commercial price $3,775)
- Orca3D Level 2 & Rhino/Flamingo/Penguin/Bongo $671 (commercial price $4,475)

Savings over the full commercial prices range from $2,907 to $3,804 depending on the package!

The minimum suite of basic CAD software needed to complete Westlawn’s full Yacht & Boat Design Program is AutoCAD plus Orca3D Level 1 & Rhino. The total cost of this suite of CAD software programs is just $288! This matches the lowest cost for the minimum required CAD software ever!

FREE Scan&Solve FEA/Simulation Software by Intact Solutions!
Students can download the student version of Intact Solutions’ Scan&Solve finite-element-analysis and simulation software for free. The free student version has some limited functionality, so students may upgrade to the academic version of Scan&Solve for $295. This is the full-featured commercial software at a special price. (The commercial price $995.)

Savings over the full commercial price is from $700 to $995!

To take advantage of these deep discounts for Westlawn, students must follow the student-purchase procedure on the Westlawn student forum. You must be a currently active Westlawn student with a valid Westlawn student ID card.
Merlin Theodore Minshall, it turned out was an adventurer, race car driver, and sailor. Born in 1906 and raised to proper British society, he received the expected British public-school education and then attended Oxford. From there, he studied architecture at London University. But Minshall disliked this upper-crust life. He gave it all up to sail his boat *Sperwer* around Europe.

Minshall was also regularly reporting on German coastal installations and transport to British intelligence. (Perhaps, this came to pass because his mother had been a British spy during World War I.) Minshall also married his first wife at this juncture. She’d had no previous sailing experience, and they were soon separated, later to be divorced.

Minshall was not alone for long, however. While sailing the Danube, a beautiful German girl joined him. It turned out that this was no accident, and that she was a German counterspy. In fact, her mission was to seduce Minshall and then kill him! She nearly succeeded. The *fem fatale* poisoned Minshall’s food and he was near death for several days.

On recovering, Minshall returned to his sailing and spying. He was reporting to Special Branch of British Naval Intelligence, and directly to none other than Ian Fleming. (Yes, the creator of James Bond.) Minshall’s designation number was, you guessed it, 007! His gun was a Walther PPK carried in a shoulder holster, with a back-up Beretta .25 concealed in his pants. A top marksman, Minshall was also both a judo and karate expert. It’s almost certain that Merlin Minshall was one of Fleming’s inspirations for James Bond. (The other was likely the incredible spy Sidney Reilly.) So here, lying quietly in this out-of-the-way museum in a Dutch seaside town, was the real James Bond’s own boat . . . Minshall’s continued to live the sort of ex...
plots needed to fill any Bond movie. Disgusted by the Nazis and other fascists he was encountering and frustrated by his inability to get the British government at the time to take a stand against them, Minshall turned to car racing. The wild road races of the era are generally illegal today, but where immensely popular at the time.

Twice a competitor in the Monte Carlo Rally in 1937, he was presented with a trophy by none other than Italian dictator Benito Mussolini. This was for the Italian Foreign Challenge Trophy, a three-day, 4,000-mile car race between Rome and Sicily. There were more than 400 entrants. Only half the entrants finished and four of the drivers died during the race.

Minshall’s car was a Singer 1.5-Litre Le Mans Special, a car that had come close to winning at Le Mans. With a flare for tinkering and invention, Minshall fitted the vehicle with several unique features, including headlamps that turned with the wheel (a development that would be first be adopted by Citroen some twenty-five years later). Minshall next raced north to south across the Sahara in a three-wheeled light truck. It was the first air-cooled vehicle to accomplish the feat.

Returning to England, Minshall yet again tried to get the powers in Whitehall to take action on all he was learning about the fascists during his travels. (Minshall was still reporting back on what he found.) The appeasement-minded British government at the time would do nothing, but did give Minshall a commission as a sub-lieutenant in the RNVR (the Royal Naval Reserve).

Not exactly the type of person to take orders graciously, it wasn’t long before Minshall was at loggerheads with the director of naval intelligence, Admiral Godfrey. It was Ian Fleming who smoothed things over to keep Minshall out of trouble.

After the war broke out—based on his first-hand knowledge of the Danube—Minshall was sent on a mission to disrupt the shipment of grain and oil from Romania to Germany. The goal was to block the Danube at the beautiful gorge—known as the Iron Gates—at the boundary between Serbia and Romania. In this instance, Minshall was dispatched by Fleming and Sir Robert Bellairs, coordinator of intelligence to the War Cabinet. Minshall’s cover was as a British vice consul. He had a cyanide capsule drilled into one of his teeth and false-bottom luggage packed with detonators. High explosives were disguised in the red-and-gold-foll packaging of a well-known candy, Mackintosh’s toffee deluxe. Yet more gelignite was shipped to him in the diplomatic pouch.

After failing in an initial attempt to bribe the local shipping pi-
lots with gold sovereigns to either leave or foul things up, Minshall commandeered several British ships and had a crew of British ratings sent out from England to work them. The aim was to sink ships in the Iron Gates thus blocking the river.

In the days of travel and preparation involved, there were two attempts on Minshall’s life. One of these occurred aboard the Orient Express, where Minshall recognized the German agent and poisoned his would-be assassin’s wine while they were both in the dining car. Minshall then disposed of the body, by standing the dead man up, wrapping an arm around his own shoulder and walking him—as if he were a drunk friend—to the men’s room. Once inside, Minshall opened the window and shoved the corpse out of the moving train.

Ultimately, the plan to sink boats in the Danube was abandoned because the Germans apparently siphoned the fuel out of the boats of Minshall’s little fleet. The small flotilla ran dry, and—dead in the water—they and Minshall’s men were captured. Minshall escaped in his launch, which was following behind. Filling the launch with explosives, he then ran it at top speed into a railway embankment, where oil barges were pulled through the rapids.

Later that same year (1940), Minshall oversaw Operation Shamrock. In this, a commandeered fishing smack was used as a base for monitoring German U-boat movements in the Gironde Estuary, in the Bay of Biscay.

Minshall was next placed in charge of a section at HMS Flowerdown. Using “Z machines” (radio direction finders and transmitter analysis) they tracked the positions of ships of all sorts. Indeed, Minshall was thus a direct participant in the hunt for the Bismarck.

Naval intelligence then moved Minshall to Fiji and on to New Zealand, where he was engaged in still more intelligence operations. This was followed by a posting in occupied Yugoslavia, where Minshall was in charge of the Allied Naval Mission to Tito.

Retiring as a Lt. Commander, RNVR, Minshall finally settled into the quite life of an architect. He lived uneventfully in Norfolk, with his fourth wife and their four sons until his death in 1987, at the age of 81.


Zuider Zee Museum:
www.zuiderzeemuseum.nl
I had had early etchings for these two 100-foot projects, which I named MScow, laying on my draftboard since last summer, together with a Volvo Open 70 and an IMOCA Open 60.

When the Volvo Ocean Race announced that future editions would use a one-design, I decided to finalize the two 100-foot sailing yachts: a Wally Cento and a Maxi Scow.

The reason to design yet another Wally lays in the designation of the WallyCento rule itself: Owners remain keen on the combination of comfort, performance, modern design and bleeding edge technology in a yacht. Even if the Wally Cento open box rule forbids canting keels and includes a

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Publishing naval architect François Chevalier's original design for an out-and-out racer immediately reveals a great blend of today's trends for breaking speed limits as well as displays the author's great ability to look into the breadth of working concepts in yachting history and formalize a proposal that could establish itself as a capable prize winner, advocating the scow bow as tomorrow's cornerstone in building racing yachts.

Donan Raven
minimum displacement figure, she remains true to the Wally essence which has begot its prestigious fleet: simple handling, automated sailing systems, utterly flush decks, light and minimalist interior spaces.

The "Record" designation of the Maxi Scow version, which features a more lightweight displacement and a canting keel, rid of all the mod cons and automation usually presented in Wallys, targets ocean records and line honors in
crewed races such as the Newport-Bermuda, the Fastnet or the Sydney-Hobart.

As featured in the wetted-surface diagrams comparing the MScow concept with conventional monohulls when heeling, the key advantage of the MScow is her stiffness, sailing at an angle which would be three times smaller than a conventional yacht. On the one hand, the righting moment is a lot more efficient, whether or not she is fitted with a canting keel, and on the other hand, the keel remains in the center-
Wally Cento and Maxi Scow by François Chevalier  continued

line under sail: The result is the MSow's better ability in pointing to windward, by one or two degrees depending on configuration.

To improve the sailing platform's performance, the bowsprit can be orientated and the clew of headsails can be adjusted in the lateral plane.

As far back as the 1970s, I made a concept for a cross-oceanic windsurfer designated for a double-handed Transatlantic race. As with many projects of this kind, the model is still hanging on my office wall. The idea reemerged ten years ago when I wrote an article investigating the origins of planing hulls. The craze which governed the American skimming dishes at the turn of the twentieth century, with waterline length as the only limitation, had given me the idea to develop an IMOCA Open 60 for the Vendée Globe single-handed circumnavigation race.

I decided to develop a progressive chine-bilged scow, and instead of a pram bow, I proceeded to cut away the stem very significantly to avoid wave slamming as much as possible. By tapering the bow both in height and in width, shocks with head waves are dampened significantly and the scow skims the surface immediately and displacing as little water as possible.

François Chevalier is a naval architect, author, journalist, illustrator, and university lecturer based in Paris, France. With Jacques Taglang, he has worked on the history of the America’s Cup and also on American and English yachts in the nineteenth century. He is an alumnus of the Westlawn Institute of Marine Technology and of the École Nationale Supérieure des Beaux-Arts (ENSBA) Paris.

Visit François Chevalier's blog with Jacques Taglang at: chevaliertaglang.blogspot.fr
C

ars are required by law to have VIN number (Vehicle Identification Numbers), boats—since about 1972—have been required to have HIN number (Hull Identification Numbers).

This is both for US-built boats and for imports. Normally, the HIN should be located on the starboard corner of the transom, in the corner up near where the deck, hull side and transom come together.

The HIN was usually 12 characters, the first three represent a code assigned by the Coast Guard to the builder or importer. Depending on the boat, these three characters (normally about 1/2 inch high) may be the only clue on the outside of the boat that gives information about its place of origin. If you are trying to track the builder, you can contact the Coast Guard to locate the builder associated with the code.

Since around 1996, HINs issued by builders exporting to Europe have included a two-character prefix preceding the 12 character number and separated by a hyphen. The prefix indicates the country of origin—US for the United States.

The last 9 characters of the HIN have a meaning as well. There are 3 standard formats:

- Characters 4-8 inclusive are sequence numbers/model numbers assigned by the builder/importer (they do not have to start with 00001 for hull number 1). Some have used character 4 or characters 4 and 5 as model designations with the remaining three characters in this segment being a sequence number. Some builders do not number boats in sequence, however, many do.

- Characters 9-12 are the ones that have several official styles, but they all include information about when the boat was built/imported.

- Style 1 - character 9 is usually an M, the next two characters are the year of the "date of manufacture" (for example "79" is the 1979 model year, which by common acceptable practice ran from Aug through July) and the last character is the month of the "date of manufacture". The month is designated by letter. The months start with Aug of the year prior to the year indicated in the previous 2 characters of the HIN. So that A is for Aug, B is for Sept., C is for Oct, etc. There are L months in a year (L is July). For example "M79B" means the date reference is Sept. of 1978; and "M79G" means the date reference is Feb of 1979. This style was used in the period 1972 through 1983, and perhaps into 1984.

- Style 2 - has the month and year in a more normal display for the "date of manufacture". Characters 9 and 10 are the month number (01 is Jan, 02 is Feb, 10 is Oct, etc.) and the last two characters are the year. This style was used concurrently with style 1.

- Style 3 - has a "model year" most visible (i.e. they are the last two characters), but the month and year of "date of manufacture" less visible. This style was optional during most of 1984, but became mandatory about Aug 1, 1984 and is still in use. In this style, the ninth character is a letter for the month of the "date of manufacture". A is for Jan, B is for Feb, C is for Mar, etc.. The tenth character is the last digit of the year of the "date of manufacture". The last two characters are the model year designated by the builder. The model year is indicated with the last two digits of the year (e.g. year 1990 would be 90).

Using the model year as an indication of boat age (as measured by the time that has passed since it was built) could lead one to believe that the boat is maybe a year (or more?) newer than the boat really is. The current definition for the "date of manufacture" is supposed to be a date that falls within the span of time between the commencement of construction and the time the boat leaves the place of manufacture. Thus, as we read the rules, it is possible to have a boat that was started in 1995, completed in 1997 but not shipped until 1999 with a "date of manufacture" portion of the HIN indicating the year of manufacture as 1999. In the case of imported boat.

![HIN Example](image)
After sailing out to watch the fireworks on July 4th, 2012, on Long Island Sound, the 34-Foot Silverton, Kandi One, capsized with 27 people aboard. Tragically, three of the children aboard lost their lives. The general feeling among marine professionals was that having so many people aboard a boat of this size was excessive and was the underlying cause of the capsize. It is important, however, to analyze the event systematically and see if hard numbers confirmed such gut feelings. At the request of Soundings magazine and using vital information from Eric Sorensen (and with valuable input and review from naval architects Eric Sponberg and Steve Dalzell), I set out to do just that.

The Kandi One was a 1978-1988 model, a model long out of production. The builder is presently in Chapter 11, so we could not obtain hull lines and technical information from the manufacturer. Accordingly, to check the stability, a model of a near sister ship was created, duplicating the normal loaded displacement, overall dimensions, profile, arrangement, and configuration of the 34-foot Silverton of the 1978 to 1988 model years as closely as possible. You can see on the drawings that this analog model boat is very similar to the 34-foot Silverton.

The initial reviews, based on a mathematical and CAD analog model of the boat did not indicate a stability problem. This was contrary to expectations. Subsequently, Eric Sorensen, on July 20, 2012, conducted an informal inclining experiment on a sister ship of the 34 Silverton. The boat tested was the same model and configuration as the boat that capsized. The data from this inclining were analyzed to further investigate the GM and VCG. Though there were still unknowns and some issues, the inclining results were the most reliable data we had. Accordingly, the GM and VCG from the inclining experiment was used to reevaluate the stability of the boat.

The inclining experiment indicated a VCG considerably higher than from the mathematical and CAD analog model. This quite high VCG is probably pessimistic, but—given the nature of the data available—is the closest to the actual boat.

The dimension and characteristics of the analog boat model, with the input for GM and VCG from the inclining...
experiment, are in the normal load condition, which is assumed to be with full tanks and 4 crew:

LOA: 34.0 ft. (excluding bow pulpit and swim platform)
DWL: 28.56 ft.
Beam: 12.39 ft. (excluding rubrails)
BWL: 10.77 ft.
Fairbody draft: 1.72 ft.
Deadrise @ transom: 15 degrees
Disp.: 14,400 lb.
VCG: 3.88 ft. above DWL
VCB: 0.57 ft. below DWL
ITwp: 1,688 ft.4
BM: 7.50 ft.
GM: 3.08 ft.
Waterplane area: 222.97 sq.ft.
Lb./in. immersion: 1,189 lb./in.

In the condition at capsize, with 27 people on board:
Disp: 17,640 lb.
DWL: 28.77 ft.
BWL: 10.98 ft.
VCG: 4.77 ft. above floatation waterline
VCB: 0.66 ft. below floatation waterline
ITwp: 1,746 ft.4
BM: 6.33 ft.
GM: 1.17 ft.

Evaluating Stability
In the U.S., there are currently no stability or capacity standards for pleasure boats over 26 feet long. (The one exception is for pontoon boats, which do have such a standard under ABYC.) So the question is how to evaluate the *Kandi One*’s stability in its condition at the time of capsize. The standard that we do have is the stability requirements for small commercial passenger vessels under the U.S. Code of Federal Regulations (CFR), Title 46, Shipping. 46 CFR has been used for decades to ensure the safety of passengers and has a solid record of success. It is also based on sound underlying naval-architecture principles. In addition, resulting heel angles and plot the curve of righting arms could be examined to get a clear picture of the stability characteristics of the heavily-loaded *Kandi One*.

46 CFR’s stability standards for boats of this type, fundamentally deal with two criteria: passenger heel and wind heel.
Learning from a Tragic Capsize continued

Passenger Heel

Working through 46 CFR for passenger heel:

The maximum allowable immersion for exposed waters is:

\[
\text{Immersion} = \frac{f \times ((2 \times \text{LOD}) - (1.5 \times \text{cl}))}{4 \times \text{LOD}}
\]

Where:
- \(F\) = lowest or minimum freeboard, ft.
- \(\text{LOD}\) = length on deck, ft.
- \(\text{cl}\) = cockpit length, ft.

For this analog model it is:

\[
\text{Immersion} = \frac{3.65 \times ((2 \times 34) - (1.5 \times 6.68))}{4 \times 34} = 1.56 \text{ ft.}
\]

Plotting the heel angle at 14 degrees (next page) gives an immersion at 14 degrees of 1.29 ft. This is less than the maximum immersion allowable of 1.56 ft. so the governing factor is the maximum heel allowed which is 14 degrees.

The formula for required \(GM\) under 46 CFR is:

\[
\text{GM} \geq \frac{N \times b}{18 \text{ passenger/long ton} \times W \times \tan \theta}
\]

Where:
- \(\text{GM}\) = minimum required \(GM\) in feet
- \(N\) = number of passengers
- \(b\) = distance passengers move off centerline, ft.
- \(\theta\) = heel angle

NOTE:
The “18 passengers/long ton” is a constant derived as:
The weight of each passenger is 185 lb. 2/3rds of them moved to the side are then:

\[
2/3 \times 185 \text{ lb.} = 123.95 \text{ lb.}, \text{ and } 2,240 \text{ lb./long ton} ÷ 123.95 = 18 \text{ passengers/long ton}.
\]

The requirements are for 2/3rds of the passengers shifted to one side of the vessel.

This works out as follows for the worst-case scenario with 27 adult passengers of 185 pounds each on board:

Maximum allowable heel angle is 14 degrees as found above.

Displacement in this condition is 17,640 lb. or 7.88 long tons.

\[
\text{GM} \geq \frac{27 \text{ people} \times 3.6 \text{ ft.}}{18 \text{ passenger/long ton} \times 7.88 \text{ tons} \times \tan(14^\circ)} = 2.75 \text{ ft. GM min.}
\]

The GM of the boat, derived from the inclining experiment, as loaded in this condition is 1.17 ft. This less than half that required by the passenger-heel criteria under 46 CFR. The boat is not sufficiently stable with this many passengers onboard.

We can check this against the standard formula for heel with shifting weights. This formula is:

\[
\text{Heel angle, degrees} = \arctan \left( \frac{W \text{ lb.} \times d \text{ ft.}}{\text{Disp. lb.} \times GM \text{ ft.}} \right)
\]

Where:
- \(W\) = weight moved, lb.
- \(d\) = distance moved, ft.
- Disp. = displacement, lb.
- \(GM\) = metacentric height, ft.

Again for our analog model boat with 27 people aboard (all 185 lb.) and with the as-loaded GM of 2.87 ft., we get:

\[
\text{arctan} \left( \frac{4,994 \text{ lb.} \times 3.6 \text{ ft.}}{17,640 \text{ lb.} \times 1.17 \text{ ft. GM}} \right) = 41 \text{ degrees heel angle}
\]

Continued next page
This not only exceeds the maximum allowable, but puts the boat past the downflood angle (next page). If all the passengers move to one side, the boat will capsize and sink.

If we used 2/3rds of passengers' actual weight (adults and children) shifted to one side per the 46 CFR requirements, we get:

\[
\text{arctan} \left( \frac{3,347 \text{ lb.} \times 3.6 \text{ ft.}}{17,640 \text{ lb. Disp.} \times 1.17 \text{ ft. GM}} \right) = 30.9 \text{ degrees heel angle}
\]

Though 30.9 degrees won't definitely capsize and sink the boat, this is too much heel as there is virtually no reserve margin of righting energy to the downflood angle. This is an unsafe condition. Any small wave or wind action would heel the boat over to the downflood angle, which would cause flooding and potential capsize.

**Wind Heel**

Another consideration is wind heel criteria. The same maximum 14 degrees of heel applies. This can be checked as follows:

The 46 CFR criteria for wind heel is:

\[
\text{GM} \geq \frac{P \times A \times h}{W \times \tan \theta}
\]

Where:

- \( \text{GM} \) = metacentric height, ft.
- \( P \) = wind pressure in long tons per square foot, tons/ft.²
  - \( P = 0.005 + (L ÷ 14,200)^2 \), tons/ft.² for ocean and coastwise service.
  - \( P = 0.0033 + (L ÷ 14,200)^2 \), tons/ft.² for protected waters such as rivers and harbors
  - \( P = 0.0025 + (L ÷ 14,200)^2 \), tons/ft.² for partially protected waters such as lakes, bays, and harbors

\( L \) = length between perpendiculars (waterline length for most ordinary boats), ft.

\( A \) = projected lateral area of boat profile above the waterline, sq.ft.

\( h \) = vertical distance from center of “A” down to center of underwater area (center of lateral plane), ft.

\( W \) = weight of vessel (displacement), long tons (tons of 2,240 lb.)

\( \theta \) = heel angle = Heel not greater than between one-quarter to one-half of freeboard (as explained earlier regarding cockpit size), but never more than 14 degrees. The amount of heeled freeboard allowed is determined by the formula from CFR 178.330, exactly as described earlier.

The wind velocities in \( P \) for the factors 0.005, 0.0033, and 0.0025 are (using Martin’s formula):

- 46 knots for ocean and coastwise
- 37 knots for partially protected waters
- 33 knots for protected waters

The “\((L ÷ 14,200)^2\)” factor in the wind-pressure calculation (\( P \)) is to increase the wind speed by 0.0458 knots for each foot of boat length.

Applying this to our analog boat in the 27-passenger load condition we get:

We can try 33 knots for protected waters—the least demanding criteria:

\[
P = 0.0025 + (28.56 \text{ ft. WL} ÷ 14,200)^2 = 0.002504 \text{ tons./ft.}^2
\]

Continued next page
Learning from a Tragic Capsize  continued

The GM of the boat in this load condition is just 1.14 ft so the boat does not pass even the least rigorous condition for protected waters with regard to wind heel when loaded with 27 passengers.

We can check this against the standard formula for heel angle due to wind pressure. This is:

$$\text{Heel angle, degrees} = \frac{P \times 57.3 \times \text{Profile Area} \times \text{Heeling Arm}}{\text{GM} \times \text{Disp.}}$$

Where:
- $P =$ wind pressure for the selected wind speed, lb./sq.ft.
- Profile Area = area of the profile of the boat above the waterline, sq.ft.
- Heeling Arm = distance from the center of lateral plane of the underbody to the center of effort of the profile area, ft.
- GM = metacentric height, ft.
- Disp. = displacement, lb.

Use wind pressures ($P$) as follow for the intended boat use:
- Ocean crossing (50 knots wind) = 13.2 lb./sq.ft.
- Coastwise ocean (45 knots wind) = 10.7 lb./sq.ft.
- Partially protected waters such as lakes, bays, and harbors (40 knots wind) = 8.5 lb./sq.ft.
- Protected waters such as rivers, inland lakes, and sheltered harbors (35 knots wind) = 6.5 lb./sq.ft.

Note: For the U.S. Great Lakes, use coastwise ocean for summer service and ocean crossing for winter service.

For our analog boat in the 27-passenger-load condition and protected waters we get:

$$\text{6.5 lb. / sq.ft.} \times 57.3 \times 231.2 \text{ sq.ft.} \times 4.95 \text{ ft.}$$

$$\frac{1.17 \text{ ft.} \times 17,640 \text{ lb. Disp.}}{17.88 \text{ tons} \times \tan(14^\circ)}$$

$$= 20.6 \text{ degrees heel angle}$$

This is well over the 14-degree allowable heel and so not acceptable even for fully protected waters.

**Stability Curve with Passenger Weights Shifted to One Side**

Also shown is the curve of righting arms (next page) in the condition with two-thirds of passengers shifted the average maximum distance possible to one side of the boat. The total number of passengers, in the state when the capsize occurred, is 27. At 17 adults, 180 pounds each, and 10 children 90 pounds each, that’s 3,960 pounds. Two thirds of that is 2,637 pounds. The maximum average distance the passengers can move to one side is 3.6 feet.

The resulting righting arm ($GZ_1$) at any angle of heel is found from:

$$GZ_1 = GZ - \left(\frac{w \times h}{W}\right) \cos(\theta)$$

Where:
- $GZ_1 =$ Righting arm with a weight shifted horizontally to one side, ft.
- $GZ =$ Righting arm without the weight shifted, ft.
- $w =$ Weight moved, lb.
- $h =$ Distance the weight is moved, ft.
- $W =$ Displacement/weight of boat, lb.
- $\theta =$ Angle of heel, degrees

Applying this formula to the curve of righting arms with 27 passengers aboard (17,640 lb. disp.) gives the curve of righting arms with the two-thirds of passenger weight shifted. This is using 17,650 lb. displacement, 2,637 lb. shifted weight of passengers, and 3.6 ft. distance of weight moved.

You can see that in this condition (2/3rds of the 27 passengers shifted to one side) there is virtually no reserve stability left to the downflood angle. This is not acceptable and the boat is highly unsafe at this condition.

Continued next page
Learning from a Tragic Capsize  continued

Conclusion
Using the GM and VCG derived from the inclining experiment added to the analog model of the boat, the results indicate that the 34-foot Silverton with 27 people aboard was dangerously unstable. The difference between the results from using the analog model only and from using the analog model with the VCG and GM from the inclining experiment are due to the much higher VCG and the lower GM from the inclining experiment. Though there are some questions about the high VCG indicated by the inclining—even if this is adjusted down somewhat—the boat would have highly questionable stability with 27 passengers aboard.

It is important to note that the 34 Silverton at normal or “standard” load, with 4 people aboard easily passes all the criteria above for stability for coastwise use under 46 CFR. For pleasure-craft use, the boat could safely carry 8 or 10 passengers in rough conditions coastwise and up to 16 or 18 passengers inshore in protected waters (as long as there weren’t an excessive number high up on the flybridge). The boat design itself is sound and safe. The load of 27 passengers (including, as reported, with 8 passengers high on the flybridge) was excessive and dangerous.

For more information on stability see the following back issues of The Masthead:

June 2007, Sailboat Stability - Part 1
September 2007, Sailboat Stability - Part 2
December 2007, Powerboat Stability

Also see Safety Practices Related to Small Fishing Vessel Stability. Published by the Food and Agriculture Organization of the United Nations (FAO), it provides an excellent overview of the fundamentals of stability and loading.
Motive Trimarans hired Persak & Wurmfeld (P&W) to develop the Motive 25R, the first carbon fiber, production trimaran in its class. Sleek, modern and performance oriented, the Motive 25R is fast, lightweight and simple to sail. The design brief called for an open, mid-size trimaran of modern length to beam ratio, capable of flying the center hull, while carrying six adults at speeds of more than 20 knots.

In keeping within the design parameters of simplicity and ease of handling, P&W developed the unique sail stowage system which allows a boomless 243 square foot square top main sail.

The Motive 25R features unique sliding outer hulls and removable crossbeams for simple and easy trailering. This boat lets you go where the sailing is good! Adding to its flexibility, the Motive 25R can be motored in compact mode.

The Motive 25R debuted at the Newport International Boat Show on September 13, 2012, winning the best new sailboat of the show.
**Specifications:**

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<tr>
<th>Specification</th>
<th>Value</th>
<th>Notes</th>
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<td>Beam</td>
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<td>Beam Folded</td>
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<tr>
<td>Draft CB Down</td>
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<td>Jib Area</td>
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<td>Screecher Area</td>
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</tr>
<tr>
<td>Aux. Power (Max)</td>
<td>6.00 hp</td>
<td>6.00 hp</td>
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</tbody>
</table>

Carl Persak & Jeremy Wurmfeld

**PERSAK & WURMFELD**

68 Jay Street  
Unit 411  
Brooklyn, NY 11201  
Office: 718-222-4401  
Fax: 866-887-8487  
Web: [www.persakwurmfeld.com](http://www.persakwurmfeld.com)  
Email: design@persakwurmfeld.com

Westlawn alumnus Jeremy Wurmfeld and Webb grad Carl Persak, are the core design team for all projects at Persak & Wurmfeld.

**Motive Trimarans, LLC**

305 East 38th Street  
New York, NY 10016  
Tel: 917-609-4660  
Web: [www.motivetrimarans.com](http://www.motivetrimarans.com)  
Email: info@motivetrimarans.com
Designers often use the shape of the waterlines when a hull is heeled to evaluate their hull form. For example, drawing a sailboat hull where the heeled waterlines are excessively asymmetrical can lead to weather helm. This article is not to give instruction on what the shape of the heeled waterlines should be, but rather how to find them.

First, it’s important to understand that simply rotating the hull and cutting waterlines will not give the correct result, because as a hull with a given weight and center of gravity (CG) heels, it will also trim and move vertically (unless it is a rotationally symmetric shape such as a cylinder). We need to find the underwater shape of the hull when the weight and buoyancy, and CG and center of buoyancy are in equilibrium.

Orca3D’s hydrostatics and stability calculation has two fundamental modes of operation; in the first, the user specifies a flotation plane with a combination of sink, trim, and heel, and Orca3D returns the displacement and center of buoyancy (as well as other parameters). In the second, the user specifies the weight and CG, and Orca3D finds the equilibrium flotation condition (sink, trim, and heel). In addition, the user can “mix and match”; for example, you can enter the weight, longitudinal center of gravity (LCG), and vertical center of gravity (VCG), and instead of the transverse center of gravity a heel angle can be specified, as shown in a later figure.

It is important to note that when finding the equilibrium flotation condition that corresponds to the specified weight, LCG, VCG, and Heel Angle, the hull is free to move vertically and to trim.

As an example, we will use the default hull from Orca3D’s Sailboat Hull Assistant, and we start the process by mirroring the surface about the centerplane, and then defining a range of waterlines in the Sections dialog (note that once the waterlines were defined, their color was...
Obtaining Accurate Heeled Waterlines in Orca3D - Continued

changed to red by right-clicking on “Waterlines” in the tree view, and selecting Set Color, fig 1. This results in the upright waterlines, fig. 2.

The hydrostatics were computed in this orientation (Sink, Trim, and Heel=0), giving a Weight of about 6500 kg, a Longitudinal Center of Buoyancy (LCB) of about 5.4 m, and a Transverse Center of Buoyancy (TCB) of 0. Alternatively, the weight and CG could be determined through a weight study, fig. 3.

Now, Orca3D’s Hydrostatics and Stability function is run again to find the heeled waterlines at 10 degrees, with the following inputs:

Note the highlighted input fields; the Weight, LCG, and Model Heel angle are specified, and the “Transform Model to Resultant Condition” box is checked, fig. 4. This option will sink, trim, and heel the model so that the Z=0 plane will correspond to the equilibrium flotation plane (the waterplane), fig 5.

By turning on ghosting in the Perspective viewport, you can get a good view of the boat’s equilibrium condition:

If you want to see the waterlines at other angles, simply run Rhino’s Undo command, and then re-run the Hydrostatics and Stability calculation at a different heel angle.

As with any hydrostatics calculation in Orca3D, be sure that the outward normals on the hull surface(s) are pointing out into the water, and only select the surfaces that you expect to be wet (that is, don’t select any interior surfaces).

www.orca3d.com

Learn about Westlawn student pricing on Orca3D software, page 5.
Obtaining Accurate Heeled Waterlines in Orca3D - Continued

Fig. 5 - Plan of heeled waterlines

Fig. 6 - Perspective view of heeled waterlines
One of the events I’ve been a part of over the last several years is Cruising World Magazine’s annual “Boat of the Year” competition. Acting as a judge for the event and assigned specifically to inspect and evaluate systems installations, I get a chance to see what may be trending in terms of system design. Over the last several years one thing has stood out to me is that the mainstream builders are perceiving that their potential buyers really don’t want to see or deal too intimately with their onboard electrical systems. What I mean by this specifically is all about how the primary electrical distribution panel appears to the end user. Is it a complex, “techy” looking array with many dual purpose circuit breaker/on-off switches and an extensive array of instrument faces, or a simple set of clearly labeled on-off switches with one multi-function display screen?

Obviously the level of complexity will vary depending upon how many electrical circuits are actually installed, but in a general sense, what I’m seeing is that builders are trending toward either using new technology over-current protection devices, or hiding all the gory details like circuit breakers and fuses behind the scenes, in accessible but generally out of sight locations, thereby simplifying the appearance of the power distribution panels. Examples of what I’m referring to here are shown in Fig. 1, a modern panel configuration and Fig. 2, a more traditional looking panel utilizing C-Type rocker breaker switch combinations.

I think for me the most interesting developments are the choices of gear for over-current protection. The industry has embraced the classic C-Style circuit breaker for dec-
Electrical System Trends - Continued

Fig. 4 - The modern DC distribution panel shown above uses a variety of ATC fuses common to the automotive industry for years. The arrow is pointing to one of several ATC fuse holders.

Fig. 5 - The red, yellow and light blue components shown on the back of the panel board above are the ATC style breakers I’m seeing more of these days on new boats.

ades for both AC and DC applications. These have worked well and are proven as relatively trouble-free. But, for a retail price of $25 each for a simple single pole unit, the cost of using these breakers adds up quickly. Compare to the cost of a simple ATC fuse that sells for a mere $1.60 ea. and you can see why cost conscious builders are embracing the use of ATC fuse holders and purpose built custom panel boards like the one shown here in Fig. 4:

Still another trend in this area that is really gaining some momentum takes the compactness of the ATC fuses and offers up the advantage of a resettable circuit breaker. The panel shown in Fig. 5 incorporates what are known as ATC style circuit breakers. With an average retail price of about $8 each, these offer up the space and weight advantages of the ATC fuses with the advantage of being able to reset them if they trip out.

So in closing, when designing electrical systems today you may want to consider some of the options presented here as a means to accomplish three primary design goals:

- Save weight
- Save space
- Save money
The Know It All questions and correct answers are important design tips for students as well as other marine professionals. We suggest that you file them away for future reference.

The Question Was:
Flash Flooder is a new sloop being built at Ginormous Boatyard under your supervision. She is:

48 ft. LOA
13.3 ft. Beam
4’-5” Freeboard at midships

Flash Flooder’s Cockpit is:
8.25 ft. long
6.5 ft. wide
29 in. high

The bottom of the cockpit sole is 13 in. above the waterline

This is a full well-type cockpit with cockpit side walls the same height all around. The crew has to step up on deck to go to companionway door to the cabin, so there is no sill.

The drawings detail two cockpit scupper drains. Each has a 90-degree elbow and a screen to keep things from falling into them through the cockpit and causing clogs. Each is 1-1/2-in. diameter.

Are these scuppers adequate under current ABYC standards?

The Winners Are:
Naval architect and marine engineer Alan Gilbert and NAMS certified marine surveyor Shawn Barntett both submitted the correct answer. Clearly, Gilbert and Barntett are each too smart for their own good. In recognition of their unalloyed brainpower, erudition, gumption, and sagacity, we have no choice but to honor them with the august title of “Know It All.” Each of our winners should henceforth be addressed only as “Mr. Know It All.” Gilbert, in fact, is now a three-time winner and—like all three-time winners—can properly be addressed as, “Mr. Know It All Know It All Know It All,” or—in the interest of brevity—as “Mr. Know It All³.” Naturally, Know It All certificates, Westlawn T-shirts, and caps are on their way to our distinguished winners.

And the Solution Is:
The answer is no, these scuppers are not sufficiently large to meet ABYC standards. The relevant standard is ABYC H-4, Cockpit Drainage Systems. Working through this, we find:

The minimum cockpit height above the waterline is 3 inches (76 mm) or
48 ft. LOA x 0.22 = 10.56 in. above the waterline. The cockpit is 13 in. above the waterline and so meets this requirement.

The cockpit volume is:
8.25 ft. x 6.5 ft. x 2.417 ft. = 129.61 cu.ft.

The hull volume is:
48 ft. x 13.3 ft. x 4.417 ft. = 2,819.8 cu.ft.

The ratio of cockpit volume to hull volume is:
129.61 cu.ft. ÷ 2,819.8 cu.ft. = 0.0459

Minimum time to drain is:
Min. time to drain = 23.385 ÷ (Cockpit/Hull Ratio)¹.⁰²⁶⁶

23.385 ÷ 0.0459¹.⁰²⁶⁶ = 552.99 sec.
Minimum flow rate is:
Min. flow rate, cu.ft./min. = 45 x Cockpit Vol., cu.ft. ÷ Min. Time to Drain, sec.

45 x 129.61 cu.ft. ÷ 552.99 sec. = 10.55 cu.ft./min.

Minimum drain area, sq.in. is:
Min. drain area, sq.in. = (Min. Flow Rate, cu.ft./min. – 0.0009) ÷ 2.3634

(10.55 cu.ft./min. + 0.0009) ÷ 2.3634 = 4.46 sq.in.

*Flash Flooder’s* two 1-1/2-in. diameter scuppers are not large enough. Their cross section area is just 1.76 sq.in. each or 3.52 sq.in. total. This is less than the 4.46 sq.in. required. It also doesn’t account for the flow restrictions due to the screens and 90-degree bend.

The minimum scuppers required could be met by the following:

We now have to refer to ABYC standard H-4 table AP 4.4.1, Flow Reduction Factors to adjust for the flow restrictions caused by the combined 90-degree bends and screens.

Let’s try two 2-in. diameter scupper drains (each with a 90-degree elbow and screen).

The area of a 2-in. circle is:

\[ \pi (2 \text{ in.} ÷ 2)^2 = 3.14 \text{ sq.in.} \]

We see from the table that we need to increase the area by 1.4 times for a 2-in. drain, therefore:

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Like all standards, this is a minimum. I recommend exceeding the minimum standard by a generous margin. I would use either a pair of 2-1/2-in. dia. scuppers, or three 2-in., or perhaps, four 1-1/2-in.
Who Will Be The December 2012 Know It All Winner?
Email your answer to: nnudelman@westlawn.edu

Want to see how much you know? Want to show everyone else how much you know? The first three people to submit the correct answer to the following question will win a Westlawn tee shirt and cap, and will also receive a Know It All certificate. The answer and winners to be published in the next issue of The Masthead.

The owner of Hooked and Cooked, a 48-foot diesel sportfisherman, has asked you to determine the boat’s weight and the fore-n-aft location of its center of gravity. Making sure that Hooked and Cooked is level and on a rugged cradle, you've brought in a pair of hydraulic jacks. Each jack has a cylinder area of 4.9 square inches. Lifting the aft end of the cradle with the pair of jacks, you get a pressure on each of the jacks of 2,590 psi. Lowering the aft end and then lifting the forward end of the cradle, you get a pressure on each jack of 1,570 psi. You've measured the distance to the center of the jacks at each lift and have carefully marked these distances to the bottom lower corner of the transom on the sketch you've made of the boat and cradle (above). You have also weighed the cradle separately and found it was 2,428 pounds.

What does Hooked and Cooked weigh and where is her longitudinal center of gravity (LCG) located?

See and Hear Dave Gerr’s Interview with Mad Mariner Magazine

Mad Mariner, the online daily boating magazine, interviewed Westlawn director Dave Gerr on July 20, 2010. In this wide-ranging, half-hour radio show, Gerr discusses almost all aspects of Westlawn, including history, operation, student and alumni successes, costs, and more. Click on the links below to listen to the full interview and watch the accompanying slide show of over a hundred boats designed by Westlawn alumni.

Click Here to watch on Windows PC
Click Here to watch on Macintosh
Regarding ABYC Tech Notes, in the September 2012 issue, Design with Serviceability in Mind, John Nystrom wrote:

Mr. Sherman,
I am a Masthead subscriber. I don't work in the industry, and am presently only hopeful that I can become a Westlawn student in the future. I do, however, have a very long and varied resume. My background was originally in aviation and the electronics industries. Being in aviation spoiled me to some extent, as serviceability and service and inspection access was literally a life and death matter. When I got into the electronics world all that changed. I worked in the field in the 70s and early 80s with electronic test equipment that was so sophisticated and expensive that I was required to troubleshoot and repair, right down to the smallest components of a device. Unfortunately, the people who designed and engineered the equipment had never had to work a day in their lives servicing or repairing their equipment. The results were that it might be necessary to spend days totally disassembling an instrument to replace a five cent electrical component, and then re-assemble it, just to test it and see if that was all that was wrong. These days a large proportion of electronics are just thrown away, rather than repaired, or at the most, a circuit board is replaced rather than discover precisely what component on the board failed.

My boating has been confined, so far, to simple daysailing or canoeing, (with no systems at all to think about), or working with the Coast Guard Auxiliary on other people's boats. Even with my limited boating experience, I think that the consideration of service and inspection access is, like in the case of an airplane, an issue that does affect safety. How many people have we lost because something failed because it was overlooked or inaccessible? It should be addressed.

John Nystrom
Peru, IN (though presently Afghanistan)

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tained in TABLE AP 4.4.1, in Paragraph AP 4.3, Step 4. Especially since I would opine, the problem presented is intended to, in great measure, test its' proper interpretation and use.

Having said the above, and as I am attaching my submission for this Know It all Contest (see attached Excel file), if any of the above six points are erroneous I would appreciate hearing from you. I am always receptive to reducing my level of ignorance.

In closing, this is the third one of these contests I have taken part in. For whatever reason, I found the davit one to be the most thoughtful for the less experienced, perhaps because one had to think about the physics of the situation, rather than rely on a "cookbook" application for the solution. At any rate, in the same spirit, I thought a problem dealing with the sizing of a wheel/chain/cable/quadrant steering system might be of interest to your readers.

Alan Gilbert
Yacht Design/Naval Architecture Services

Dave Gerr's reply:

Alan:

Your notes about suggested improvements to ABYC Standard H-4 echo some of my own thoughts. I suspect the reason for these minor omissions and occasionally awkward presentations are due to the harmonization with ISO, specifically ISO 11812. In fact, ABYC’s PTC basically rewrote H-4 for this purpose in 2008. Though harmonization with ISO is important, the process isn’t always smooth and some of the issues you note are the result. I believe H-4 will be improved further with the next revision, which should be this coming year (2013) as the standard review process is every five years.

Specifically, you note:

1) The X axis (abscissa) is labeled CP. You are right that this stands for cockpit and that this abbreviation should be explicitly defined in the standard.

2) The R value on the charts is actually the $R^2$ value. It is the root mean squared of the curve fit and indicates the degree of fit to the original data. In my opinion—once the committee has completed the review and acceptance of the data—there’s no need to include this or the original data points. And the root-mean-squared value can be omitted. If it’s retained, then it should be explicitly defined.

   I agree that the equation should be restated for clarity using T for time (the Y value) and CP for cockpit (the X value).

3) Again, I agree it would be clearer if the instructions for step 3 of AP 3.2 read "Time to Drain 75%.

4) Yes, it would be better of the equation was transposed for direct solution, and (as with other formulas) the formula should have the variables X and Y replaced with, say, FL for flow rate and DA for drain area. The transposed and rewritten formula would then read:

   DA = (FR + 0.0009)/2.3634

   Where:
   DA = Drain area, sq.in.
   FR = Flow rate, cu.ft./min.

   I would add that the constant 0.0009, could be dropped. It is so small that it will not significantly change the results. Then the formula could be simply:

   DA = FR/2.3634

   Going a step further: Four decimal places aren't needed and the formula could be simpler still as:

   DA = FR/2.363

4 & 5) Yes, the factor in question accounts for the reduction in flow rate due to the type of fitting. It should and could be more clearly stated.

All the above are well worth doing to improve the ease and accuracy of use of the standard. It’s important to note, however, that the standard itself gives accurate results, even if portions of it could be stated more clearly.

I’m passing along our email conversation on this to the ABYC tech department.

Glad you’ve enjoyed the Know It All questions. Great suggestion about a wheel-steering system question. Stay tuned . . .

Cheers,
Dave
It was a restless night in 1929, and Captain Joel Vansant lay sleepless due to one haunting problem. What was to become of his new son Jimmy and daughter Aleta, moreover what would happen to the rest of the kids growing up in our gangster-ridden neighborhood, in Bungalow Park in Atlantic City. At the height of prohibition, it was a teeming cesspool of rumrunners, gangsters and gunslingers. What about John Martin’s boys, Jimmy and Johnny? Things looked bleak also for Russell Post, the Russo brothers, Bert Wescoat’s grandsons, and the yet unborn. Time would reveal their fates.

Captain Joel Vansant wrote many articles for boating magazines under the pen name of Abel Brown. Several nights later he gathered a group of neighborhood captains, boat builders, and engine men, including my father and his head designer, boat builder Harry Andrews. He showed them an eleven-foot, scow-type sailboat he was building, the Jumping Juniper. He explained to them his dream that perhaps they could put their heads together and come up with a set of rules for designing a development-class racing sailboat, which they did.

The founders decided to encourage creativity by making the Moth a development class. Primary rules were: maximum length 11’-0”; one rudder; one centerboard; maximum limits on luff, foot, leach, and headboard of the sail. There were to be no weight, beam, or construction limitations. Every summertime Wednesday night the entire neighborhood came together to watch the races.

Russell Post, the Russo brothers, Bert Wescoat’s grandsons, and the yet unborn. Time would reveal their fates.

The Evening Star Yacht Club - The club held 30 Moth Boats on dollies, which were rolled out of the club house and down the ramp to a float where they were rigged and launched.
out to the club to sit on the bleachers, watch the races, and root for their favorites.

Captain Joel Vansant's plan worked. None of the kids he worried about became gangsters. Russell Post founded the Egg Harbor Boat Company, and later Post Marine. The Wescoat boys ran the Tug Boat and Pile driving business. All the Kammerman kids were very successful. Jack Leek became president of Pacemaker Sea Skiffs, and later Ocean Yachts. Davey Martin became a yacht designer. Al Russo and his brother Bob headed the development crew at Pacemaker. The Moth class grew like wildfire all over the world. Terry Watson, a British Moth builder and racer, got a job with Russell Post and became part owner of Ocean Yachts. Bobby Trexler became a wonderful artist who went into his own commercial art business and did fantastic renderings of my designs. Johnny Keating ran his own brick laying and masonry business. Jay Coyle read my first book, quit his nice secure Post Office job to study Yacht design at Westlawn and became a fantastic draftsman and Yacht designer, and is now at large editor for Yachting. Warren Bailey raced his Moth in the 1948 World's Championship at our club, and ended up in charge of tooling for Bertram. All this happened because Captain Joel Vansant couldn’t sleep one night in 1929.

Last week I emailed the first two pages of this story to my old friend Jay Coyle, at
Yachting magazine. He was thinking of a Yachting article on boats for kids, and he asked me for some input on the subject, so here it is:

Every morning Johnny Keating 84, and I 82, have breakfast together. Both of us grew up near the Evening Star Yacht Club, and both of us raced Moth boats. Johnny thinks that the Optimist Pram is the greatest thing that ever happened. He is very active in the yacht club’s large Optimist fleet.

No doubt about it, The Opti is a wonderful boat, but I said, “You rarely see any kid sailing one unless there is a race and they have a very large spectator group of parents and grandparents watching them. Nobody goes fishing, rowing or just plain day sailing in them. After the race is over the parents whisk the kids off to soccer, Little League, day camp, or the beach. After labor day, it is all over.” I continued, “I think a good kid’s boat would be an Optimist Pram design blown up to just under 11 feet so it fits the Moth Class rule for classic Moth Boats.”

Johnny replied, “That’s right Dave, You don’t have to start a new class, and the builders can design any shape they want just so it’s under 11 feet long and 5 feet wide. It could even be a flat bottom easy to build scow, like the Duster,”

“Yep,” I said. “The Optimist has no side deck but I would like to see about a 4-inch side deck so she could heel a bit further without flooding. She should have oarlocks and oars and a transom that would hold a 2-horsepower outboard, she should be light enough so she could be put on car top carriers. Foam flotation is a must. She should be comfortable enough so a father and a couple of kids could go fishing in her.”

Johnny responded, “All you gotta’ do is put a Moth Boat sail on it and race under the Classic Moth rule.”

Westlawn graduate David Martin has spent a lifetime designing all types of boats. His books, Martin’s Yarns and the Book of Dave Martin Designs are available on CD from Amazon.com.

CLICK HERE to purchase Martin’s Yarns on CD, from Amazon.com.

CLICK HERE to purchase the Book of Dave Martin Designs on CD, from Amazon.com.

CLICK HERE to read the Classic Moth Class rules.
Boat Recovery Gets More Complex with Damage from Sandy

According to details posted in the November 19 on-line issue of Soundings Trade Only Today, boat owners are always responsible for removing their vessels from the property of others. There seems to be much confusion surrounding the topic because it’s not usually a problem, but BoatUS spokesman Scott Croft also stated in The Daily Record in New Jersey that this was the case.

It gets more complicated if the boat has damaged the property, as was occurred in many instances during Hurricane Sandy.

Eric Stenson, a spokesman for the New Jersey Manufacturers Insurance Co., which does not provide watercraft coverage, said the answer varies. If the boat is in someone else’s yard and hasn’t touched the house, it’s the sole responsibility of the boat owner.

There are varying possibilities if a boat hits a home. If it were brought into a house by Sandy’s storm surge, it’s excluded from homeowners’ insurance policies. They must have flood coverage to help mitigate the cost.

If it’s brought into the home by wind, the homeowner’s policy does apply. Either way, he recommends contacting the boat owner, whose insurance policy could provide assistance.

Croft also said property owners should try to contact the vessel’s owner. Boat owners with insurance should contact their agents to figure out a removal plan to avoid inflicting damage to private property.

Property owners typically can track down the owner of a boat by finding the identification number on the hull and contacting the state Motor Vehicle Commission or by going to the Coast Guard’s website at: http://cgmix.uscg.milPSIXSearch.aspx

Excerpts From the “Survey of Published Data and Reports on Blended Fuels in Marine Applications.”

Forward
1/12/2012
“I am pleased to present the following report, “Survey of Published Data and Reports on Blended Fuels in Marine Applications” which has been prepared by the United States Coast Guard.
Sincerely
R.J. Papp, Jr.
Admiral, U.S. Coast Guard
Commandant

Executive Summary
Section 620 of the Coast Guard Authorization Act of 2010 (P.L. 111-281) directs the Secretary of Homeland Security, acting through the Commandant of the Coast Guard, to submit a survey of published data and reports pertaining to the use, safety, and performance of blended fuels in marine applications not later than 180 days after the enactment of the Act.

To the extent possible, the survey shall include data and reports on: (A) the impact of blended fuel on the operation, durability, and performance of recreational and commercial marine engines, vessels, and marine engine and vessel components and associated equipment; (B) the safety impacts of blended fuels on consumers who own and operate recreational and commercial marine engines and marine engine components and associated equipment; and (C) fires and explosions on board vessels propelled by engines using blended fuels.

An internet search using the search words “ethanol in marine applications” produces almost 100,000 results. A survey of the very large volume of articles regarding this issue was conducted by the Coast Guard to provide the members of Congress with the information that is currently available on the effects of ethanol as a gasoline additive on the marine industry and boat owners and operators. A representative sampling of the various types of documents that have been published was used in preparing this report.

Although many studies using scientifically proven procedures have been conducted on the blending of various levels of ethanol as a gasoline additive in automobiles, there have been few such studies conducted on marine engine and fuel systems, and the test procedures were very limited. The Environmental Protection Agency (EPA) has recognized this in both an initial waiver granted to allow up to 15 percent ethanol blending in cars and light trucks built since 2007, and a follow-on waiver to allow up to 5 percent ethanol blending in cars and light trucks built between 2001 and 2006.

Both waivers exempted boat engines because, as stated in the waivers, current testing data do not support such a waiver.

The limited testing of ethanol

Continued on Next Page
blending that has been performed on marine engines has raised some environmental, performance, and safety issues that have yet to be resolved and are of concern to the Coast Guard. In the Coast Guard’s submittal of comments to the docket of the EPA, “Notice of Receipt of a Clean Air Act Waiver Application to Increase the Allowable Ethanol Content of Gasoline to 15 Percent” (74 Federal Register 18,228 of April 21, 2009), the Coast Guard concluded:

“Only after a comprehensive study, including accelerated aging tests, is complete, will sufficient data be available to determine whether or not specific ethanol fuel blends pose an increased risk of injury to the boating public.”

Few such studies conducted on marine engines and fuel systems, and the test procedures were very limited. The environmental Protection Agency (EPA) has recognized this in both an initial waiver granted to allow up to 15 percent ethanol blending in cars and light trucks built since 2007, and a follow-on waiver to allow up to 15 percent ethanol blending in cars and light trucks built between 2001 and 2006. Both waivers exempted boat engines because, as stated in the waivers, current testing data do not support such a waiver.

Background
The limited testing of ethanol blending that has been performed on marine engines has raised environmental, performance, and safety issues that have yet to be resolved and are of concern to the Coast Guard. In the Coast Guard’s submittal of comments to the docket of the EPA, “Notice of Receipt of a Clean Air Act Waiver Application to Increase the Allowable Ethanol Content of Gasoline to 15 Percent” (74 Federal Register 18,228 of April 21, 2009), the Coast Guard concluded: “Only after a comprehensive study, including accelerated aging tests, is complete, will sufficient data be available to determine whether or not specific ethanol fuel blends pose an increased risk of injury to the boating public.”

The phasing-out of the use of Methyl Tertiary Butyl Ether (MTBE) as an oxygenate gasoline fuel additive began in 2000 due to environmental concerns regarding incidents of ground water contamination. This phase-out opened the door for alternative oxygenate fuel additives such as ethanol. The passage of the Energy Policy Act of 2005, which repealed the Clean Air Act requirement to use MTBE or other oxygenates as fuel additives, resulted in ethanol becoming the gasoline fuel additive of choice. A gasoline blend of ten percent ethanol (E10) had long been approved by the EPA through a 1978 waiver to the Clean Air Act.

The transition from MTBE blended gasoline to E10 blended gasoline was relatively seamless for many gasoline users. Few problems arose from the widespread use of E10 in automobiles. Such was not the case, however, for the boating community. Upon the introduction of E10 to the boating community, some vintage boats experienced problems with ethanol-blended fuels resulting in catastrophic damage. These instances almost exclusively involved the installation of fiberglass fuel tanks in boat models older than 1981. Other problems involving fuel system clogging, leaking gaskets, rough engine performance, and engine stalling were attributed to the use of E10.

There have only been a few tests performed on marine engines using E10 and higher ethanol blended fuels, and the test parameters were very narrow in scope and did not include testing of the entire fuel system as well as the engines. Testing did not include normal usage over an extended period of time. There is a much larger percentage of ten-year and older boats and marine engines in use than automobiles. Boats, especially fiberglass boats, can easily be in service for thirty years or more.

To date, there has not been enough research and testing of the use of ethanol blended fuels on marine engines and marine fuel systems and the impact of these fuels on the marine community. A much more comprehensive study of ethanol blended fuel use in boat fuel systems is necessary to determine the effect of ethanol blended fuels on the operation, durability, performance and safety of marine engines and marine fuel systems.

Conclusion
Although much information has been published regarding “ethanol in marine applications,” only a few studies with any scientific rigidity have been conducted to date. The four studies have mixed results, but raise concerns regarding the use of ethanol in marine engines leading to the conclusion that more testing is necessary. Because tests were performed on new engines, they did not resolve concerns regarding the legacy fleet of older boats.
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<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Class</th>
<th>City, State</th>
</tr>
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<tr>
<td>12/4/2012</td>
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<td>MS400-Marine Systems Certification,</td>
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<td>1/08/2013</td>
<td>1/11/2013</td>
<td>ELC200 Introduction to Basic Electric and Corrosion Protection,</td>
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<td>2/7/2013</td>
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26-27 February 2013, Singapore
Call for Papers Open

**Surv 8 - Surveillance, Search and Rescue Craft**
20 - 21 March 2013, Poole, UK
Call for Papers Open

For a complete listing, description, & Registration of upcoming RINA events, go to: [http://www.rina.org.uk/events_programme](http://www.rina.org.uk/events_programme)

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**Memorial**
Britton Chance Jr., Dead at 72.

Britton Chance Jr., the innovative designer of three Americas Cup winners, died on October 12 in Branford CT. Mr. Chance was born in Philadelphia and grew up in Mantoloking New Jersey on Barnegat Bay. As a youngster, boats and sailing became an important part of his life.

Later he studied math and related sciences at the University of Rochester and Columbia University in New York City, and went on to work at the Stevens Institute towing tank, and later in the design offices of Ray Hunt and Ted Hood. He also taught classes in naval architecture and engineering at Yale, Wesleyan, and Trinity. In 1962 he established Chance & Company, a naval architecture firm in Essex Connecticut.

His design portfolio ranged from racing shells to multihulls to offshore racers as well as meter and Americas Cup boats. He was well known for his willingness to experiment in the search for speed, and because of this he was one of the most important marine designer innovators of the 1970's and 80's. He was the lead designer of *Stars and Stripes*. This was the racer, captained by Dennis Conner, that reclaimed the America's Cup for the U.S. from the Australian defender in 1987.
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Our Mission

Founded in 1930, the mission of the Westlawn Institute of Marine Technology is threefold:

- To provide our students with the skills and knowledge required to build a rewarding career in the profession of yacht and small-craft naval architecture via distance learning.
- To support continued growth of the recreational and small-craft marine community through the development of well-trained, safety-oriented, boat designers developing better products for the benefit of the boating public.
- To provide continuing education to marine-industry professionals.